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Guest Editorial

Preparing for the ADA Title II Clarification: A Call to Cultural Change in Virtual Reference

Thomas Gerrish and Katie Gibson*

In April 2026, the Department of Justice's clarification of Title II of the Americans with Disabilities Act (ADA) will take effect, defining accessibility requirements for the web and mobile services of public institutions, including academic libraries (U.S. Department of Justice, 2024). These updates formalize expectations that library websites, chat services, and other digital platforms meet Web Content Accessibility Guidelines (WCAG) 2.1 AA standards (World Wide Web Consortium, 2025), which is a necessary threshold many academic libraries have yet to reach. As the deadline approaches, conversations among our colleagues have increasingly centered on the urgency of compliance. However, as librarians with expertise in accessibility, we contend that the pressing problem that comes with these requirements is not timelines or technical remediation—the deeper issue is cultural. We encourage libraries to move away from approaching accessibility as a reactive process by responding to audits, complaints, and deadlines; rather we encourage colleagues to embed it as a proactive, ongoing value in our work.

Accessibility is not a separate compliance task; it is a core component of service design, user experience, and digital stewardship. Drawing on our complementary experience in online reference and accessibility, we approach these changes with the goal of providing accessible reference services that meet the needs of all our users. Because virtual reference sits at the intersection of human interaction and technology, it is an ideal place to begin promoting a culture of accessibility in academic libraries. In our experience, waiting until issues arise requires more time and labor to remediate documents, provide accessible databases, etc., than it would if accessibility had been considered from the start. More importantly, it limits who can fully participate in academic life. We contend that a proactive culture requires intentional planning, distributed responsibility, and leadership that prioritizes inclusion and accessibility in every decision about library systems and services.

We argue that this moment offers libraries an opportunity to move beyond compliance by moving toward cultural transformation. The approaching deadline should not be seen just as a mandate to meet but as the impetus for reimagining how accessibility is integrated into daily practice within academic libraries. Building a proactive culture means that accessibility is not just the work of designated specialists or coordinators: it is everyone's job. As one of the most visible digital touchpoints of the library, virtual reference can lead the way.

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By starting here, libraries can then work toward embedding accessibility into other design processes, training, and evaluation cycles to become more inclusive while also ensuring that our services reflect our values as library professionals.

What Is the ADA Title II Update?

In 2024, the U.S. Department of Justice issued an update to Title II of the ADA, extending accessibility requirements to all digital services offered by state and local governments, including public colleges and universities. The ruling mandates that online platforms—such as virtual reference tools, research databases, and instructional media—meet WCAG 2.1 AA standards by April 1, 2026, for institutions serving populations of 50,000 or more, and by 2027 for smaller entities (U.S. Department of Justice, Civil Rights Division, 2024). The populations are defined by broad census areas rather than just the university community. These requirements apply equally to third-party and licensed content, underscoring that accessibility is a shared institutional and social responsibility.

Why Virtual Reference Belongs in the Accessibility Conversation

Virtual reference is an access service. It extends the library's expertise to users wherever they are—on campus, at home, or around the world. As our teaching and research environments have become increasingly hybrid, the virtual reference desk has become the “front door” of the library. However, that front door is not equally open to all.

Research continues to reveal barriers faced by users with disabilities when interacting with digital library services. Ferrara (2024) notes that inaccessible platforms perpetuate systemic inequities in academic life, affecting students' ability to complete coursework or fully participate in their institutions. Studies of library websites show persistent accessibility failures. Liu et al. (2024) found that 80% of the top 100 U.S. university library websites contained WCAG 2.0 AA-level errors, while Yang et al. (2020) observed similar shortcomings among Ivy League institutions.

Barriers impact not only users with disabilities but all users. Chow and Croxton (2014) similarly linked patron satisfaction with virtual reference to the overall usability of the library's website. Mulliken (2019) found that visually impaired patrons using screen readers required substantially more time to learn library interfaces, disrupting research workflows and diminishing the perceived usability of library services. Thus, accessibility is not an isolated concern but a dimension of user experience itself.

When accessibility is neglected, the impact is systemic as users with disabilities may be excluded outright and all users may experience friction. Conversely, when accessibility is integrated into virtual reference from the start, everyone wins. As Vesco (2024) observes, “when we design and provide accessible products, everyone benefits.” Users gain flexibility and choice, and libraries save time and resources by avoiding costly retrofits later.

From Reactive Compliance to Proactive Culture

Accessibility in libraries has often been treated as a technical or legal issue, separate from service design or user experience. The ADA Title II update should compel academic librarians to rethink that division. Accessibility and usability are not separate tracks; they are mutually reinforcing dimensions of inclusive design (Schmutz et al., 2017).

Creating accessible virtual reference services requires a shift from reactive remediation to proactive cultural integration. Accessibility cannot rest solely with the web developer nor

the accessibility coordinator. It must be distributed across the organization into everyday decisions about platforms, content, staffing, and training. Thus, we propose four strategies for building sustainable accessibility in virtual reference services. We provide links to resources for more information in Appendix A. Additionally, based on these points, we also created an annual checklist/workflow in Appendix B.

Test Regularly and Routinely

Accessibility testing should not be a one-time compliance task. Libraries can begin with basic automated tools, such as WAVE or Axe, to identify common WCAG violations; however, automated reports are only a starting point. Full accessibility evaluation must include usability testing by people with disabilities, ideally drawn from the institution's student and staff communities (Ghosh & Dubey, 2025; Øksnebjerg et al., 2019; Valencia et al., 2021).

Partnerships with campus accessibility or disability resource offices can make this feasible. Likewise, an in-house accessibility librarian also improves a library's chances of success. If this is not an option, task an existing staff member, or a working group with these responsibilities. If full testing cycles are not possible each year, a rotating schedule can ensure coverage of key services. Testing should mirror real information-seeking behavior by asking participants to complete tasks that range from finding a database article to booking a reference appointment. Regular testing not only improves compliance but normalizes accessibility as part of the library's operational rhythm, which shows that inclusion is ongoing work and not a project to be completed and forgotten.

Procurement with Accessibility in Mind

Many academic libraries rely on vendor-provided virtual reference software such as LibChat, LibraryH3lp, or third-party chatbots and widgets. Under the ADA clarification, these tools must also meet accessibility standards. Libraries should integrate accessibility criteria into procurement and licensing workflows. They should also obtain a current Voluntary Product Accessibility Template (VPAT) and conduct independent verification using the tools mentioned above when possible (Hines, 2012). The VPAT is a disclosure voluntarily filled out by the vendor and indicates to which level their product is accessible. Because they are completed by vendors or updated with every interface update, it's important to check their accuracy.

The Library Accessibility Alliance, a partnership between the Big 10 Academic Alliance and other regional consortia, has led the way in sharing accessibility resources. They provide sample contract language and vendor accessibility evaluations to assist in this process. Oud (2011) cautions that technical compliance does not guarantee usability; even an "accessible" product may pose barriers in real contexts. Procurement policies should therefore include both compliance review and user testing to ensure that chosen platforms truly work for the library's community. Proactive accessibility training for staff overseeing procurement can help identify accessibility problems before they become major issues.

Train and Empower Staff

Accessibility must be part of every staff member's skill set, not confined to one department or a designated accessibility librarian. Many accessibility issues arise simply because staff are unaware of them (Oud, 2011). Training programs can begin with basic instruction in WCAG principles and progress to advanced workshops on accessible content creation. Training should cultivate empathy, foster accountability, and include the real-world impacts of design

choices on disabled users. For virtual reference, this training could include best practices for interacting with patrons and providing online information. This could mean providing additional time for visually impaired students to interact with the database link you have sent them; using shorter, more easily understood sentences; or providing screenshots with alternative text or appropriate color contrast.

Ferrara (2024) emphasizes that staff skills and confidence improve when training is tiered and the training meets employees where they are. As staff knowledge grows, they become better equipped to identify barriers in their daily work, whether editing LibGuides, responding to chat inquiries, or designing search tutorials. Accessibility goals should be embedded into professional development plans and performance evaluations, reinforcing that they are everyone's responsibility. Empowered staff not only catch accessibility issues early but also foster a culture in which inclusivity becomes a professional norm rather than a compliance burden.

Engage the Users: "Nothing for Us Without Us"

A core principle of the disability rights movement—"Nothing about us without us"—should guide library accessibility work. Libraries can only design accessible services by working in partnership with those who use them. Engaging with student disability organizations, faculty advocates, and campus accessibility offices brings critical lived experience into decision-making.

Hearing directly from users reveals barriers that automated audits or staff reviews might miss. Users may note that chat windows automatically take focus and disrupt screen-reader navigation, or that captioning lags in live-reference video sessions. These insights help libraries move beyond minimal compliance toward authentic inclusivity. Ongoing communication channels, such as accessible feedback forms, user advisory groups, or open office hours, can keep the conversation active and ensure that accessibility remains responsive to changing needs. Including the community in yearly accessibility testing can improve results while also building trust (Pionke 2017).

Sustaining the Work: Resources and Leadership

Sustained accessibility requires resources, including time, staffing, funding, and administrative will. As Ferrara (2024) reminds us, these investments are essential if accessibility work is to move beyond rhetoric. Creating "born accessible" content takes time, as does building relationships, conducting user testing, and training staff.

Leadership commitment is crucial. Administrators must recognize accessibility as core to the library's mission and allocate corresponding support. Accessibility should appear in strategic plans, budget lines, and annual goals. Library administration should internalize that accessibility is a defining service standard. At the same time, libraries can understand that accessibility investments often result in efficiency and user satisfaction. Vesco (2024) notes that designing accessibly from the start saves time, cost, and effort later. The "extra" time spent now prevents far greater time lost to retrofitting, user frustration, or legal exposure later.

Building a Culture of Accessibility

Accessibility work does not end when a library meets the April 2026 deadline. Laws, technologies, and user expectations evolve and so must academic libraries. To sustain progress, accessibility must become part of institutional culture and a shared expectation that at

the very least informs all decisions. This means embedding accessibility into the annual assessment cycle, just as libraries already schedule budget reviews or accreditation reporting. It also means treating accessibility as a form of professional ethics and upholding librarianship's core value of equity.

Removing barriers to information is a natural area of growth for the academic library. As campus information leaders, libraries have both the power and the obligation to dismantle barriers for all patrons. A culture of accessibility grows through repetition and reinforcement: regular audits, continuous training, collaborative design, and leadership advocacy. Over time, these practices move accessibility to an active choice rather than an afterthought.

Conclusion: From Regulation to Transformation

The April 2026 ADA Title II update offers libraries a powerful opportunity. Meeting WCAG 2.1 AA standards for virtual reference and digital services is non-negotiable; failure to comply risks both legal and ethical consequences. However, compliance should not be our ultimate ambition.

The real opportunity here lies in transforming how libraries think about accessibility, from a reactive technical issue to a proactive cultural value. When accessibility becomes embedded in design, procurement, training, and user engagement, the benefits reach far beyond compliance. Benefits can include smoother user experiences, reduced barriers, improved equity, and a stronger institutional reputation. A truly accessible library fosters a culture of empathy, inclusion, and shared responsibility wherein accessibility is embraced not merely as a requirement but as a reflection of core institutional values.

As librarians, we hold equity as a defining principle. Ensuring that all members of our communities—students, faculty, staff, and the public—can seek and receive information equitably is not a new mandate. This is the heart of our profession. The 2026 deadline should therefore be understood not as an endpoint but as a milestone on a longer path. By committing to continual testing, staff empowerment, inclusive design, and community partnership, libraries can fulfill both the letter and the spirit of the ADA. More importantly, we can build the kind of culture where accessibility is no longer exceptional but expected.

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APPENDIX A		
Accessibility Resources for Consideration		
Resources	Website	Description
Title II of the Americans with Disability Act	https://www.ada.gov/law-and-regs/regulations/title-ii-2010-regulations/	Full text of the updated ruling on Title II of the ADA
Web Content Accessibility Guidelines (WCAG) 2.1 Standards	https://www.w3.org/TR/WCAG21/	WCAG 2.1 standards and success criteria
Library Accessibility Alliance	https://www.libraryaccessibility.org/	A comprehensive resource that includes an accessibility toolkit, sample licensing language, accessibility testing results, and information on the ADA Title II update
The Digital Accessibility Handbook for Libraries	https://alastore.ala.org/dahdbkl	Book published by the American Library Association (ALA) with practical strategies for incorporating digital accessibility at all libraries
ALA Accessibility for all Libraries	https://www.ala.org/accessibility	A resource curated by the Accessibility Assembly at ALA that includes best practices for libraries, accessibility toolkits, information on the Title II update, and resources for building accessible online content
Librarian Groups Working in Accessibility	https://www.ala.org/accessibility/ala-accessibility-groups	Professional librarian organizations doing accessibility work
Association on Higher Education and Disability (AHEAD)	https://www.ahead.org/home	Professional organization for accessibility work in higher education. Includes resources and training opportunities.

APPENDIX B
Annual Checklist/Workflow for Virtual Reference Accessibility

1. Regular Testing of Virtual Reference Services and User Feedback

- Schedule and conduct automated accessibility testing on all virtual reference platforms with diverse users, including individuals with a range of disabilities (e.g., visual, hearing, motor, cognitive).
- Test all associated content that could potentially be linked during virtual reference interactions (e.g., research databases, LibGuides, tutorials, instructional videos). Include users in testing and platform selection when possible.
- Establish a rotating testing schedule for larger or more complex content.
- Form and maintain partnerships with campus disability services and student groups. Collect feedback from users about their experiences with virtual reference.
- Update services and interfaces based on user feedback.
- Document test results and create remediation plans to address inaccessible content.

2. Procurement and Vendor Compliance

- Conduct independent accessibility testing of vendor products, even if a Voluntary Product Accessibility Templates (VPAT) is provided.
- Include accessibility clauses in contracts with third-party vendors.
- Request, review, and archive VPATs.

3. Policy and Content Creation

- Ensure all in-house digital content follows WCAG 2.1 AA standards (“born accessible”).
- Review and update policies to reflect changes in ADA, WCAG, or state regulations.
- Maintain an accessibility policy for virtual reference services.
- Maintain documentation of accessibility training for content creators.
- Maintain updated lists of tools and resources supporting accessibility.
- Document your remediation priorities and workflows. Record all tests, remediation, and training conducted during the year.

4. Staff Training and Awareness

- Provide regular accessibility training at multiple levels (i.e., basic to advanced).
- Train staff to identify and report accessibility barriers.
- Maintain training on best practices of patron interaction for virtual reference services.
- Encourage staff to consider accessibility in all workflows.

5. Repeat and Improve

- Schedule next year’s accessibility review at the end of each cycle.
- Identify lessons learned and adjust processes for continuous improvement.
- Celebrate and recognize staff successes and contributions to accessibility initiatives.

Python for All: A Library Workshop for Bridging AI Literacy and Coding Skills

Kristen L. Scotti and Lencia McKee*

In response to a growing, cross-disciplinary demand for individuals to develop programming skills, libraries are expanding their educational offerings to provide coding support for learners from diverse backgrounds. Teaching learners how to use generative artificial intelligence (AI) chatbots to code can enhance independent learning via real-time assistance and debugging support. Here, we describe the design, delivery, and assessment of a library workshop that teaches participants to leverage AI chatbots for learning Python. Python for All: Democratizing Coding Mastery with AI Chatbot Support combines AI literacy with practical coding skills to empower participants to use AI tools effectively and ethically. Workshop materials are available as open educational resources to support the democratization of coding education.

Introduction

The development and integration of generative artificial intelligence (GenAI) into education is reshaping the field (Lund et al., 2023; Walter, 2024). GenAI chatbots can personalize learning and offer real-time, iterative learning support (Ayala, 2023; Kasneci et al., 2023; Wu & Yu, 2023). However, GenAI integration also poses challenges; educators must manage increased risks of academic dishonesty (Hoq et al., 2024; Teel et al., 2023), address the potential for over-reliance on GenAI (Hoq et al., 2024), and tackle ethical concerns around data privacy and algorithmic bias (Ellis et al., 2024; Lund et al., 2023). These challenges are not entirely new. Since the 1950s, artificial intelligence (AI) has steadily integrated into education, evolving from computer-assisted instructional systems in the 1960s (Carbonell, 1980; Gable & Page, 1980), to intelligent tutoring systems in the 1970s (Anderson et al., 1995), and into dialogue-based tutoring systems (N. Kim et al., 1989), as well as exploratory learning environments (Hsu et al., 1993) in subsequent decades. Computers, the internet, and online learning brought similar challenges, requiring new pedagogical approaches and critical discussions about equitable access and privacy. Our need to balance innovation with ethics, access, and sustainability will continue as our educational practices and environments continue evolving.

The rapid integration of GenAI into educational settings makes AI literacy — that is, understanding, effectively using, and critically evaluating the impacts of AI technologies — imperative

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(Long & Magerko, 2020; Ng et al., 2021). AI literacy is intrinsically linked with information literacy (Bridges et al., 2024; James & Filgo, 2023), a foundational library service that teaches students how to identify, locate, evaluate, and use information effectively (Mackey & Jacobson, 2011). Libraries have consistently and repeatedly adapted to new technologies and consequent shifts in modes and practices of information sharing and have helped students to develop skills for engaging with information effectively and ethically (Walter, 2024). With the growing demand for programming skills and their increasing importance in understanding and leveraging AI technologies (Bridges et al., 2024), libraries have become increasingly responsible for providing coding education (Kang & Sinn, 2024; Martin, 2017). By integrating information literacy, AI literacy, and coding workshops, libraries can offer comprehensive educational programs that empower individuals to navigate this landscape more effectively, fostering a more informed and capable academic community.

This paper describes the design, implementation, and evaluation of Python for All: Democratizing Coding Mastery with AI Chatbot Support, a workshop offered by Carnegie Mellon University Libraries. This workshop blends hands-on exercises, guided learning, and group discussions to assist participants in developing both foundational programming skills and AI literacy. With this work, we aim to provide practical insights for educators and contribute to ongoing discussions about effective integration of AI tools in education.

Literature Review

Utilizing generative AI chatbots for teaching programming brings advantages and challenges. Artificial intelligence tools offer the potential to create more inclusive learning environments by providing instant feedback and better accommodating diverse educational needs and learning styles (relative to more traditional learning pedagogies) (Ayala, 2023). Multiple studies show that AI can enhance educational outcomes (Shen et al., 2024; Y.-C. Tsai, 2023; Zheng, 2023). Indeed, incorporating AI into programming instruction has been shown to increase student confidence and reduce anxiety (Becker et al., 2023; N. W. Kim et al., 2024; M.-L. Tsai et al., 2023; Y.-C. Tsai, 2023), a common impediment to learning how to code (Charles & Gwilliam, 2023; Demir, 2022; Özmen & Altun, 2014). However, studies have also shown negative impacts of AI integration. For example, an over-reliance on AI tools may impair students' problem-solving skill development (Ellis et al., 2024; Hoq et al., 2024; Joshi et al., 2024). Studies also highlight the limitations of AI tools. Haindl and Weinberger (2024) found that ChatGPT struggles with complex reasoning and code adjustments; their work emphasizes the need for human oversight and critical evaluation. Generative AI chatbots also have a tendency to confidently generate incorrect information (referred to as "hallucinations" or "fabrications") (Ahmad et al., 2023; Walters & Wilder, 2023). Good prompt engineering (the process of crafting effective prompts that generate desired results and mitigate AI inaccuracies and bias) is essential for maximizing the benefits of using GenAI for code generation (Denny et al., 2023; Ma et al., n.d.; Prather et al., 2024). Overall, studies underscore the importance of using AI as a complementary tool rather than a replacement for traditional learning methods.

Studies investigating the integration of GenAI chatbots into general programming education to teach programming skills are well-documented in the literature (Haindl & Weinberger, 2024; Hartley et al., 2024; Joshi et al., 2024; Ma et al., n.d.; T. Wang et al., 2024). However, we were unable to locate similar reports within the library and information science literature. Libraries recognize the importance of AI literacy, with literature in the field emphasizing the

need to teach students how to engage with AI tools responsibly (Cox & Tzoc, 2023; *IFLA Statement on Libraries and Artificial Intelligence*, n.d.; Lo, 2023a; Polverini & Gregorcic, 2024; Walter, 2024). Related case reports describe efforts by libraries to build AI literacy by teaching about AI tools and providing infrastructure to support their use (B. Kim, 2019; Michalak, 2024). Teaching with large language models (LLMs), such as ChatGPT (Johnson et al., 2024; Torres, 2024), the implementation of professional development programs for librarians to enhance their AI literacy skills (Lo, 2024), and using ChatGPT to develop educational resources (Cox & Tzoc, 2023) have also been documented. Despite these reports, empirical studies that investigate the impact of AI in library pedagogy are limited. In a study carried out in early 2024, Torres explored how GenAI models have been incorporated within library pedagogy and found that most of the published studies are conceptual. At the time of this writing, few empirical evaluations exist, which highlights a significant gap in understanding how GenAI tools, including chatbots, might be gainfully employed within library-facilitated coding workshops (wherein participants often represent more diverse programming backgrounds relative to students enrolled in computer science courses).

Workshop Description

The Python for All: Democratizing Coding Mastery with AI Chatbot Support workshop is aligned strategically with Carnegie Mellon University (CMU) libraries' commitment to fostering AI literacy (Bongiovanni et al., 2024; Slayton, 2025), and supporting open science initiatives (H. Wang et al., 2022). The libraries offer a diverse selection of workshops (CMU Libraries, 2024), including those that address fundamental programming skills, open science practices, and research data management. Within this landscape, the Python for All workshop targets individuals with some, but minimal coding knowledge, and aims to equip participants with the foundational skills needed to learn independently through GenAI chatbots, fostering self-reliance and adaptability in their programming journey. Thus, the focus on syntax is limited as this is addressed directly in other library workshops.

Over a two-hour virtual session, participants become familiar with AI concepts and vocabulary, use AI chatbots to generate code, and practice troubleshooting corresponding errors. To build participants' skills in assessing the accuracy and reliability of AI-generated code, we place a strong emphasis on critically evaluating the generated code. The workshop learning objectives are aimed at developing both technical and critical thinking skills:

- *AI Fundamentals*: Remember and understand key concepts and terminology related to GenAI by defining and describing them.
- *Practical Application*: Apply GenAI as a programming assistant to enhance coding efficiency and diagnose coding errors; demonstrate increased confidence in using GenAI tools by integrating GenAI to complete coding exercises.
- *Critical Evaluation*: Evaluate the accuracy, reliability, and usefulness of AI-generated code and solutions in coding projects.
- *Ethical and Practical Evaluation*: Analyze the ethical implications of generative AI, including its strengths, weaknesses, biases, and limitations.
- *Adaptability and Continuous Learning*: Create strategies to continuously adapt and respond to advancements in AI technologies, developing new skills to stay current.

Workshop materials are provided as open educational resources (OER; <https://osf.io/2xz7u/>), including introductory slides and student and instructor Jupyter notebooks. The

instructor notebook includes detailed notes for each exercise, covering learning objectives, teaching methods, and worked solutions. For teaching workshops, we keep the student Jupyter notebook in a GitHub repository and have participants access the notebook using MyBinder (Corbi et al., 2023). MyBinder is an open-source web service that allows users to execute notebooks (from GitHub) in a web browser; thus, participants are not required to install software on their personal devices prior to attending a workshop. Google Colab provides similar functionality (Bisong, 2019).

Exercises

Introduction to Prompt Engineering

Prompt engineering involves writing prompts in a manner that elicits desirable responses from AI models (Ekin, 2023). The *Python for All* workshop includes six exercises that collectively aim to build participants' prompt engineering skills; however, the first three exercises approach prompt engineering explicitly. We start with a description of the CLEAR framework (Concise, Logical, Explicit, Adaptive, and Reflective) for prompt engineering (Lo, 2023b), which provides a structured approach for improving interactions with GenAI models. In the first exercise, participants are asked to adopt the persona of a software engineer tasked with creating an algorithm to find the shortest path in a 2D maze. Using the CLEAR framework, they draft prompts with the objective of better understanding the logic behind the algorithm they are tasked with creating. As our participants typically come from diverse programming backgrounds, with many having little or no coding experience, we emphasize understanding programming logic over syntax to promote an understanding of foundational programming concepts that are necessary for critically evaluating generated code.

In the second exercise, participants use identical prompts to ask their chatbots to create a markdown table to help participants understand Python syntax elements. Upon comparing their results, they typically note differences among their peers' tables. We explain that these differences can result from training data variations, randomness in AI responses, and user-specific interactions (Bansal et al., 2024). By exploring the variability in AI responses, this exercise aims to enhance AI literacy, helping participants understand the complexities behind AI-generated responses.

In the final exercise of this section, participants generate code to produce a basic scatter plot in Python. We ask participants to brainstorm ideas for what to include in the prompts. Next, participants engage in an iterative process to modify various aspects of the plot (e.g., changing the marker colors). We encourage participants to review their code and try to identify which sections are relevant for making these changes. Participants are also guided through the process of using their chatbot to explain the code, line by line, and for generating code comments suitable for specified audiences. These steps ensure that participants grasp both the underlying logic and the syntax of the generated code, fostering both AI literacy and practical coding skills.

Simplifying Complex Coding Problems

Following the prompt engineering exercises, participants are asked to use their chatbots to build a number guessing game where the computer randomly selects a number for a user to guess. This exercise builds on the algorithmic logic introduced in the first exercise (where participants are asked to conceptualize a problem prior to generating code). Here, participants

deconstruct the multifaceted coding challenge (i.e., building a number guessing game) into manageable parts using pseudocode. Pseudocode uses plain language to outline the steps of an algorithm, again allowing participants to focus on logic over syntax (Bellamy, 1994), while also providing a basis for writing subsequent prompts (T. Wang et al., 2024). We begin with a complex problem statement and demonstrate the first step in breaking down the problem into parts, writing the first identified task (i.e., generating a random number) in pseudocode. Participants are subsequently guided through creating a prompt that will produce code for the task. After demonstrating the first step, participants are grouped into breakout rooms to work together to identify remaining tasks, craft corresponding prompts, and test resulting snippets individually; ultimately, they combine their snippets to test functionality of the final product. Breaking down complex tasks into parts reinforces algorithmic literacy while also helping to improve the accuracy of generated code (Haindl & Weinberger, 2024). Moreover, working with code snippets simplifies debugging processes, making it easier to identify and correct issues along the way (Sadowski et al., 2018).

Code Optimization and Translation

The last two exercises teach participants to enhance code efficiency and adapt it to different programming languages. In the first exercise, participants work with a set of provided Python functions that sum all prime numbers below an input number with the goal of reducing the computational resources needed for the task. Many algorithms exist for this problem, each differing in effectiveness based on a given scenario (e.g., input value; Crandall & Pomerance, 2001). The diversity of potential solutions facilitates conversations about potential AI biases when optimizing code—participants learn about the importance of algorithmic optimization and explore how AI might favor certain algorithms or libraries based on its training data (Ferrara, 2023).

Participants begin by running the provided code to verify its functionality while ensuring that they fully understand the original solution prior to proceeding. Next, they are tasked with asking their chosen chatbot to optimize the code for better performance. The key part of the learning process involves critically evaluating whether the chatbot suggested optimization actually improves efficiency (and if so, under which conditions it does so) (Liu et al., 2024). To accomplish this, participants engage in hands-on testing, where they compare execution times of both the original and optimized versions of the code, using various input values.

The last exercise involves translating MATLAB (a proprietary language) code to Python (an open-source language). We provide MATLAB code that generates a plot; the code includes a “hold” attribute that is valid in MATLAB but deprecated in Python’s Matplotlib library. Chatbots sometimes retain this attribute during translation; if they do, running the code will return an error. These errors provide an opportunity to discuss limitations that arise from outdated training data (Torres, 2024). Chatbots also tend to correct the plot title from “Plot of the Sine Function” (as specified in the original MATLAB code) to “Plot of the Sine and Cosine Functions” (based on the context of the original code, which plots both sine and cosine functions). While this adjustment increases the accuracy of the resulting figure, it raises important questions about AI systems making unprompted changes. This leads to a discussion on whether such automatic corrections are appropriate and whether they align with the user’s original intent. Participants are encouraged to critically assess AI-generated code to ensure it accurately reflects their specific goals and maintains both clarity and correctness.

Workshop Summary

The pedagogical techniques employed in the Python for All workshop are designed to teach information and AI literacy competencies through hands-on, iterative learning and critical evaluation of AI-generated code outputs. The exercises employ best practices for effective learning, including immediate feedback, practical application of theoretical concepts, and collaborative problem-solving (Chi & Wylie, 2014; Hattie & Timperley, 2007; Rummel & Spada, 2005). For example, the prompt engineering exercises encourage students to refine their prompts, understand AI variability, and enhance AI literacy, reflecting findings from previous studies (Polverini & Gregorcic, 2024; Walter, 2024) that emphasize the importance of understanding LLM mechanisms and prompt engineering. The exercise that requires simplifying coding problems aims to strengthen participants' algorithmic literacy skills, addressing the need for human oversight in complex reasoning tasks (Haindl & Weinberger, 2024). Finally, the code optimization and translation exercises address potential limitations in using AI to generate code, encouraging critical evaluation of AI output (Backström & Kihlert, 2023; Rahman & Watanobe, 2023). Together, these exercises aim to provide participants with an understanding of GenAI models, while fostering critical thinking, adaptability, and proficiency in leveraging these models to enhance their programming skills.

Evaluation

We used pre- and post-surveys via Zoom to evaluate the effectiveness of the workshop in enhancing participants' confidence in using GenAI chatbots to learn Python. The pre-survey, given at the beginning of each workshop, contained three multiple choice questions that assessed participants' previous experience with Python, GenAI chatbots, and using GenAI chatbots for coding tasks, specifically, as well as free response questions for providing their role within the university and their academic field. Five options are provided for each question, ranging from no experience to expert-level experience for each of these skills. The post-survey, administered at the end of each workshop, included two multiple choice questions assessing participants' likelihood of using generative AI chatbots for coding in the future (with five options, ranging from very unlikely to very likely) and rating any confidence changes due to the workshop (again, five options, ranging from "significantly decreased confidence" to "significantly increased confidence"). The post-survey also contained a free-response question, inviting participants to provide feedback on the workshop. The surveys were intentionally kept short to facilitate administration during the workshop; thus, we did not assess each learning objective individually. Instead, the pre-survey responses helped tailor the depth of code explanations that we provided during each workshop, and the post-survey was used to gauge the workshop's overall effectiveness in enhancing participant's confidence in using GenAI chatbots to continue learning Python.

This assessment was reviewed and determined to be exempt by the Institutional Review Board at Carnegie Mellon University under 2018 Common Rule 45 CFR 46.104(d). All workshop participants were informed that their responses to survey questions were voluntary and anonymous. No identifying personal information was requested or collected.

Participants

The Python for All workshop attracted a diverse group of participants, possibly reflecting a widespread interest in using GenAI chatbots for learning code. A total of 93 participants

TABLE 1
Workshop Participant and Survey Respondent Backgrounds by Role and Academic Field
(Across Five Workshops)

	Participants	Completed Surveys
	n=93	n=62
Role		
Undergraduate Students	1 (1%)	1 (2%)
Graduate Students	58 (62%)	37 (60%)
Postdoctoral Researchers	2 (2%)	2 (3%)
Staff	14 (15%)	10 (16%)
Faculty	14 (15%)	10 (16%)
Community Members	4 (4%)	2 (3%)
Academic Field		
Biology, Chemistry	6 (7%)	5 (8%)
Business	17 (18%)	10 (16%)
Computer Science	14 (15%)	10 (16%)
Engineering	10 (11%)	9 (15%)
Fine Arts	5 (5%)	2 (3%)
Public Policy	39 (42%)	25 (40%)
Psychology	2 (2%)	1 (2%)

attended one of five two-hour workshop sessions (offered monthly between June and October 2024), including (62%) graduate students, 28 (30%) faculty and staff members, four (4%) community members, two (2%) postdoctoral researchers, and one (1%) undergraduate student. Participants represented various academic fields, with 42% representing public policy, 18% from business, 15% from computer science, and others from biology, chemistry, engineering, fine arts, and psychology (see Table 1). The relatively high representation of public policy participants can be attributed to targeted outreach by the liaison librarian to Carnegie Mellon's Heinz College of Information Systems and Public Policy. Faculty were also well represented, at 15% of participants, which is higher than usual for similar workshops. Increased faculty involvement likely reflects a growing interest in exploring methods for AI chatbot integration in curricula. Some faculty participants reached out for further support, aligning with broader trends previously reported (Miller, 2024), where instructors are reaching out to their librarians for guidance on managing and incorporating GenAI tools in their teaching.

Outcomes

Of 93 total workshop participants, 62 (67%) fully completed both the pre- and post-workshop survey. As previously stated, all participants were informed that responding to survey questions was both voluntary and anonymous. The pre-survey results showed a range of Python experience levels. Specifically, 26% of participants had no prior Python experience, 34% rated their experience at a beginner level, 31% as intermediate, and 6% and 3% as advanced and expert-level, respectively. More notably, responses regarding previous use of GenAI chatbots

emphasize the growing importance of integrating AI literacy into education; only 11% of participants reported no prior experience with generative AI chatbots (i.e., the overwhelming majority [89%] already had some level of experience with these tools). About 10% of participants reported little previous experience, 31% reported occasional use, and 48% reported regular or frequent usage. Additionally, 13% of participants reported frequent use of generative AI chatbots for coding tasks, specifically. As we grapple to find the balance between discouraging use of GenAI and promoting responsible engagement (Lau & Guo, 2023; Miller, 2024), it is important to recognize that students are likely already engaging with these technologies. This lends credibility to the argument that we have a responsibility to equip students with the knowledge necessary to engage ethically with these tools (Borenstein & Howard, 2021), regardless of whether educators or institutions ultimately seek to restrict or encourage their use.

The heatmap in Figure 1 shows the relationship between participants' (n = 62) self-rated pre-workshop experience in Python and their post-workshop confidence change for using generative AI chatbots to enhance their coding skills. Most participants (58%) reported that their post-workshop confidence "significantly increased;" about 35% reported their post-workshop confidence as "increased," and 6% reported no change. No participants reported a decrease in post-workshop confidence. Participants with no prior Python experience reported the highest post-workshop confidence increases, with 69% reporting a significant increase in confidence, while those with advanced and expert-level Python experience reported lesser gains (see Figure 1, Table 2). As our workshop is targeted toward beginner-level Python participants, these results provide some assurance that we are meeting the needs of that group. Importantly, as our post-workshop survey was conducted immediately after workshop sessions, we are unable to assess whether these gains translated to longer term confidence gains.

FIGURE 1
Heat Map Illustrating the Relationship Between Participants' (n = 24) Pre-Workshop Experience in Python (top) and Changes in Post-Workshop Confidence for Using Generative AI Chatbots to Enhance Python Coding Skills.

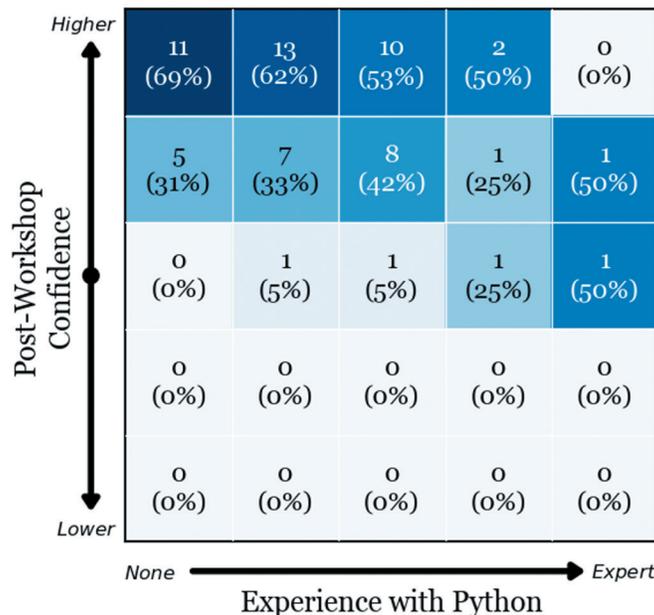


TABLE 2
Changes in Reported Post-Workshop Confidence Levels Using GenAI Chatbots to Learn Python

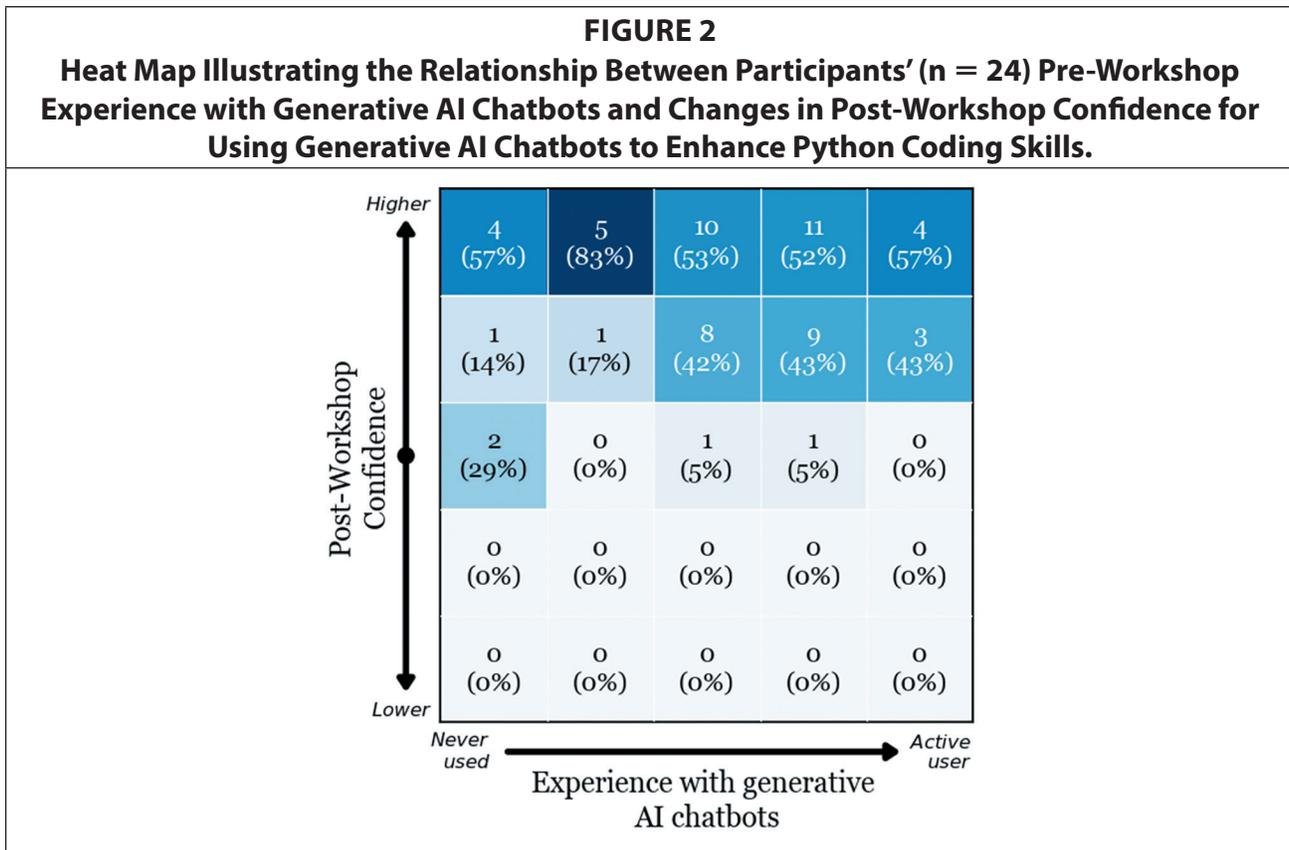
	Participants	Significantly Decreased Confidence	Decreased Confidence	No Change	Increased Confidence	Significantly Increased Confidence
Python Skill Level						
No Experience	16 (26%)	0	0	0	5 (31%)	11 (69%)
Beginner	21 (34%)	0	0	1 (5%)	7 (33%)	13 (62%)
Intermediate	19 (31%)	0	0	1 (5%)	8 (42%)	10 (53%)
Advanced	4 (6%)	0	0	1 (25%)	1 (25%)	2 (50%)
Expert	2 (3%)	0	0	1 (50%)	1 (50%)	0
Chatbot Experience						
No Experience	7 (11%)	0	0	2 (29%)	1 (14%)	4 (57%)
Tried it Once or Twice	6 (10%)	0	0	0	1 (17%)	5 (83%)
Occasional User	19 (31%)	0	0	1 (5%)	8 (42%)	10 (53%)
Regular User	22 (35%)	0	0	1 (5%)	9 (43%)	12 (52%)
Frequent User	8 (13%)	0	0	0	3 (43%)	5 (57%)

Figure 2 provides a heatmap showing the relationships between participants' self-rated pre-workshop experience using generative AI chatbots (for coding or otherwise) and their post-workshop confidence changes in leveraging AI chatbots for coding applications in the future. Participants with some, but minimal, prior experience using generative AI chatbots reported the highest post-workshop confidence gains with 83% reporting a significant increase in confidence. However, participants' previous experience with chatbots is not highly correlated overall with post-workshop confidence.

Participant feedback provided within the free response portion of the survey was almost exclusively positive; participants expressed appreciation for the workshop's hands-on approach, and four participants requested more exercises as "homework." Two respondents indicated that the pacing of the workshop was too fast. Overall, these outcomes suggest that the workshop effectively enhanced participants' technical skills and confidence in using AI-assisted coding tools.

Challenges and Future Directions

Initial iterations of this workshop (not included in the evaluative metrics provided here) focused on using GenAI chatbots to translate MATLAB code to Python. Our motivation was to promote the use of open-source tools (e.g., Python) as part of a broader effort to support open science initiatives. Low registration numbers suggested that our scope was too narrow. We expanded the workshop to more broadly cover the use of GenAI chatbots for coding in Python, which increased interest. Shifting to a virtual format offered improved engagement as the online platform made it easier to facilitate a collaborative learning environment as participants were better able to share their screens.



During the first workshop, participants found the number guessing game exercise too challenging. In subsequent workshop sessions, we included more emphasis on basic programming skills within the preliminary exercises. We also added breakout rooms to encourage peer-learning. Participant feedback indicated that breakout room format helped them work through the problem-solving process. During breakout sessions, participants asked questions, shared their screens to compare outputs, and experimented with different approaches for obtaining AI-generated code. To encourage collaboration and reflection, each group was asked to nominate a “spokesperson” to report back to the larger group on how they approached the problem and what they learned. One group noted that their AI model generated code that provided the user hints if they guessed a number that was lower or higher than the computer-generated number, even though the prompt did not provide those instructions. Other groups discussed adjusting prompts to improve outputs or to prevent the model from anticipating next steps. Another group explored whether prompts worked the same with numbers typed out (e.g., “ten”) versus numerals (e.g., “10”). Across the four (of five) workshops for which these approaches were implemented, every breakout room group completed all tasks.

Looking ahead, we plan to refine the workshop content to address varying levels of programming and AI experience, including developing preparatory materials for beginners to review prior to the workshop. We are also considering expanding the workshop into a series to cover more advanced topics. Continuous assessment and participant feedback will remain integral for iteratively improving the workshop to meet evolving needs.

Conclusion

The Python for All: Democratizing Coding Mastery with AI Chatbot Support workshop teaches AI literacy using Python programming instruction. The aim of the workshop is to teach participants how to use AI tools in learning how to code in Python. The workshop integrates hands-on exercises, peer-learning, and opportunities for critical discussions that collectively promote an understanding of applications and limitations of AI-generated code. We used pre- and post-workshop surveys to evaluate the effectiveness of the workshop; survey results over five workshop sessions indicate that the workshop increased participants' confidence for using generative AI chatbots to learn coding skills. Participants with minimal previous coding experience reported the highest post-workshop confidence gains. By documenting the workshop's structure, learning objectives, and outcomes, this paper contributes to the broader conversation on AI integration in education. The workshop materials are available as an OER to support educators with integrating AI literacy into curricula.

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Credibility Across Borders: Online Information Evaluation of Chinese International Graduate Students

Huan Gao and Angela Kohnen*

This study investigates the experiences of Chinese international graduate students in assessing the credibility of online information in the U.S., focusing on their challenges and the underlying reasons for these challenges. Using qualitative methods, including semi-structured interviews, information diaries, and focus group discussions, the research reveals that these students often struggle to assess the credibility of U.S. online content without being aware of their difficulties. The findings show that their judgments are influenced by their pre-existing understandings of authority and prior internet usage in China. Additionally, their sense of estrangement, stemming from their outsider status in an unfamiliar online environment, exacerbates these challenges. This study underscores the complex interplay of sociocultural, political, and educational factors in shaping their assessments. It recommends that U.S. higher education institutions incorporate culturally sensitive information literacy instruction to support international students from diverse backgrounds, thereby enhancing their academic experiences and empowering them as information-literate global citizens in a digital society.

Introduction

In the digital age, the proliferation of misinformation, disinformation, and substandard information online—facilitated by the ease of content creation and distribution—has underscored the importance of verifying the credibility of online sources. The dynamic nature of digital information (Lynch, 2016), the rise of influential social media figures lacking traditional oversight (Kim & Kim, 2022), and the profound influence of personal biases on credibility assessments (Metzger & Flanagin, 2013) present significant challenges in determining trustworthy sources.

International students, especially those studying in a non-native language country, face compounded challenges in assessing online credibility. They not only consume information in a different language but also navigate a vast and unfamiliar digital landscape with an

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overwhelming volume of content (Chang & Gomes, 2020). This issue is particularly significant given the increasing presence of international students in U.S. higher education. According to the Open Doors 2025 Report, the United States hosted about 1.2 million international students in 2024/25, marking a 5 percent increase from the prior year and confirming its position as the world's leading study destination (IIE, 2025a).

While existing research acknowledges the challenges international students face in assessing online credibility (Crist & Popa, 2020; Rodriguez, 2014), there is a notable gap in exploring the underlying reasons and specific nature of these difficulties (Sin & Kim, 2018). Previous studies have identified the struggles international students encounter in evaluating the credibility of online information within the digital landscapes of host countries (e.g., Sin & Kim, 2018). However, this study aims to address the need for a deeper examination of the factors contributing to these challenges.

This study examines how Chinese international students assess the credibility of U.S. online information. Although China is now the second-largest source of international students in the United States, following India (IIE, 2025b), Chinese students remain a substantial population whose distinct linguistic backgrounds and prior experiences within a highly regulated digital ecosystem shape particularly complex approaches to credibility assessment. These transnational information experiences position their navigation of U.S. online information environments as a critical site for understanding how information literacy is culturally and geopolitically situated. By illuminating their experiences navigating an unfamiliar digital information environment, this study seeks to inform the development of more culturally responsive information literacy instruction in U.S. higher education institutions.

Literature Review

This literature review first explores the intricate relationship between information literacy, authority, and cultural influences. It then offers an overview of the online environments that Chinese international students encounter and navigate. The review concludes by examining existing research on the information literacy of Chinese international students.

Information Literacy, Authority, and Culture

Evaluating misinformation is a critical component of information literacy, which was traditionally viewed as a collection of abstract, universal cognitive and technical skills (ACRL, 2000). However, the last decade has seen a paradigm shift in information studies toward recognizing information literacy as a socially embedded practice (Papen, 2013; Savolainen, 2007), aligning with New Literacy Studies' emphasis on social constructivism (Barton et al., 2000; Street, 2003). This approach views information literacy as a social practice, deeply rooted in specific sociocultural contexts and constituting a dialogic process shaped by collective social dynamics rather than solely individual motives (Savolainen, 2007).

Reflecting these evolving views, the Association of College and Research Libraries (ACRL) updated its framework in 2015, underscoring the constructed and contextual nature of information literacy. Its *Framework for Information Literacy for Higher Education* introduces foundational concepts including the principle that authority is constructed and contextual, recognizing the variance in what constitutes authority across different cultures (ACRL, 2015).

Research has shown that cultural factors significantly influence the credibility assessments made by individuals, including international students, who must navigate complex new informational and cultural landscapes (Limberg et al., 2012; Mansour & Francke, 2017). Studies have highlighted that international students' cultural backgrounds profoundly impact their evaluations of information credibility (Crist & Popa, 2020; Rodriguez, 2014); however, gaps remain in fully understanding the cultural and non-cultural factors influencing their credibility assessment challenges.

Online Ecology of Chinese International Students

The online information ecosystems vary significantly across countries, influenced by political, ideological, social, cultural, and economic factors, including governmental regulations, media ownership, and internet penetration rates (Ashley, 2019). In contrast to the relatively open online public sphere in the U.S., China's digital landscape is highly regulated, ranking as the least free among the 65 countries evaluated in Freedom House's global internet freedom assessment (Freedom House, 2025). Since 2009, major platforms like Google, Wikipedia, and Facebook have been blocked, promoting a more uniform and controlled dissemination of information (King et al., 2017).

As a result of this regulatory context, prior to studying abroad, Chinese students predominantly engage with a restricted digital environment, relying on domestically available services that are functionally similar to Western platforms (China Internet Watch, 2024). A study by Chen and Yang (2019) found that despite access to unblocked foreign content via VPN, many students chose not to explore these resources, indicating a tendency to adhere to familiar digital spaces.

Upon relocating, these students confront entirely new digital ecosystems, a transition that Chang and Gomes (2020) term "digital information ecologies," which describes the complex, context-dependent environments that shape how international students access and process information. This adjustment is compounded by cultural, academic, and informational shifts, increasing these students' vulnerability to misinformation, as they must navigate these unfamiliar terrains without the benefit of contextual familiarity (Porshnev et al., 2021). Further research by Gao (2023a) indicates that Chinese students in the U.S. display varying transnational information-seeking habits, influenced by the nature of the information they pursue.

Despite these challenges, research shows that multilingual international students can adeptly manage multiple information sources across different languages and cultural contexts (Reyes et al., 2018; Gao, 2023b). This ability not only counters the deficit narratives often associated with international students' information literacy but also highlights their capacity to utilize transnational information resources effectively.

Credibility Assessment and Chinese International Students

Studies indicate that international students frequently encounter noncredible, irrelevant, and outdated information, with difficulty assessing information quality being significantly higher among them compared to domestic peers (Click et al., 2017; Sin, 2015; Sin & Kim, 2018). Yoon and Chung (2017) documented how international students' information needs and behaviors evolved from pre-arrival through early settlement, with information credibility identified as a key concern throughout the transition.

Focusing on Chinese international students in the U.S., Rodriguez (2014) used the ACRL's earlier framework to reveal that these students often evaluate information based on the reputation and ranking of the source institution rather than content quality. Crist and Popa (2020) further explored these students' perceptions of "authority," showing a strong trust in teachers as credible sources. Additionally, during the COVID-19 pandemic, research showed that Chinese students relied heavily on information from China for making critical decisions regarding health, safety, and international travel (Gao & Kohnen, 2023).

Other studies have suggested that cultural differences in educational philosophy may underlie the challenges Chinese international students face in assessing information in the U.S. (Chan et al., 2011; Ku & Ho, 2010). Davies and Barnett (2015) argue that critical thinking, a key skill for evaluating information credibility and considering diverse viewpoints, has historically not been a focus in many Asian educational systems, potentially for centuries. Some other scholars show that Chinese students often struggle to meet the critical thinking standards expected in Western graduate programs (Lucas, 2019; Zhang, 2017). Furthermore, unlike the U.S., where the ACRL promotes information literacy as a core library objective, China does not have a comparable professional organization dedicated to this purpose.

This review highlights the pressing need to better understand how Chinese international students assess the credibility of information in unfamiliar digital environments, aiming to identify specific challenges they face and suggest targeted interventions.

Method

This study is a part of a larger research project employing a basic qualitative research approach (Merriam & Tisdell, 2016) to examine the online information-seeking experiences of Chinese international graduate students. The principal focus of the project was on understanding their literacy practices in information seeking, the evaluation of the credibility of online information originating from the U.S., and the sense making of these experiences by the students. Specifically, our research questions for this article were:

- What challenges do international graduate students from China encounter when assessing the credibility of U.S. online information?
- How do participants describe the factors influencing these challenges?

Participants

We employed a purposive sampling strategy to select six participants who represented information-rich cases (Merriam & Tisdell, 2016) from a large public university in the Southeastern United States. Participants met the following criteria: 1) they were born and they completed their entire K-16 education in mainland China and 2) they were enrolled in graduate programs within the College of Education.

Our criteria targeted individuals raised and educated in mainland China, particularly those with significant exposure to the mainland Chinese internet before beginning their graduate studies. This focus was chosen to understand the experiences of individuals transitioning between digital information environments. We specifically selected Chinese graduate students, who may possess more deeply rooted Chinese worldviews and cognitive patterns compared to undergraduates. To reduce variability in information literacy and credibility perceptions across disciplines, we limited our study to participants in the field of education. This group was also chosen due to the expectation that education majors would have a heightened aware-

ness of information literacy, which would be beneficial for their future careers. Additionally, our affiliation with the College of Education facilitated easier recruitment of these students.

We selectively invited participants from the eligible pool to ensure diversity in hometowns, family backgrounds, genders, degree programs, and year levels. All six participants arrived at or returned to the U.S. campus in August 2021 for the current academic semester, amid the COVID-19 pandemic. Table 1 summarizes their demographic details.

Pseudonym	Gender	Age	Degree Program	Year Level^a	Total Years of Studying in the U.S. at the Time of the First Interview
Yan	Female	22	Master's	2 nd year	3 months
Xinxin	Female	23	Master's	2 nd year	1 year and 3 months
Haiyang	Female	25	Master's	2 nd year	1 year and 3 months
Cheng	Female	24	Ph.D.	1 st year	1 year and 3 months ^b
Ling	Female	29	Ph.D.	1 st year	2 years and 3 months ^b
Zhan	Male	29	Ph.D.	1 st year	1 year and 3 months ^b

^aThe year level as reported by participants at the time of the first interview.

^bTotal time includes the time spent on their master's degree at a U.S. institution.

Data Collection

The data collection process consisted of three rounds of semi-structured phenomenological interviews (Seidman, 2006), weekly diaries documenting information-seeking activities, and a focus group discussion. Given the complex and contextual nature of information literacy (Hicks & Lloyd, 2016; Lloyd & Williamson, 2008), Seidman's approach was chosen to capture participants' subjective experiences and the meanings they ascribe to them.

Each of the three interviews focused on a specific aspect: the first addressed participants' online information-seeking experiences in China; the second explored their experiences in the U.S.; and the third reflected on the overall meaning of their information-seeking across contexts. On average, each interview lasted about 100 minutes and was conducted virtually due to the pandemic.

After the completion of the second interview, participants were also asked to maintain a weekly diary, documenting one information-seeking incident each week for four consecutive weeks. The diary was administered as an online questionnaire distributed every Friday. To further explore issues that may not have emerged in the interviews, a 95-minute focus group discussion was held (Krueger, 2014).

Interviews were conducted primarily in Mandarin Chinese, with occasional use of English, reflecting participants' linguistic preferences and comfort, particularly given the shared linguistic background between participants and the interviewer (the first author).

Data Analysis

Upon collecting the data, audio-recorded interviews were transcribed and analyzed directly in Mandarin, as recommended by Blair (2016), to preserve the nuances and complexities of participants' experiences. The transcriptions were then imported into NVivo 12 for qualitative

data analysis. The first author led the initial coding, focusing on segments related to participants' evaluations of online information in the U.S. context. This analysis leveraged the first author's fluency in Mandarin, ensuring an accurate interpretation of the data. Collaboration with the second author followed, facilitating discussions that identified areas needing further analysis.

The primary analysis centered on data from the second and third interviews, with the first interviews reviewed retrospectively to contextualize participants' experiences. This retrospective examination was crucial in understanding how past experiences influenced current evaluation practices. The analysis began with an initial interpretation of transcripts, applying tentative labels during the reading and marking process (Seidman, 2006).

The constant comparative method (Merriam & Tisdell, 2016) was used to openly code the first participant's interview data; this process was subsequently applied to the other participants. Codes were refined and expanded as necessary, with earlier interviews revisited during each iteration to ensure consistency. The cross-participant analysis categorized data based on the challenges in assessing online credibility and the factors influencing these challenges. Recurring patterns and themes were identified through this method, supported by thematic analysis (Merriam & Tisdell, 2016). To strengthen the analysis, findings were triangulated with data from participants' diaries and focus group discussions, which helped confirm, expand, and clarify the results. Ongoing communication with participants ensured they reviewed and approved translated quotes and provided valuable feedback on the findings. This iterative process enriched the study's depth and reliability.

Findings

This study found that most Chinese international graduate students struggle to assess the credibility of U.S.-specific online content, often without realizing these difficulties. Three key factors contribute to these challenges: pre-existing views on authority; prior exposure to online information in China; and a sense of estrangement as outsiders in an unfamiliar online environment.

Impact of Sociocultural Beliefs on Authority

The challenges Chinese international students face in evaluating online credibility stem from deep-rooted sociocultural beliefs, as their inclination to trust traditional authority figures within Chinese culture often hinders their ability to accurately assess trustworthy sources in the U.S. context. Moreover, the professional presentation of U.S. websites often leads to an assumption of credibility based solely on formal aesthetics. Furthermore, a perceived hierarchy that prioritizes English over Chinese content diminishes their propensity to critically evaluate the credibility of English-language online information.

Preference for "Professional" Design

Participants tended to trust online sources with specific design features, reflecting an expectation from China that official websites adhere to formal visual standards. Ling noted, "All their websites look very organized and formal," while Haiyang observed, "Even small businesses have their own websites. They are highly functional, and you can make appointments there." These comments suggest that participants associated a conservative, official appearance with trustworthiness. This reliance on the formal and authoritative presentation style of U.S.-based

websites led participants to conclude that information from these sources was professional and credible.

This positive inclination toward professional-looking websites made participants vulnerable to credulity when encountering lesser-known English sources with polished designs. For example, Xinxin initially trusted an online English news article that appeared formal and reliable, assuming it was from an official U.S. news outlet. However, after watching a video that exposed the outlet's true nature, Xinxin realized the biased news was from a notorious content farm. Xinxin stated:

Their website and newspaper name seemed authentic, so I believed their reports were objective ... But it turns out it's an Indian media outlet paid to spread fake articles bashing other countries, including China ... There's no actual newspaper, just an online news site.

Participants' reliance on visual cues led them to trust most U.S. websites, even those that weren't necessarily credible, and sometimes misjudge official sites lacking a polished aesthetic. For example, when searching for the official state curriculum standards website, Cheng initially questioned its legitimacy due to its less professional appearance, stating,

I'm not familiar with this organization's abbreviation, and the flashy, cute design doesn't seem authoritative ... In China, official websites always look serious—like the National Education Examinations Authority (中国教育考试院), where the logo is on the top left.

Cheng's experience highlights how her cultural preference for formal website aesthetics initially hindered her recognition of an authentic U.S. educational website. In the United States, professionalism often includes diverse and dynamic visual designs that prioritize functionality, user-friendly interfaces, and informational clarity over traditional appearances. Official websites, particularly in contexts like K–12 education, may adopt a more approachable or playful design to connect with their audience. As participants adapted to the U.S. online environment, they had to learn to evaluate credibility beyond just visual design.

Information Hierarchy

Participants placed significant importance on website design when judging credibility in the U.S. context. However, they consistently trusted U.S. online information over content from China, reflecting a perceived linguistic and cultural hierarchy, possibly influenced by historical narratives of white supremacy.

Even in China, students showed a strong preference for English-language information, especially academic content—a tendency Ling described as “hard to explain and natural.” This trust deepened over time through positive experiences with U.S. information during their studies in the U.S., where they had regular access to such content. All participants viewed U.S. information as exceptionally high-quality, trustworthy, and well-crafted. Xinxin shared these observations:

I find myself trusting U.S. websites without really knowing why, probably because we've always put English on a pedestal in China. People who were good at English were respected, and now, English videos are considered as more advanced ... English sites like Wikipedia feel more credible than Chinese ones like Baidubaike⁴ ... It's a hard bias to shake off, likely just the influence of white supremacy.

Xinxin's perceptions reveal an implicit bias that privileges information from certain countries, particularly English-dominant contexts. Her "inexplicable" trust in U.S. websites reflects widely circulated social narratives in China that associate English language with authority and global legitimacy. The mention of "white supremacy" underscores how these perspectives shape trust in information sources, with linguistic factors contributing to perceived credibility, as seen in the preference for English Wikipedia over Baidubaike.

This bias is further reinforced by the historical association of white supremacy with colonialism and imperialism (Mignolo, 2007), which has positioned U.S. information as more authoritative globally. Haiyang echoed this, acknowledging that her trust in U.S. sources might stem from cultural beliefs that place Western countries, especially the U.S., at the top of a global hierarchy:

My trust in U.S. information likely comes from a belief that Western nations, especially the U.S., are more advanced and influential than China, despite my efforts to change this view ... I still feel their official information on medicine or technology is more reliable.

These dynamics likely made Haiyang and other participants more inclined to trust U.S. information without skepticism. Having experienced China's restricted and censored information landscape, which was often filled with homogeneous perspectives and limited viewpoint diversity, many participants perceived the U.S. information environment as more trustworthy. They believed U.S. sources offered greater opinion diversity, objectiveness, and transparency. As Haiyang put it, "I generally trust U.S. information more. It seems more transparent, like how the CDC openly states the negative effects of COVID-19 vaccines."

This perceived disparity in the quality and reliability of online information between China and the U.S. contributed to a bias favoring U.S. sources, potentially making participants more susceptible to trusting questionable U.S. information due to its perceived objectivity. These observations underscore the complex interplay of language, historical esteem, and global recognition in shaping trust biases, revealing a deeply ingrained and challenging bias among Chinese students toward U.S. information sources.

Influence from Digital Past

Students' previous experiences with online information significantly hindered their ability to assess credibility in the U.S. information landscape. Accustomed to a more restricted in-

⁴Baidubaike (百度百科) is a Chinese online encyclopedia operated by Baidu, similar to Wikipedia, but with content that is collaboratively edited under platform moderation and subject to China's regulatory and censorship framework.

formation environment, they struggled to distinguish credible sources from misinformation. Disappointing experiences with Chinese search engines, coupled with challenges in finding reliable information, led them to place undue trust in U.S. sources. Additionally, their lack of information literacy education further disadvantaged them in navigating this new information environment.

From Walls to Open Horizons

Before studying abroad, Chinese students navigated a censored online environment limited by the Great Firewall,⁵ distinct from the open internet in the United States. For instance, Ling recalled learning about the coronavirus in Wuhan, China, before “COVID-19” was even a term. She said,

The Chinese media downplayed the virus, but my cousin, who checks international news through a VPN, wasn't so sure ... I know how the media in China can shape what people think, so I checked out foreign news with a VPN too, and it was a whole different story ... The English sites said it would be bad, so I got myself a bunch of masks, and they were right.

Ling's trust in English sources was validated by later events. However, after moving to the United States, she couldn't uncritically accept English content. This challenge was shared by all participants, whose previous isolation from a broader online environment may have led to an overreliance on English sources.

Participants found the transition from a censored to an open internet both refreshing and overwhelming. Some encountered videos and commentaries on Chinese political and historical events that differed from what they had learned in China. For instance, Cheng immersed herself in information pertaining to Chinese history. As she shared:

I'm uncertain about these sources ... They present information in a documentary style that seems genuine, but it's hard to judge their reliability ... These reports contradict what I've seen online in China, but it's good to know alternative viewpoints.

Cheng struggled to assess the credibility of sources that conflicted with her prior knowledge, ultimately viewing them as just “alternate viewpoints.” Similarly, Xinxin explored videos on Chinese history but, unlike Cheng, didn't focus on evaluating their credibility. Instead, she prioritized gaining diverse perspectives without concern for the accuracy of the information.

Trust Shaped by Disappointment

Negative experiences with Chinese search engines like Baidu⁶ led participants to view Google and other American sources as more trustworthy. Many expressed frustrations with Baidu,

⁵Great Firewall (防火墙) is the government-imposed barriers that restrict and regulate internet access within mainland China.

⁶Baidu (百度) is a major Chinese technology company and the operator of Baidu Search, the most widely used search engine in China.

citing its abundance of ads, perceived unreliability, and unhelpful search results. Zhan, for example, remarked, "I spent hours browsing ten web pages but found very little useful information. Baidu killed itself." Haiyang echoed this sentiment, saying, "I think Baidu is going to close down."

During their international travel amid the COVID-19 pandemic, participants uniformly avoided using Baidu for information, preferring Chinese social media platforms instead. Ling explained, "I never considered using Baidu to find a Chinese government website. I don't know which site to go to, and I doubt I'd quickly get the information I need." This avoidance reflects a general skepticism toward Baidu.

Conversely, participants had a positive view of Google, particularly compared to Baidu. They tended to trust top-ranked results on Google's first page, believing these results to be reliable. Haiyang remarked, "The first results should be good because they appear to everyone who enters the same search; otherwise, everyone would be fooled." Zhan also relied on a figure he found at the top of a Google search for pandemic updates. He noted:

It was the top result on Google, and I trust Google. Their algorithm simplifies info processing and optimizes search results ... The figure looked authoritative. I think it is unquestionably reliable, so I didn't check the source or question its credibility.

Zhan's strong confidence in Google led him to accept the first figure he found in his pandemic search as "unquestionably reliable," without scrutinizing the source. This reflects the participants' deep trust in Google's ranking algorithm and its ability to streamline information.

Nevertheless, these students remained oblivious to the fact that not all U.S. online information is inherently reliable. The top-ranked Google search results can include sponsored content and be fraught with unreliability. Numerous studies have underscored the prevalence of misinformation and disinformation in the U.S. online landscape during the era of Web 3.0, particularly evident during the 2016 U.S. presidential election (Grinberg et al., 2019) and the COVID-19 pandemic (Cinelli et al., 2020).

Information Wilderness

Before studying abroad, none of the students had received any form of information or media literacy education in China. Ling mentioned that the term "information literacy" was entirely new to her, and she first encountered it through participating in this study. All participants noted that their prior academic experiences in China lacked a focus on online information seeking, making their academic engagement in the U.S. significantly different. From elementary school through college in China, there was little expectation for students to independently gather information for academic work. Mandatory computer classes in elementary and middle school focused mainly on word processing and other basics. As Ling put it, "In our computer classes, we only learned basic office software, and the only information-related task was using Baidu to search with keywords." This pattern continued into college, where students rarely had to find their own online information sources. For example, Cheng shared:

Here, it's common to bring laptops to class, but in China, we rarely do. We simply attend class, listen to lectures, complete assignments, and take exams ... And, like,

for Teacher's Qualification Test, the college informs us of registration details and preparation requirements; we don't need to search for anything ourselves.

As these students transitioned to U.S. higher education, they entered an environment that prioritized independent study and critical thinking, requiring them to actively search for information as part of their graduate studies.

Estrangement as Outsiders

Participants' sense of estrangement as outsiders in the U.S. online environment hindered their ability to assess credibility. This estrangement stemmed from three factors: lack of familiarity with U.S. sources; linguistic and cultural differences that undermined confidence in evaluating English content; and the absence of accessible human sources for consultation.

Information Agility Divide

Most participants considered themselves skilled information seekers within China's online environment, reflecting a common tendency among youth to overestimate their information literacy (Rieh & Hilligoss, 2008). They expressed confidence in identifying misinformation on familiar platforms like WeChat.⁷ While they took precautions to avoid scams, they did not systematically assess information credibility, believing that China's more restricted and straightforward information landscape made such scrutiny unnecessary compared to the U.S. context.

Participants were familiar with online phenomena unique to China. For example, Cheng recalled first encountering the "internet water army" while reading an entertainment story, sharing:

I once searched for a movie star's scandal, saw biased comments under the video ... Later, I realized internet water armies were hired by companies for a fee ... they create fake accounts on [Chinese] social media to manipulate discussions and influence public opinion.

In addition, participants were confident in identifying "native advertising," wherein sponsors pay content creators to embed their brand or mission into the content. They were also aware that top-ranked advertisements on Baidu searches often lacked credibility.

Participants' proficiency in navigating the internet stemmed from their deep familiarity with Chinese online culture. Growing up in this digital landscape, they felt confident in their understanding of online behaviors, trends, and communication styles unique to China. Their exposure to Chinese social media platforms, search engines, and forums gave them insight into how information is disseminated and consumed. As a result, they believed they could "intuitively make reasonable judgments," as Xinxin put it, based on their knowledge of the information ecosystem and the typical traits of misinformation.

⁷WeChat (微信) is a versatile Chinese messaging, social media, and mobile payment app, offering features such as text messaging, voice and video calls, and financial services.

In the United States, participants had to adopt new strategies for evaluating information. Like many of their U.S. counterparts, they relied on heuristics and shortcuts that are often unreliable indicators of credibility. For example, Ling viewed domain names (e.g., .com, .gov, .org) as the “sole criterion” for assessing U.S. content, while Zhan questioned, “What other indicators can be trusted if the official domain name fails?” Yan even believed that domain names were regulated by the government, further illustrating their reliance on these cues. Yan stated,

The U.S. has taken rigorous measures in regulating and supervising the internet. So, their websites ending with formal domain names, like government or organization, can be trusted ... This high level of credibility is ensured by its network management system.

This misplaced trust in domain names is not unique to Chinese students, but the participants’ level of confidence in domain names as a credibility indicator was particularly pronounced.

Linguistic and Cultural Barriers

All participants perceived their status as cultural outsiders and their English language proficiency as barriers to evaluating English online content with the same confidence they had in navigating the Chinese online landscape. Haiyang, for example, viewed her “ease and familiarity of reading in Chinese” as a significant asset, while her lack of familiarity with English made evaluating U.S. content challenging. Other participants shared this sentiment, noting that they could quickly assess the formality, reliability, and nature of Chinese content based on linguistic cues alone, without needing to reference the source.

However, when consuming English content, challenges arose. Haiyang admitted, “When I read English website content, I can only say I read and try to understand it, but it’s uncertain to what extent I grasp it. Sometimes, I lose my discernment.” The cognitive effort required to comprehend English left little capacity for evaluating credibility. Xinxin also struggled, recalling an experience with an online promotion for a SIM card: “I decided to get a new SIM card for my phone, but I was still uncertain about the details ... I was worried about misunderstanding something and whether it was genuinely real.”

These obstacles stem from three main factors. First, the English learned in China is academically oriented, making it difficult for participants to distinguish appropriate expressions for different online contexts. As a result, webpages often appeared similar to them, lacking clear language style cues for credibility. Second, understanding “internet Englishes” —including colloquial expressions, abbreviations, and slang—proved challenging for students who learned English as a foreign language. Lastly, the mental effort required to code-switch and comprehend English content online diminished their focus on evaluating its credibility.

The cultural nuances embedded in U.S. online information make it difficult for Chinese students to discern misinformation. While participants were confident in spotting obvious advertisements, they struggled with subtler tactics unfamiliar in China. For instance, Zhan stated, “I can easily recognize blatantly false information like fake advertisements, but I might not detect it if there’s an intentional trap.” His concern reflects the challenge of identifying deceptive content that uses selective presentation or ambiguity to mislead.

Participants also faced difficulties due to a lack of cultural background knowledge. Zhan, for example, described feeling cautious and somewhat helpless when trying to gather trustworthy information for purchasing a car in the United States saying, “I perceive myself as a conservative person. I had to have 100% trust in information to guide my actions.” As he elaborated:

I don't know much about English terms for buying a car or insurance, so I googled 'car dealer + [city name]'. But I just browsed because I couldn't judge credibility; I am not familiar with those dealers ... I compared prices and read comments, but if I am in China, I'd just go to Dianping⁸ and find everything quickly.

Zhan's attempt to use English-language platforms like Google to gather information on purchasing a car highlights a strong sense of alienation. Despite similarities between Google reviews and niche Chinese websites, he struggled due to linguistic barriers, cultural differences, and unfamiliarity with the specific context. His limited knowledge of car-related terminology and unfamiliarity with dealerships intensified this feeling of disconnection. While the process of researching online for car buying may resemble practices in China, the accumulation of subtle differences creates a distinctly challenging experience. Zhan's difficulties underscore the complex challenges of navigating a foreign information landscape for critical daily decisions, where language barriers, unfamiliar information sources, and lack of culturally contextualized knowledge pose significant obstacles.

Absence of Human Sources

Participants' sense of estrangement stemmed from being physically distant from their familiar support networks. In China, they had access to family, friends, and acquaintances for advice and information. In the United States, however, they lacked these human resources, forcing them to rely on the internet even when they felt uncomfortable doing so. Haiyang specifically highlighted this lack of support, emphasizing the challenge it posed, sharing,

In China, I didn't always rely on the internet. I could get information from people around me ... When I first came to the United States, I wasn't used to using online resources, but I realized it's necessary because I can't always rely on other international students. In China, I could easily ask for help, but here, I'm less likely to.

Even though all participants were connected with other Chinese students studying at the same university, Haiyang noted that these peers weren't always the best source of information. Instead of turning to them, or to other human sources from the university or her peer group, Haiyang felt that she needed to seek out her own information. Zhan appeared to agree with Haiyang:

We don't need to search online much in China; info on things like baby formula and newborn care just comes to us through people around us ... But here, I have

⁸Dianping (大众点评网) is a popular Chinese online platform that provides user-generated reviews and ratings for various businesses and services, such as restaurants, hotels, shops, and entertainment venues.

to actively search, mostly online ... It feels different; people rely on online info and like to find things themselves.

For Haiyang and Zhan, the absence of trusted human sources in the United States compelled them to adopt an active information-seeking approach (Kohnen & Saul, 2018). In contrast, they relied on incidental encounters with offline information from real people in China. Zhan acknowledged the abundance of “good online info” in the United States, hinting that quality information is harder to find in China. Both participants suggested that independent information gathering is more valued in the United States.

In the example of Zhan’s car-buying experience, he emphasized that “in China, if I’m uncertain about online information, I can simply ask my friends.” This highlights how people around them serve as reliable information sources. Jing echoed this sentiment, noting that in China, “one can navigate life without the need to actively seek out information.” As she detailed,

In China, staying informed is easy; information is readily available. As a student, everything I need is shared in our class WeChat group ... I’m surrounded by classmates and friends discussing these topics, so I confidently follow their lead. I won’t miss anything important.

The availability of human sources in China creates a strong support system for navigating information. When uncertainties arise, seeking clarification from friends helps verify and contextualize information, enhancing comprehension and informed decision-making. However, this reliance on social networks for information verification poses a significant challenge for international students abroad, where the lack of accessible human resources in a new cultural and social environment becomes a major obstacle.

Discussion and Implications

While Chinese international students share some challenges with domestic students, this research uncovers distinct dimensions unique to this demographic. The findings reveal that these students often struggle to assess the credibility of U.S. online content, frequently without being fully aware of their difficulties. Their judgments are significantly influenced by pre-existing understandings of authority and prior experiences with the internet in China. Furthermore, their sense of estrangement, rooted in their outsider status within an unfamiliar online environment, exacerbates these challenges. This study underscores the complex interplay of sociocultural, political, and educational factors in shaping their credibility assessments.

Building on the foundational work of Crist and Popa (2020), and Rodriguez (2014), which highlighted the information literacy challenges faced by Chinese international students, particularly their reliance on culturally ingrained notions of authority, this study extends the discourse by uncovering more intricate reasons behind their credibility assessment difficulties. Our findings reveal that these challenges are not merely a product of cultural transfer but are deeply embedded in a complex interplay of historical, socio-cultural, political, and linguistic factors. This nuanced understanding highlights how these elements collectively influence the ways in which Chinese international students evaluate online information credibility in the U.S. context.

Moreover, our research diverges from the predominant focus of prior studies, which have largely concentrated on international students' information practices within academic settings (e.g., Reyes et al., 2018). While academic information-seeking remains crucial, our findings echo the work of Hertzum and Hyldegård (2019), who argue for the importance of information needs related to everyday life. The experiences shared by our participants demonstrate the breadth of their information-seeking activities, ranging from staying updated on pandemic developments to engaging with social media, purchasing cars, and navigating promotional offers for acquiring SIM cards. These diverse information needs underscore the importance of considering the full spectrum of information practices that shape the everyday lives of international students.

This study offers critical insights for literacy scholars, academic librarians, and U.S. higher education institutions engaging with international multilingual students. First, it highlights the need for further research into how information literacy intersects diverse cultural and linguistic backgrounds. Such research should aim to deepen understanding of students' assessment practices and perceptions, thereby enabling educators to effectively bridge the information literacy gap through culturally and linguistically tailored approaches.

Additionally, the findings underscore the necessity for U.S. academic librarians to develop targeted interventions to enhance the information evaluation skills of these students. Echoing Hicks (2016), the study advocates for curricula and instructional strategies that are customized for culturally and linguistically diverse populations, moving beyond a generic, one-size-fits-all approach. This includes sensitizing students to cultural variations in perceptions of authority and credibility, which can significantly influence their academic engagement and success.

Furthermore, the research calls for U.S. higher education institutions to proactively support the integration of Chinese international students. This involves understanding and addressing their unique challenges related to sociocultural adaptation, linguistic barriers, and digital literacy. Institutions can provide targeted resources and support mechanisms that address these students' specific needs from the onset of their academic journey, potentially through pre-arrival and early semester interventions such as virtual seminars or workshops. These initiatives could ideally be designed and led by experienced international students, enhancing relevance and efficacy.

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Declaration of Interest Statement

The authors declare no conflicts of interest.

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OA or Nonchalant: A Survey of Open Access Dissemination Initiatives of Higher Education Institution Library Websites and Systems in the Philippines

Daniel Soriano Balbin*

The objective of this study is to determine the extent to which libraries are disseminating open access (OA) through conducting a survey of the different library websites and systems of higher education institution (HEI) libraries in the Philippines. This also aims to identify the types, subject fields, quantity, and quality of the OA resources shared by private and public HEI libraries in terms of the links they embed in their websites and systems. The study employed a quantitative research design focusing on website analysis. The findings revealed that many libraries have established websites and systems that they use to embed information about OA resources. Most OA resource links disseminated by HEI libraries are multidisciplinary, and the majority of these are OA journals. Comparing the number of OA resources advertised by HEI libraries, private institutions tend to share more links. From the 2,917 OA resources embedded in 312 library websites, the Directory of Open Access Journals (DOAJ) topped the most shared OA resource. Although librarians selected resources indexed in reputable databases, several resources were erroneous or flagged as predatory. Libraries need to improve their OA initiatives by increasing both the quality and quantity of the links they shared in their library management system (LMS) and content management systems (CMS). Librarians must also improve their knowledge about OA, predatory publishing, and indexing services to ensure the quality of OA resources being disseminated on their websites. The support of their institution of the resources needed by their library is also important for these initiatives to be implemented.

Introduction

In the digital age, the paradigm of information accessibility has been dramatically transformed, placing an increasing emphasis on the availability of open access (OA) resources (Guédon, 2017). OA refers to the practice of providing unrestricted access to scholarly research, educational materials, and other resources via the internet, free of charge or other access barriers (Tennant et al., 2016). This movement is a response to the limitations imposed by

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traditional publishing models, which often restrict the dissemination of knowledge through paywalls and subscription fees (Frank et al., 2023; Siler, 2017).

OA resources are pivotal in democratizing knowledge (Acharjee & Acharjee, 2024). They ensure that students, researchers, and educators from around the world can access high-quality information regardless of their financial or institutional affiliations. This is particularly important in the context of higher education in the Philippines, where economic disparities and varying levels of institutional funding can impact the accessibility of academic resources. By advocating OA, libraries can bridge these gaps, thus supporting academic excellence and fostering a more inclusive academic environment (Maron et al., 2019).

The role of academic libraries in this landscape cannot be overstated. Libraries have traditionally been the gate openers of knowledge; in the digital era, this role extends to the curation and dissemination of OA resources (Boufarss & Haviainen, 2021). Librarians, as information professionals, are uniquely positioned to identify valuable OA resources, integrate them into library collections, and make them easily discoverable for their patrons (Buitrago-Ciro & Bowker, 2020).

Moreover, the active marketing of OA resources by librarians is crucial. According to Haddad and Aharony (2024), librarians see great importance in their role of advising researchers regarding OA. The potential of OA benefits remains underutilized if users are unaware of their existence or unsure of how to access them despite the growing availability of OA materials. Librarians play a vital role in educating their communities about OA, guiding users in navigating these resources, and advocating for the adoption of policies within their institutions (Nagpal, 2021). Libraries implement various strategies to advertise OA to their patrons, such as adding OA resources to the online public access catalog (OPAC), sharing information about OA, and hosting workshops and lectures, all of which are crucial for maximizing the impact of OA initiatives (Adil et al., 2024; Balbin, 2025).

In the Philippines, higher education institution (HEI) libraries have made strides in embracing OA, but there is a need for a systematic evaluation of these efforts. In a country where higher education is heavily commercialized, opening access to knowledge is an unusual idea to many (Garcia et al., 2013). However, Pawlowski et al. (2014) argued that the potential of OA in the Philippines is high, given the economic barriers faced by HEIs. This study aims to fill that gap by assessing the OA initiatives of HEI libraries, focusing on the quantity and quality of OA resources they disseminate. By creating an inventory of OA links and evaluating the extent of their integration into OPACs and web pages, this research provides a comprehensive overview of how well these libraries are marketing OA resources to their patrons. The findings will inform the development of an OA institutional repository or directory, further enhancing the visibility and accessibility of OA resources in the Philippines. This research presents an overview of how HEI libraries in the Philippines are supporting OA. It also offers valuable insights for library administrators and policymakers to enhance the accessibility and visibility of OA resources, thus supporting academic research and education in the country.

Literature Review

The rise of OA and open educational resources (OER) has revolutionized academic publishing, creating a more inclusive and accessible knowledge landscape. This review explores recent

scholarly discussions on the advantages of OA and OER and the changing roles of librarians in advocating for them, despite the barriers impeding their widespread adoption.

One of the major benefits of using OERs is to expand access to learning and allow readers anywhere in the world to access these resources at any time (Salisbury et al., 2023). Because of the increasing cost in higher education and even with the high-cost resources needed for research, zero cost access to knowledge benefits students and researchers in the academic world (Swain & Pathak, 2024). Similarly, Nwaohiri (2021) emphasized that the promotion and awareness opportunities for OER can result to enhanced higher education success.

Unfortunately, several barriers were enumerated by Adil et al. (2024), such as lack of support, resources, skills, and infrastructure, which are still faced by librarians, educators, and other academics in disseminating OA resources. Academics also noted that lack of skills, awareness, and support are barriers or problems encountered in both publishing and using OERs (Kumar et al., 2021). Although some academic communities or fields have better awareness and usage of OERs, sustaining open access initiatives is still one of the biggest challenges. In addition, training programs and copyright awareness sessions are needed to further popularize the use of OERs (Midha & Kumar, 2022). Specifically, librarians and students need to be trained in identifying, accessing, evaluating, and using OA resources to increase their awareness and utilization of OA resources (Adil et al., 2024).

Librarians are not just to disseminate OA resources but must also educate users with OA resources. As part of their function as gate-openers, librarians use varied methods in educating users about OA resources and publishing (Boufarss & Harviainen, 2021). These includes user education initiatives intended for both users-as-readers and users-as-authors. Lusk et al. (2023), added that librarians must work closely with faculty in scholarly publication support roles by advocating OA. Even in expanding institutional repositories, it is important to foster librarian-faculty partnerships to make scholarships more open and accessible (Butterfield et al., 2022). Furthermore, making institutional repositories OA enhances the visibility of university research outputs in higher education (Korkuvi et al., 2022).

Libraries from developing countries tend to benefit from these OA opportunities. Due to the rise of free access to scientific literature, knowledge and research products can significantly increase even in resource-constrained environments (Buehling et al., 2022). Even without the use of expensive back-end software, academic libraries could provide information sources from different sources in a single-window search using free-source library management systems (Roy et al., 2022). Ogunbodede and Cocodia (2023) emphasized that the role of librarians in providing information to OA resources is one potential solution to lack of high-quality materials, high cost of commercial textbooks, and underfunding of general education. However, if the cost of publishing continuously increases and there is a lack of institutional OA mandates and policies, progress of OA acceptance among developing countries will remain slow (Sheikh & Richardson, 2023).

Another issue that slows down the acceptance of OA among faculty and librarians is the confusion around OA publishing and the growing concerns surrounding quality and reputation, as well as the perceived lack of peer review on OA journals. In a study conducted by Lusk et al. (2023), many faculty viewed OA publishing negatively due to the perception that OA journals are lower quality than subscription journals; worse is that there is a continued

belief that OA journals are fake or predatory. Scott et al. (2023) echoed these concerns as one reason why some faculty have negative perceptions regarding the quality of OA resources. These concerns are valid because there are OA journals that exist for the sole purpose of profit, not the dissemination of high quality research findings and furthering of knowledge (Berger & Cirasella, 2015). To foster greater OA participation, some libraries hire specialized scholarly communication librarians and offer workshops about predatory publishing to prevent patronage of and publication in predatory journals (Buitrago-Cirio & Bowker, 2020). Librarians must also improve their own knowledge regarding predatory publishing to better help researchers acquire research literacy skills (Buitrago-Cirio, 2022).

Although the benefits of OA are well established, recent literature extends beyond these general assertions to analyze the specific ways in which libraries advocate for OA and related open practices. Studies have identified a range of practical activities that librarians have implemented to advocate for OA (Jurchen, 2020; Nagpal and Radhakrishnan, 2021), open data (Oladokun & Gaitanou, 2024), open science (Saarti et al., 2020; Liu & Liu, 2023; Dorotić Malič et al., 2023; Zainal et al., 2023), and open publishing (Olubiyo & Fagbemi, 2021).

Besides the identifying library strategies, numerous studies have examined the awareness and usage of librarians, faculty, and students in the different OA resources. Research shows that faculty and students usually have positive views of OA resources, but faculty tend to know more about OA than students (Nazmul, 2020). However, some academic library users are still unaware of OA resources, such as those provided during the COVID-19 pandemic (Chisita et al., 2022). To address this, researchers recommended aggressive campaign among librarians to increase the use of OER to enhance teaching, learning, and research (Nwaohiri, 2021). As part of broader OA advocacy strategies, Hlasten (2023) emphasized that librarians must also advocate smaller publishers offering hybrid or gold OA in order to promote diverse sources of knowledge that benefit students and researchers.

As the academic community in the Philippines continues to embrace OA and OER, ongoing research and policy development will be crucial to address the emerging challenges and maximize the benefits of these transformative practices. Librarians continue to play a crucial role in these developments; they are well positioned to advocate for OA resources while providing researchers with more direct information on how to clearly distinguish credible OA resources from predatory publications (Buitrago-Cirio & Bowker, 2020). In some libraries, librarians work with committees and liaise with researchers to discuss open science concerns, which may include selection of the relevant OA journal, identification of predatory journals, publication of papers in the institutional repositories, licenses and copyright issues, open review, open science from the researcher's perspective, and many more services (Dorotić Malič et al., 2023). These practices illustrate the proactive role of librarians in influencing their university policies with regards to OA. In terms of the active role of librarians, Buitrago-Cirio and Bowker (2020) recommended that information about OA and predatory publishing should be made available to library users. This study aims to shed light on the dissemination initiatives of libraries in the context of their library websites to suggest recommendations on how academic libraries could further maximize the potential of OA resources in their institutions. Existing research has already explored awareness and attitude of librarians toward OA; however, no studies at present have conducted an inventory of the OA links shared by academic libraries on their websites and in their OPACs.

Research Objectives

This study aimed to explore the OA initiatives of HEI libraries in the Philippines by examining the links shared in their websites and systems. Specifically, the study aimed to accomplish the following:

1. Identify the types and subject fields of the OA resources disseminated by HEI libraries in their websites and systems.
2. Determine the extent of OA dissemination practiced by private and public HEI libraries in terms of the links they embed in their websites and systems.
3. Conduct an inventory of the OA links integrated into the libraries' OPAC or web pages.
4. Examine the OA resources linked by HEI libraries through cross-referencing with recognized indexing databases and published lists of potentially predatory journals.
5. Develop recommendations for the creation of an OA institutional repository or directory for academic libraries in the Philippines.

Methods

This study employed a quantitative research design focusing on website analysis. The researcher conducted a comprehensive review of the websites of HEI libraries in the Philippines to identify and catalog OA resources. It used an ad hoc list to record the types of resources, their accessibility, and the integration of OA links in their OPAC or web pages. To be included in the list, the resource must be marketed on the website under "open access resources," "open educational resources," or "free online resources." This method of using a checklist to collect and tally data from library websites has been utilized by various research to evaluate usability of OPAC or check availability of certain information (Kumar & Mir, 2017; Li & Wanigasooriya, 2016). Ullah (2024) also used the same method to determine necessary improvements on design, features, and number of items contained in selected library websites. Although libraries use social networking sites as platforms for marketing services, including OA resources, these do not have perpetual visibility as newer posts and contents superseded initially posted contents, and thus were not included in this study. The websites or the OPAC of the libraries offer a more permanent access to OA links. Although focusing on websites and OPACs may limit the assessment of the full range of libraries' promotional efforts, this could still provide insights toward the extent of effort that libraries exert in maximizing their websites or library portals as marketing or promotional tools for OA resources. The researcher initially identified universities from list of Recognized and Accredited HEIs (CHED, 2024) per region and checked which institutions have working school websites or portals. Then, libraries were checked for an existing OPAC, LMS, or website. For the purposes of this study, LMS, OPACs, and CMS-based library websites were examined as the primary platforms through which HEI libraries disseminate OA resources. Since LMS availability and accessibility varied across HEI libraries, the study also considered CMS-based library websites as alternative or additional means to provide ongoing access to OA resources. Although these platforms differ in structure and function, presenting these allows readers to understand the digital environments in which the assessment was conducted and the range of strategies libraries use to make OA resources accessible to users.

Table 1 shows the breakdown of the HEI library websites visited. Initially, 404 HEIs were identified. After checking the availability and accessibility of their websites, only 77.22% had visible and retrievable websites. These libraries have different strategies on how their OA

TABLE 1
Summary of HEI Libraries Surveyed

	With Visible OPAC/Website	Without Visible OPAC/Website	Total
Private	185	65	250
Public	127	27	154
Total	312	92	404

resources links were presented depending on the set up of their library system and website. Some had embedded features in their library management system that enabled them to integrate OA links. Some libraries used other content management systems to provide lists of OA resources. Overall, a total of 312 OPAC's or library websites were visited; 59.29% of those are private HEIs and 40.71% are public, state-run or LUC institutions.

Out of the 312 libraries left for analysis, it was found that 93 libraries do not have a publicly accessible library management system (LMS). They have visible websites made with paid or open-source CMS, but link to their OPAC and LMS is locally hosted. As shown in Table 2, Follett Destiny Library Manager tops the list of LMS used in the Philippines, followed by Koha, which is an open-source LMS. A percentage of libraries also used in-house LMS, such as the iLib or Tuklas of the University of the Philippines System. Other LMS used by HEI libraries in the Philippines include TLC, Librarika, InfoLib, PageMaster, Athena, Online LMS, Atrium, NewGenLib, and others. The "others" include Alexandria, Opals, WebPAC Pro, DynDNS, and many more.

Due to the absence of library management systems, some libraries set up library websites using various content management systems (CMS). Table 3 shows that the majority of the libraries' websites were managed and designed by their own university's ICT. Some are

TABLE 2
Frequency Distribution of LMS Used by HEI Libraries

	Frequency	Percentage
No LMS	93	29.81%
Follett	89	28.53%
Koha	55	17.63%
In-house	23	7.37%
TLC	12	3.85%
Librarika	10	3.20%
InfoLib	4	1.28%
PageMaster	4	1.28%
Athena	3	0.96%
Online LMS	3	0.96%
Atrium	2	0.64%
NewGenLib	2	0.64%
Others	12	3.85%
Total	312	

TABLE 3
Frequency Distribution of CMS Used by HEI Libraries

	Frequency	Percentage
In-house	97	28.95%
Integrated	95	28.36%
WordPress	66	19.70%
Google Sites	51	15.22%
Wix	10	2.98%
Blogger	3	0.90%
Weebly	2	0.60%
Joomla	2	0.60%
Others	9	2.69%
Total	335	

integrated into the LMS that they use. Other libraries with no LMS or a developed in-house website to integrate their OA links, used WordPress, Google Sites, Wix, Blogger, Weebly, Joomla, and others as an alternative CMS. There are some libraries that used multiple strategies, such as maintaining an in-house website, integrating links in their LMS, and supplementing with WordPress or Google Sites.

The feature of Follett and Koha that enables libraries to integrate other links and modify homepages makes OA dissemination readily available for libraries using said LMS. Data shows that many libraries still do not have library management systems. Libraries with a working LMS have the capacity to incorporate OA links and other library information on their homepage. Results also show that many libraries are also maximizing free software applications even in their LMS, such as Koha, Librarika, PageMaster, NewGenLib, and others. Even the prevalence of WordPress, Google Sites, Wix, and Blogger, which all have “free-mium” packages, shows that libraries also maximize open-source CMS.

Results

Varied resource types were linked by HEI libraries in their websites. As shown in Table 4, most of the OA links embedded on library websites of academic libraries are OA journals. This is followed by resources, such as websites and online documents, and links to publishers offering OA contents. However, 10% of the resources linked by several libraries were found to be unavailable, erroneous, and inaccessible. There are also several journals that only offer OA articles but are not fully OA in nature; these were classified as semi-OA journals. Several journals are OA but have ceased publication. Fortunately, the websites of these discontinued journals still provide access to their archives. There are also libraries that provide links redirecting users to LibGuides created by other universities, which offer other lists of OA resources. This shows that the OA resources linked by HEI libraries range from journals, resources, databases, educational resources, repositories, libraries, directories, government and non-governmental documents to even library guides. The presence of erroneous links, LibGuides, and discontinued journals in the OA links of the HEI libraries indicates the need for update of the said links to make sure that only working and relevant information sources are shared.

	Frequency	Percentage
Journals	1,480	50.73%
Error	294	10.08%
Resource	241	8.26%
Publisher Initiative	128	4.39%
Database	118	4.05%
OER	110	3.77%
Libraries	98	3.36%
Directory	83	2.84%
Semi-OA Journals	76	2.61%
NGO	72	2.47%
Repositories	64	2.19%
Government	55	1.89%
Institutional Repositories	36	1.23%
LibGuides	32	1.10%
Journals (Discontinued)	30	1.03%
Total	2,917	

In terms of the topics covered by the OA links shared by HEI libraries, Table 5 shows that most of the OA links are multidisciplinary. Out of the 2,917 OA links, 13.88% are multidisciplinary. Specific topics with the most OA resources linked include accountancy, business and economics, humanities, and medical. Several subjects also have few OA resources which comprise less than 1% of the resources linked by libraries. These include religion, logic, sports, environmental science, marine sciences, veterinary, and geology and earth sciences. Overall, these topics reflect the multidisciplinary focus of the different HEIs in the Philippines, which their libraries try to support in terms of adding OA resources. The number of OA links per field also illustrates that other fields tend to have more OA content compared to other fields.

Table 6 shows that a private HEI in the Calabarzon region shared the greatest number of OA links on their website. Out of the total resources linked by all libraries, excluding the

Field	Frequency	Percentage
Multidisciplinary	405	13.88%
Accountancy, Business and Economics	308	10.56%
Humanities	275	9.43%
Medicine, Nursing, Health	267	9.15%
Education	227	7.78%
Sciences	152	5.21%
Information Technology, Computer Sciences	126	4.32%

Field	Frequency	Percentage
Social Sciences	111	3.81%
Media, Music, Arts	109	3.74%
Management, Human Relations, and Organizations	105	3.60%
Governance and Public Administration	84	2.88%
Psychology and Guidance Counselling	73	2.50%
General Reference	71	2.43%
Food and Nutrition	70	2.40%
Mathematics, Statistics	63	2.16%
Engineering and Technology	57	1.95%
Criminal Justice and Military Science	56	1.92%
History, Geography	48	1.65%
Architecture, Designing, and Planning	44	1.51%
Tourism, Travel, Hotel and Restaurants	43	1.47%
Agricultural Sciences	42	1.44%
Library and Information Science	41	1.41%
Law	38	1.30%
Religion, Spirituality and Faith	29	1.00%
Logic, Ethics, Philosophy	20	0.69%
Sports and Wellness	15	0.51%
Environmental Sciences	13	0.45%
Aquaculture and Marine Sciences	12	0.41%
Veterinary and Animal Sciences	8	0.27%
Geology and Earth Sciences	5	0.17%
Total	2,917	

TABLE 6
Libraries with Most OA Integrated in Their Website (Noted by Region)

Private HEI Library	Frequency	Percentage	Public HEI Library	Frequency	Percentage
Calabarzon-A	804	30.65%	NCR-P	228	8.69%
Calabarzon-G	322	12.28%	Ilocos-A	186	7.09%
NCR-H	190	7.24%	Central Visayas-A	112	4.27%
Caraga-E	156	5.95%	NCR-K	93	3.55%
Central Luzon-B	129	4.92%	NCR-O	81	3.09%
NCR-Ae	125	4.77%	Caraga-A	70	2.67%
Ilocos-F	117	4.46%	West Visayas-J	69	2.63%
NCR-Ad	111	4.23%	Calabarzon-I	67	2.55%
NCR-D	92	3.51%	Central Luzon-B	66	2.52%
Central Visayas-G	88	3.35%	West Visayas-K	60	2.29%
Average	23	0.89%	Average	21	0.80%

t-test p-value = 0.008

erroneous resources, 30.65% of these are shared by that library, followed by a library in the same region with 12.28%. For public HEI libraries, a library in National Capital Region (NCR) linked 8.69%, followed by a library in Ilocos region with 7.09% of the total listed OA resources. The 185 private HEI libraries shared an average of 23 links (0.89%) of the total OA resources. Public HEI libraries also averaged 21 links (0.80%) of the total open resources. Comparing the frequency of links shared by private and public HEI libraries, private libraries tend to share more OA links.

Based on the frequency distribution on the range of OA links shared by libraries, Table 7 shows that only 3.53% shared more than 101 OA links. Most of the libraries shared one to 25 OA links. It also revealed that 33.97% of the libraries with accessible and visible library websites contain no OA links at all. Overall, the libraries share an average of 22 (0.84%) of the total OA links.

	Frequency	Percentage
More than 101 Open Access Links	11	3.53%
76 to 100 Open Access Links	5	1.60%
51 to 75 Open Access Links	20	6.41%
26 to 50 Open Access Links	42	13.46%
1 to 25 Open Access Links	128	41.03%
0 Open Access Links	106	33.97%
Total	312	

Because the majority of HEI libraries websites or OPACs shared one to 25 (an average of 22) OA links, the top 25 OA resources disseminated by libraries must also be revealed. Table 8 shows that the top shared OA resource is the DOAJ, followed by Philippine e-journals and Project Gutenberg. Although Philippine e-journals is a subscription platform, there are OA journals and articles retrievable from their website, which motivated 26.20% of the HEI libraries to share it as an OA resource. Other repositories and databases similar to Directory of Open Access Journals (DOAJ) (e.g., the Directory of Open Access Books [DOAB], Educational Resources Information Center [ERIC], Open Access Theses and Dissertations [OATD], Connecting Repositories [CORE], Social Science Research Network [SSRN] and Google Scholar) were also linked by many HEI libraries in their website. Local databases and libraries (e.g., Department of Science and Technology [DOST] STARBOOKS, PHL CHED Connect, Philippine e-Lib) were also shared. Websites of publishers with OA initiatives (e.g., Springer, Wiley, Biomed, PubMed, JSTOR, ProQuest, OpenStax, PLOS, HighWire Press, and EBSCO) were also linked by libraries. Other OA initiatives (e.g., the Internet Archive, Open Textbook Library, and OER Commons) were also included in the commonly linked OA resources.

Besides the goal of providing quantitative description of the resources shared by academic libraries, this study also aims to qualify the resources. The following results compared the list of resources shared by different universities with known lists of predatory resources and compared it with different indexing and abstracting services. Table 9 shows that five (5) OA journals are included in the Beall’s list of Predatory Journals and four (4) claims to be indexed

TABLE 8
Frequency Distribution of Links Disseminated by HEI Libraries

OA Resources	Frequency of HEI Libraries Linking the OA Resource	Percentage
Directory of Open Access Journals (DOAJ)	112	35.78%
Philippine e-journals	82	26.20%
Project Gutenberg	80	25.56%
Directory of Open Access Books (DOAB)	76	24.28%
DOST STARBOOKS	70	22.36%
Springer Open	65	20.77%
PHL CHEd Connect	64	20.45%
ERIC	58	18.53%
Internet Archive	54	17.25%
Wiley Open Access	51	16.29%
BioMed Central	50	15.97%
J-STOR Open Access	47	15.02%
PubMed Central	45	14.38%
Social Science Research Network (SSRN)	42	13.42%
Google Scholar	39	12.46%
Open Textbook Library	39	12.46%
Philippine E-lib	38	12.14%
CORE	38	12.14%
ProQuest PQDT Open	38	12.14%
Open Access Theses and Dissertations	37	11.82%
OpenStax CNX	36	11.50%
Public Library of Science (PLOS)	35	11.18%
HighWire	34	10.86%
OER Commons	32	10.22%
EBSCO Open Dissertations	32	10.22%

by DOAJ which is less than 1 percent of the total journals shared by HEI libraries. This indicates a careful curation was done and very few have questionable quality.

On the other hand, it is also possible to compare the list with indexing services acknowledged by local accreditation and standards. Results also show that 31.90% of the journals are Scopus indexed; 10.28% are indexed in Emerging Sciences Citation Index (Clarivate-Web of Science), and only 1.26% of the journals are indexed in Andrew Gonzales Philippine Citation Index. Lastly, 29.26% of the journals are indexed in the DOAJ. Although most of the journals are not indexed or yet to be recognized by indexing services, the list indicates that HEI libraries carefully selected the resources they shared and attempted to exclude OA journals considered to be predatory and/or poor-quality.

In terms of the publishers, Table 10 shows that 13 to 14 publishers shared by libraries are also found in known lists of predatory publishers. The results revealed that HEI libraries included a significant number of potentially predatory publishers in their links. Although these

TABLE 9
Frequency of Flagged vs Recognized Open Access Journal Titles

Journals	Frequency (n = 1,586 OA, Semi-OA and Discontinued Journals)	Percentage of Journals
Beall's List of Predatory Journals	5	0.32%
Claims to Be Indexed by DOAJ	4	0.25%
Scopus Indexed	506	31.90%
Clarivate Indexed	163	10.28%
AGPC Indexed	20	1.26%
DOAJ Indexed	464	29.26%

are 10 percent among the publishers that were linked in the libraries' websites, HEI libraries must reexamine their dissemination initiatives to improve the quality of promoted information resources in their websites. On the other hand, 15 of the journals are classified and recognized by Australian Political Studies Association, 12 of these publishers are recognized by DOAJ, and 20 of the publishers are shared by Wikipedia. Libraries could revisit these websites and enrich their lists to include more classified and recognized titles and publishers.

TABLE 10
Frequency of Flagged Publishers vs Recognized Publishers

Publishers	Frequency (n = 128 publishers)	Percentage of Publishers
Predatory Publishers List	14	10.94%
Beall's List of Predatory Publishers	13	10.16%
APSA Classified Index	15	11.72%
DOAJ Open Access Publishers	12	9.38%
Wikipedia List	20	15.63%

Discussion

The results described the nature of OA resources shared by HEI libraries in terms of quantity and their partial quality in terms of the lists warning and recommending journals and publishers. The subject content of the resources also reflects the quantity of available information provided by OA publishing.

HEI Library Websites and Systems in the Philippines

The results revealed that many libraries have established websites and systems that they use to embed information about OA resources. Commonly used LMS are Follett, Koha, and in-house developed systems; common CMS used are also in-house developed, integrated in their LMS and WordPress. These websites and systems are required for HEI libraries to have; even the inclusion of OER is explicitly stated in the minimum requirements of Commission on Higher Education (CHED) as suggested supplements for library collections (CHED, 2021). However, the data shows that many HEI libraries still need to comply with the minimum requirements set by the commission as stated in Section 4 and 5 of the memoranda. Even with the budget constraints and lack of administrative support, available open-source CMS and

LMS are used by other libraries without the need for expensive subscription. In fact, some libraries invested in proprietary CMS to ensure delivery of information in a proper and easily understandable manner (Factor et al., 2023). Libraries with bigger budgets could develop separate tools embedded with recommender systems to help users select suitable OA journals (Entrup et al., 2024).

Types and Disciplines of Open Access Resources Disseminated by HEI Libraries

Most OA resources disseminated by HEI libraries are multidisciplinary, and most of these are OA journals. With the goal of many academic librarians to connect their patrons to vast resources, multidisciplinary OA repositories (e.g., DOAJ, DOAB, OATD) are the most efficient platforms to introduce OA resources in different fields of specialization at one time. Most academic libraries also cater to universities offering more than one academic program making it too expensive to subscribe to field-specific journals or databases. Multidisciplinary OA resources enable libraries to simultaneously cater to multiple students, faculty, and researchers regardless of their field at lower or no cost. Recent studies have shown that one-stop access is an effective solution for libraries in providing easy access to heterogeneous collections through a single location (Prajapati, 2016). These also offer simplified single interfaces for users (Roy et al., 2022), which also simplifies the backend design of the interface for librarians. In conclusion, multidisciplinary OA resources, such as DOAJ, DOAB, OATD, and many others, are convenient for both librarians and users.

A significant number of field-specific OA resources in business and economics, humanities, medicine, education, and natural science were also shared by different libraries. Although most libraries tend to share only those common multidisciplinary resources for convenience and efficiency, other libraries go above and beyond by disseminating field-specific OA resources to their patrons. The data mirrors the commonly offered academic programs in the Philippines, which are also in demand for Filipino students both in private and public HEIs. The 4th Philippine Graduate Tracer Study conducted by Tutor et al. (2021), revealed that social sciences, business and law, health and welfare, science and agriculture, and education are among the top chosen degree programs that HEIs offer. Consequently, OA links shared by HEI libraries would normally be aligned with the disciplines that their schools offer. This is also the reason why schools offering the same degree programs have similar OA links shared by their libraries. Other libraries could benchmark websites of libraries catering to similar degree programs to discover other OA resources they could share.

The OA links shared by libraries are also dependent on the number of OA resources available on the respective disciplines. The fields that topped the list also reflect the growth of OA in various fields. According to Severin et al. (2018), there are varying proportions of openly accessible research outputs across disciplines depending on how scholars from different disciplines embrace the concept of OA and on the relative importance of publication channels used by scholars. The category of multidisciplinary sciences has the highest gold OA percentage in Web of Science (Wang et al., 2018). Although the data of Piwowar et al. (2018) showed that biomedical sciences had the highest OA prevalence, a disclaimer was made to indicate that multidisciplinary journals were categorized under biomedical research. These recent statistics coincide with the findings that multidisciplinary resources are the most shared OA resource among libraries due to the growth of multidisciplinary OA publications.

OA Links Embedded by Private and Public HEI libraries

The findings also revealed that many OA resources are not well-disseminated on library websites. Private HEI libraries on average share 23 OA links, while public HEI libraries shared an average of 21 OA links. However, data shows that there are many libraries with websites or systems—which could be an opportunity to embed OA links—that did not provide any links at all. Despite their probable awareness of OA resources, many libraries were unable to share as many OA resources on their websites. This could be due to the lack of institutional support, resources, and even skills training needed to implement OA dissemination (Adil et al., 2024). Creating a repository, or even simply designing a website that contains links to OA resources, requires adequate ICT-related skills. Another problem is that most libraries rely on in-house websites managed by their ICT. Some LMS do not have features to embed links in their website. As a solution, librarians often maximize free CMS (e.g., WordPress and Google Sites) as a means of sharing OA resources. Factor et al. (2023) assessed websites of HEI libraries and found that their CMSs have been utilized to their fullest, enabling patrons to access information about collections and services with just one click. Other libraries also use social media to share OA resources, which was not included in this study. This study excluded social media, despite social media being an effective platform for information dissemination, because it has issues regarding permanent visibility of information, which makes it difficult to keep valuable content—such as OA resources—accessible over time.

Inventory of OA Links

The study was able to discover 2,917 OA resources from the 312 HEI library websites or systems visited. With an overall average of sharing one to 25 OA links per library website or system, the top 25 shared OA links presented an interesting trend to quantify the OA initiatives of libraries in the Philippines. The top shared OA repository, which is the DOAJ, was only embedded in 35.78% of the visited HEI library websites. The trend showed that more than half of the websites, and the LMS of these libraries, did not even include other common repositories (e.g., DOAB, OATD, Philippine E-journals, and Project Gutenberg). This study calls for HEI libraries to embed at least these OA resources to introduce free resources to their patrons to supplement their current print collection and electronic subscriptions. Studies also found that most are only familiar with OA journals in their field (e.g., DOAJ, OATD, and DOAB) (Sheikh, 2019; Sultan & Rafiq, 2021). Besides familiarity, DOAJ also topped the list of most-shared OA resources due to its strong reputation in the OA community (Entrup et al., 2024). Nevertheless, libraries must also advocate small publishers, along with the major publishers and databases offering hybrid and gold OA, to ensure diversity of knowledge resources accessed by and shared to users (Nazmul, 2020).

Cross-Referencing of OA Resources Linked by HEI Libraries with Indexing Databases and Predatory Journal Lists

The results show that librarians selected resources indexed in DOAJ, and Scopus; however, several resources are found on lists of predatory journals or publishers. In addition, 10.08% of the links embedded by libraries were erroneous, meaning that they were not actually OA, no longer running, untraceable, taken down, or that the original domain was already taken over by other websites. This suggests that, beyond embedding links to their websites, libraries

must also recheck or revisit the links from time to time to make sure that all links are working. There were also libraries that embedded hyperlinks to OA links that instead redirected users to the OA links shared by other university libraries. One way of making sure that these links are legitimate and working is to visit each link and to assess the quality and relevance of the contents for users. Checking against a list of known predatory journals or publishers would also help improve the list of OA resources to avoid sharing low quality information with the users. However, Kakamad et al. (2024) argues that watchlists also have shortcomings. Specifically, Beall's list is criticized for its lack of context and bias against OA publishers from less economically developed countries (Berger & Cirasella, 2015). Some watchlists also need refinement and regular updates to accurately reflect changes in publishing practices (Kakamad et al., 2024). Libraries must therefore continually revisit and recheck the links that they embed to make sure that no predatory resources are included. Buitrago-Ciro (2022) emphasized that librarians must also update their knowledge and skills around predatory publications and indexing services to qualify as trainers of researchers and scholars. Debates regarding publishers are predatory or not require critical approach for researchers and librarians. Ojala et al. (2020) encouraged librarians to assess OA journals for their inherent value rather than their brand, and to evaluate their quality versus their prestige in promotion and tenure. As an alternative, Cabells list of predatory journals (Strielkowski, 2018), Academic Journal Predatory Checking (AJPC) system (Chen et al., 2023), and Kscien's list of predatory journals (Kakamad et al., 2019) could be referenced in determining the quality of journals and publishers. Soliciting opinions from experienced researchers or using established criteria is still advisable in assessing quality of journals and publishers (Misra et al., 2017). Apart from exclusionary approaches such as cross-referencing with blacklists, DOAJ is also providing datasets that contain snapshot of the journals indexed in their database as a historical record that libraries and researchers may consult (DOAJ, 2025).

Recommendations for the Creation of an OA Institutional Repository or Directory for Academic Libraries in the Philippines

Libraries must maximize other OA resources and make use of their websites and systems as a permanent display of their OA links. Despite the active dissemination of libraries in the use of OA resources, the actual integration of OA links in their websites still needs to improve. Maximizing the features of their LMS and utilizing available open-source CMS are some of the cost-efficient strategies that libraries could implement to disseminate OA. Librarians must explore other types and categories, beyond journals and multidisciplinary resources to advocate field-specific OA resources as well. Increasing the number of OA links would also be beneficial to offer more options to users. This includes sharing small publishers to keep the diversity of knowledge sources. Benchmarking from other HEI library websites with similar degree program offerings would enable librarians to explore other OA resources. Most importantly, libraries must make sure all links are working by continuously updating lists to prevent predatory content from being disseminated. Development of institutional repositories for OA resources in academic institutions is therefore recommended to provide easy access to OA links (Monirul & Shafkat, 2023; Eromosele et al., 2022). Academic and college librarians in the Philippines may start from examining the integrity of their existing repositories, databases, and links in their website using available tools such as watchlists or safelists (Teixeira Da Silva & Nazarovets, 2023).

Conclusion

This study concludes that HEI libraries disseminate varied OA resources. Although many libraries provided subject specific OA resources, multidisciplinary resources turned out to be the commonly shared OA resources. This includes the major databases—such as DOAJ, DOAB, and OATD. The survey also revealed that many OA resources are still under-disseminated by academic libraries in their websites and systems. Some libraries could be considered as appropriately “OA” or “overachiever” in terms of providing OA information while others remain “nonchalant” or “laid-back” by providing little to no information about OA resources.

Libraries that maximized their LMS and CMS to disseminate OA to their users implemented above and beyond strategies such as specifying OA resources per degree programs. Institutional support to the resources and training needed for libraries are therefore important to effectively advocate OA resources. This also includes librarians updating their knowledge about OA, predatory publishing, and indexing services to ensure the quality of OA resources being disseminated in their websites.

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Learning from Experience: Librarians as Research Partners

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Given current discussions in the field about librarians' engagement in research partnerships, this study examines the experiences of librarians at The Ohio State University, a doctoral university with very high research (R1), to better understand their preparation for the collaborations, the knowledge and skills they contributed, their roles on project teams, their motivation for joining teams, and the subsequent criteria they have adopted for determining participation on future projects. Interview and post-interview survey findings indicate librarians have developed their own strategies for determining their roles on research teams based on their individual strengths and that they have benefitted from the experiences overall. This study also reveals inconsistencies in support for this form of engagement and makes recommendations for libraries related to scoping involvement and establishing criteria for participation of librarians on research teams.

Introduction

Librarians support researchers by offering best practices, brainstorming approaches, and locating resources. In this way, they are connectors between expertise, services, resources, and users. In recent years, there has been a growing trend of librarians participating on research teams. From the initial trend of librarians contributing to research teams to those who have become full partners in research projects, librarians are viewed as collaborators instead of merely a resource or connector in the process (Batten, 2020; Bell, 2021; Mazure & Alpi, 2015). Andrew Cox, in *Evolving Academic Library Specialties*, finds optimism in librarians' ability to extend their reach beyond their traditional support for scholarship and "into specialties embedded in academic departments and research teams" (2013; p. 1526.). OCLC reported that its expertise at building partnerships and their ease with social interoperability across the university is one set of skills librarians can bring to a research team (Bryant et al., 2020).

Tenure-track librarians are often expected to produce scholarship to fulfill promotion and tenure requirements. At the authors' institution, for example, all tenure-track librarians have faculty status and are expected to meet requirements in the areas of librarianship (80%

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of time) and service and research (20% of time) for promotion and tenure. Librarians' research agendas can be based on disciplinary background or librarianship roles, contributing new ideas or extending previous research. Librarians publish practitioner-informed research that shares case studies, informs services, or models emerging trends within the profession. In this way, research in librarianship informs ongoing practice, approaches, and strategies.

Librarians often span departmental boundaries that are inclusive of several disciplines, regularly connect with other units, and serve as a lynchpin for recognizing faculty strengths. With an increasing push at many universities to grow and diversify research dollars, libraries are supporting these endeavors and encouraging librarian engagement on research teams from project onset. Deeper engagement and integration at any point in the research process—particularly during the planning phase—allows librarians not only to connect researchers to services and resources but also to contribute their own skills and expertise to research teams. Many librarians are adept at navigating university or research processes, serving as facilitators, or interrogating underlying assumptions embedded in research approaches. Librarians' broad subject knowledge, understanding of reference interview strategies, and ability to connect users to resources aligns naturally with work on a research team. These skills can be valuable to any research team, but particularly to interdisciplinary teams where members' skills and expertise vary.

Each of this study's authors has been involved in research partnerships with disciplinary faculty. Digital Humanities Librarian Leigh Bonds has collaborated on several projects, contributing her disciplinary knowledge and skill sets (e.g., technical, research, project management, data management). Head of Research Services Meris Longmeier joined an interdisciplinary research team focused on translating research into application and contributed campus connections, her understanding of the publishing cycle, and understanding of research support available on campus to the partnership. English Librarian Jennifer Schnabel partnered with a disciplinary faculty member at a previous institution on a book chapter and has been included on several grant applications submitted by disciplinary faculty at Ohio State. Our involvement in these projects and knowledge of other librarian colleagues' activities position us well to investigate the topic of research partnerships.

In light of discussions in the field—from professional conferences and in the literature review—as well as our own varied experiences, we were curious about the experiences of colleagues who have participated on research teams, and about what their contributions were to those collaborations. We also wondered what recommendations our colleagues would have for library organizations considering prioritizing librarian engagement on research teams. Therefore, for this study, the research questions we developed included:

- What roles do librarians have when involved as part of research teams and in research partnerships with other faculty outside of library and information science?
- How do individual expertise and specific skill sets (e.g., collaboration, project management, communication, networking, facilitation, and follow-through) the librarians possess impact the research partnership?

Literature Review

Recent articles and reports examine librarians' participation in research partnerships explicitly (Brandenburg et al., 2017; Borrego et al., 2018; Bright, 2019; Batten, 2020; Borrego & Pinfield, 2020; Evidence Base, 2021; Rabasa & Abrizah, 2022; Mihram & Miller, 2022). Several other

articles published since 2011 address the topic of research partnerships in articles about librarians' roles and librarianship models. Those focusing on librarians' roles mention research partnerships within the context of evolving roles of subject and liaison librarians (Auckland, 2012; Johnson, 2020; Kranich et al., 2020; Resnis & Natale, 2020), transforming subject and liaison librarian roles (Jaguzewski & Williams, 2013; Rockenbach, 2018; Baker & Miller, 2019), or developing new academic librarian roles (Ducas et al., 2020). Those framing research partnerships within librarianship focus on the embedded (Carlson & Kneale, 2011; Monroe-Gulick et al., 2013; Inuwa & Abrizah, 2018; Shin, 2021), liaison (Kenney, 2014; Diaz & Mandernach, 2017), engaged (Gibson, 2020), and "inside-out" (Simons & Smith, 2020) models.

Knowledge and Skills

Overwhelmingly, the literature selected explores the knowledge and skills librarians contribute—or potentially could contribute—to the research enterprise. As Auckland (2012) explains,

A shift can be seen which takes Subject Librarians into a world beyond information discovery and management, collection development and information literacy training, to one in which they play a much greater part in the research process and in particular in the management, curation and preservation of research data, and in scholarly communication and the effective dissemination of research outputs (p. 5).

Like Auckland, most researchers on this topic note contributions related to scholarly communications, data management, and information literacy. References to scholarly communications include publishing, disseminating, and preserving research outputs; open access; and repositories (Auckland, 2012; Jaguzewski & Williams, 2013; Kenney, 2014; Diaz & Mandernach, 2017; Borrego et al., 2018; Inuwa & Abrizah, 2018; Rockenbach, 2018; Batten, 2020; Ducas et al., 2020; Gibson, 2020; Johnson, 2020; Kranich et al., 2020; Resnis & Natale, 2020; Shin, 2021; Rabasa & Abrizah, 2022). Librarians possess core skills related to discovery, evaluation, use, and management of resources, information, and collections, often resulting in expertise for literature reviews or systematic reviews (Auckland, 2012; Monroe-Gulick et al., 2013; Jaguzewski & Williams, 2013; Brandenburg et al., 2017; Diaz & Mandernach, 2017; Borrego et al., 2018; Inuwa & Abrizah, 2018; Rockenbach, 2018; Bright, 2019; Batten, 2020; Borrego & Pinfield, 2020; Ducas et al., 2020; Johnson, 2020; Kranich et al., 2020; Resnis & Natale, 2020; Evidence Base, 2021; Shin, 2021; Rabasa & Abrizah, 2022). Librarians also bring data management skills and knowledge (Carlson & Kneale, 2011; Auckland, 2012; Monroe-Gulick et al., 2013; Jaguzewski & Williams, 2013; Kenney, 2014; Borrego et al., 2018; Inuwa & Abrizah, 2018; Rockenbach, 2018; Bright, 2019; Borrego & Pinfield, 2020; Ducas et al., 2020; Johnson, 2020; Kranich et al., 2020; Resnis & Natale, 2020; Evidence Base, 2021; Shin, 2021; Rabasa & Abrizah, 2022), and/or subject and disciplinary expertise (Auckland, 2012; Diaz & Mandernach, 2017; Inuwa & Abrizah, 2018; Rockenbach, 2018; Bright, 2019; Ducas et al., 2020; Gibson, 2020; Johnson, 2020; Kranich et al., 2020; Resnis & Natale, 2020; Evidence Base, 2021; Mihram & Miller, 2022). Other areas of domain knowledge are technical skills and expertise with tools, applications, and emerging technologies (Auckland, 2012; Brandenburg et al., 2017; Bright, 2019; Ducas et al., 2020; Gibson, 2020; Kranich et al., 2020; Resnis & Natale, 2020; Evidence Base, 2021; Shin, 2021; Mihram & Miller, 2022; Rabasa & Abrizah, 2022), and soft skills that

include relationship building, communication, negotiation, presentation, interpersonal, networking, collaboration, and leadership (Carlson & Kneale, 2011; Auckland, 2012; Jaguzewski & Williams, 2013; Diaz & Mandernach, 2017; Johnson, 2020; Resnis & Natale, 2020; Evidence Base, 2021; Shin, 2021; Rabasa & Abrizah, 2022).

Benefits

Relatively few articles discuss the benefits of librarians' participation in research partnerships. Evidence Base's report for Research Libraries UK (2021) provides the most comprehensive discussion, specifying the benefits of research partnerships for librarians, researchers, libraries, and institutions. Librarians benefit from the skills and knowledge development, "increased recognition" of their skills and knowledge, building "new professional links and networks," "personal satisfaction," "greater confidence to get involved in research activities and communities," and "learning about different perspectives and ways of working" (Evidence Base, 2021, p. 21). Researchers benefit from "alternative perspectives that can help to shape" research; "enhanced reputation of the university through involvement in quality research, awareness of important collections and being seen as innovative within the sector;" developing "further networks and research opportunities;" and "opportunities for public engagement/impact activities" (Evidence Base, 2021, p. 20). Libraries benefit from "greater knowledge" and use of collections in research and teaching, "development and preservation of collections," "improved access to collections," "equipment that could be reused for future projects," "changing perceptions of libraries," "credibility within the university and greater integration within the academic community," "potential for better staff retention (through involvement in interesting work and development opportunities)," "raised reputation and profile for the service—nationally and/or internationally," and "development of networks and new contacts that could have broader benefits for the library service" (Evidence Base, 2021, p. 21). Institutions benefit from "better staff retention through access to opportunities they may not get elsewhere," "enhanced reputation of the university through involvement in quality research, awareness of important collections and being seen as innovative within the sector," developing "further networks and research opportunities," and creating "opportunities for public engagement/impact activities" (Evidence Base, 2021, p. 19).

Among the other articles that mention benefits, the focus is primarily on the benefits to librarians. For example, relationship building with researchers and departments (Carlson & Kneale, p. 169; Kranich et al., p. 299), and knowledge and skill development (Monroe-Gulick et al., 2013; Borrego et al., 2018). Benefits to the libraries include librarians' increased knowledge and expertise in research methods and subject content (Monroe-Gulick et al., p. 386) and improvement of "the image of library services" (Borrego et al., p. 663). Researchers benefit from reciprocal engagement and "mutual benefit" (Gibson, p. 15) and "interdisciplinary research teams" benefit from interdisciplinary librarians (Jaguzewski & Williams, p. 4).

A key benefit to all involved in the research enterprise, of course, lies in increased competitiveness for research funding:

Within this environment, academic and research libraries already play a valuable role within the research and scholarly landscape in the arts and humanities and beyond. The potential value of libraries, archives, special collections, museums, and galleries as research partners has increasingly been recognised by research

funders. These conditions provide an opportunity for library staff to further contribute as active collaborators and leaders in research (Evidence Base, p. 6).

Of course, all these benefits necessitate the shift in perceptions of librarians from “service providers” to “research partners” as discussed by Varner and Hswe (2016), Brandenburg et al. (2017, p. 278), and in Research Libraries UK’s report (Evidence Base, 2021, p. 7).

Challenges

In the *Chronicle of Higher Education* article “The Librarians Are Not Okay” (2023), Dolezal poses the question, “Why is it that academic librarians are rarely viewed by their faculty colleagues as experts, collaborators, and equals?” The view of librarians as “supporting faculty” (Bright, p. 551, Brandenburg et al., p. 278,) or “service providers” (Evidence Base, p. 37) with different status from faculty researchers (Bright p. 551; Evidence Base, p. 39) was among the challenges, barriers, and threats to librarians’ participation in research partnerships identified in a few articles. Research Libraries UK’s report discusses many of the barriers mentioned in other articles, such as capacity, prioritization, and institutional support (Evidence Base, 2021, pp. 41, 40). Other articles specified include revising job descriptions to include research partnerships (Carlson & Kneale, p. 168; Rockenbach, p. 62) and lacking “pathways to engagement” (Carlson & Kneale, p. 170) or “guidelines or manuals” (Shin, p. 472).

Gaps in the Literature

Based on our literature review, which only uncovered 24 articles on the topic, it is unsurprising that gaps in the literature remain related to specific aspects of research partnerships. Only three articles discuss librarians’ motivations for participating in research partnerships. Among those, Inuwa and Abrizah observed that “embedded librarians engaged in these practices in order to meet their institutional service needs” (p. 743), and the Research Libraries UK report states “it is more usually personal motivation, rather than external impetus from the library services or wider institution” with those personal motivations being “to develop new skills and knowledge; gain confidence in undertaking research; widen their professional networks and perspectives; and gain personal satisfaction” (Evidence Base, p. 22). None of the articles discussed librarians’ criteria for choosing to participate in research partnerships and their perceptions of research partnerships’ impact on other areas of their work; only one discusses how they would advise colleagues considering participation (Borrego & Pinfield, 2020). Therefore, based on the relatively few articles on the topic and our own experiences on research teams, we sought to understand if our colleagues had similar experiences.

Methodology

For this study, we interviewed and surveyed 11 tenured and tenure-track faculty librarians at the authors’ institution, The Ohio State University, to examine what enabled or influenced their collaboration on research teams as part of their research endeavors or librarianship or both (American Council on Education). We limited our study to research partnerships in which the librarian was an active collaborator on a team with researchers outside of library and information science to understand their motivations for joining the research team, the specific skills they leveraged or developed as part of the partnership, and the impacts of the

research partnership on other areas of their work such as librarianship and research. With these parameters in mind, we invited colleagues whom we thought may have participated in such partnerships to talk with us in semi-structured interviews. The post-interview survey gathered additional insights and demographic information (see Appendix A for the interview questions and survey tool). This study qualified for and was approved as Institutional Review Board-exempt research by The Ohio State University (IRB #2002E0120).

Once approved to move forward, we identified and invited 18 librarian colleagues to be interviewed. Eleven accepted and were interviewed via Zoom, and nine completed the post-interview survey. Interviewees included seven subject librarians, three special collections curators, and two digital research method specialists; one holds a PhD, eight have a master's in library science or archives, and eight hold an additional master's in another field. At the time of the interviews, six colleagues were tenured and five were untenured.

Each interview had two of the study's authors present: one who asked questions (see Appendix A) and the other who took notes later used to help identify colleagues' answers that addressed common themes. Interviews were recorded to gather specific quotations and to create auto-generated transcriptions used for the qualitative analysis. The interviews were semi-structured using the questions, but additional questions may have been asked to clarify points. At times questions were skipped if answered completely previously in the interview. Following the interviews, the transcripts and survey responses were input into NVivo for analysis. Each author coded three different transcripts independently, merged the individual files into one master file, and refined our code structure by merging and defining the parameters of common themes. We then coded the remaining interviews using the code structure in the master file. Using this qualitative method, we were able to quantify the number of responses that addressed common themes in our colleagues' answers.

The post-survey captured quantitative data about our colleagues' education level and research partnership experiences (see Appendix A). Several questions in the survey asked colleagues to rate the importance of specific considerations, resources, and impacts using a 5-point Likert scale. Respondents could also add comments to clarify their responses.

Findings

Commonalities among our colleagues' responses emerged in the analysis of the 11 interviews and nine post-interview surveys in the key areas of focus: motivations for research partnerships, criteria for choosing research partnerships, preparations for research partnerships, contributions to research partnerships, impact of research partnerships, and advice to librarians considering research partnerships. The unique responses reflected our colleagues' individual knowledge and skill sets, positions (e.g., subject librarians, special collections curators, and digital research method specialists), and the priorities of their respective departments or divisions within the library organization. When considered holistically, participant responses in these key areas clarify the roles librarians fill on research teams and the impact their individual expertise and specific skill sets have on the research partnerships.

Motivations for Research Partnerships

When asked what motivated them to join research partnerships (see Table 1), over half of our colleagues equally cited their interest in the project topic and/or the methodology being used and their desire to fulfill tenure and/or annual review expectations. "Initially, I was interested

because I was just starting as a junior faculty member and I needed to have a research project," a colleague remarked. The project partnership was "right in line with my teaching activities and there were people in the college that were interested in [the] idea [of] doing a research project alongside the class. [It] seemed to be in line with my librarianship ... as well as my research interests." In equal number, our colleagues (n = 4) also named benefits to the libraries and collections, building and strengthening relationships with the department or researcher(s), their own expertise and knowledge, and opportunities for learning and development. This was the case for one colleague approached by a researcher who "had a very specific need" that was related to an area they "needed to learn more about." "I find one of the easiest ways for me to learn the tools that I use in research librarianship is to have [a] messy project and totally immerse myself in it." When discussing what motivates their continued participation in an ongoing research partnership, one of our colleagues remarked, "Honestly, it's one of the major things that gives me professional satisfaction and joy."

Responses	Number of Interviewees (n = 11)
Project Topic/Methodology	6
Tenure/Annual Review	6
Benefits Libraries/Collections	4
Building/Strengthening Relationships	4
Topic Expertise/Knowledge	4
Learning, Development	4
Research Interests	3
Benefits Communities	2
Alignment with Teaching	1
Benefits Funding Proposal	1
Impact to Field	1
Professional Satisfaction, Joy	1

Criteria for Choosing Research Partnerships

As for the criteria our colleagues used to determine which research partnerships to join (see Table 2), our colleagues' interview responses seemed more individualized. The majority did, however, pinpoint two key criteria: their relationship(s) with the partner(s) (n = 7) and whether they have expertise in the subject or discipline to contribute (n = 6). "The primary thing is the subject if it's something that someone else is initiating [and] they're seeking collaborators. If it's something that is of interest, that's one thing," a colleague shared:

The individuals involved are another. Depending on the type of partnership, I may or may not know a lot about the way people work. There are people who I am happy to work with over and over again, and people that I'll [not work with] again. And then some people are new to me to work with, so that's a risk that I'll take sometimes, but it gives me information for the future.

Again, nearly half of our colleagues cited interest in the research topic and/or methodology ($n = 5$), and many consider the time commitment involved ($n = 5$). For one colleague, “what kind of time commitment it’s going to be” was their first consideration. “I have been asked to be listed on like grant applications before because they think it’ll look good,” and when the grant is awarded, “I’m on the study” and need to know “how much time is this actually going to require me to take.”

Responses	Number of Interviewees (n = 11)
Relationship(s) with Partner(s)	7
Subject/Disciplinary Expertise/Knowledge	6
Topic, Methodology Interest	5
Time Commitment	5
No Set Criteria	2
Research Interest	2
Collections Use	2
Benefits Libraries	1
Impact on Other Colleagues' Workload	1
Relationship Building	1
Role	1
Connections to Leverage	1

In the post-interview survey, colleagues rated the importance of each consideration from a provided list for joining a research partnership using a 5-point Likert scale (Appendix A, post-interview survey question #2). “Available time in your schedule” and “Clear contribution expectations of you” receive the highest mean ratings (mean = 3.8) as considerations of most importance in deciding to join a research partnership. Those who chose “Other” specified “Relationship with person making the request,” and “Appropriate expectations around authorship or acknowledgment” as most important (mean = 4). Those who consulted resources when making this decision rated “Your supervisor” (mean = 1.83) and “A colleague in the library” (mean = 1.8) as slightly to very important (see Appendix A, post-interview survey question #3).

Preparation for Research Partnerships

When asked specifically how the librarians prepared for research partnerships, our colleagues most often responded in their interviews that they do preliminary research themselves: they read the potential researcher partner’s publications or about a specific methodology, tool, or technical terminology; they conduct searches on the topic; or they consult best practices and guidelines from peer institutions. Table 3 highlights the coded interview responses around preparation for the research partnership. For one specific partnership, our colleague explained,

There’s a lot of supplemental work that I have to do to educate myself on a lot of the technical vocabulary that’s thrown around in a lot of those meetings. [...] I have

to do some background reading or have background conversations with folks so I can keep up to speed with some of that language because that's not my area.

With equal frequency, study participants responded that they rely on their own academic training and disciplinary expertise, on training in specific methodologies and tools, or on prior experiences in their librarianship or their own research. "I suppose I prepared," a colleague reflected, "in the extent that I have all the background knowledge already," and knew the work in which the researchers were interested because it is their research area. "I suppose, if I didn't already have that background knowledge, I would have had to dig into the literature a little bit to understand where that importance was [and] why that was the focus of the research."

Responses	Number of Interviewees (n = 11)
Preliminary Research	7
Academic/Subject/Disciplinary Training	5
Research Methodology, Tool Training	5
Prior Experiences, Research Area	5
Collection Knowledge	2
Knowledge in the Researcher's Area	2
Management Skill Training (Project or Data)	2
Librarianship Training	1
Previous Work Experience/Position	1

Contributions to Research Partnerships

As noted in most of the literature reviewed, our colleagues tended to discuss their contributions to research partnerships in terms of skills or roles (see Tables 4 and 5). Seven identified disciplinary knowledge and skills as a contribution, and several specified information literacy skills, such as searching for literature and citation data, identifying and accessing collections materials, and citation development and management. A few responded that they contributed technical skills (3) and skills in specific research methodologies. (3) "I think it's [the] personal contact where they realize the range of what I can offer them," a colleague told us. "It sort of violates their preconceptions of what a librarian is. And for them, the strong point is my access to materials."

As for roles, five interviewees identified themselves as filling the role of resource researcher and reviewer, contributing to the literature reviews, systematic reviews, or scoping reviews. Many identified themselves as connectors to networks, communities, the campus, and resources. For one of our colleagues, being a connector is of the utmost importance: "My end goal and why I'm participating in the project from the beginning to end [is] to give a platform to [a community] that is often talked *about*, but they don't get to have the agency about what they do." Our colleague sees their role as helping members of that community navigate

academia, “helping them get through those hoops.” “Because that’s really why I became a librarian,” they explained. “That’s the role I saw for myself when I signed up to be a librarian. I’m going to help researchers and people from these communities reach these audiences, and so my goal is to like tear through all of those walls.”

Responses	Number of Interviewees (n = 11)
Disciplinary Knowledge/Skills	7
Information Literacy	5
Technical	3
Research Methodology	3
Project Management	2
Networking	2
Pedagogy	2
Writing/Editing/Proofing	2
Soft Skills	1
Data Structuring/Analysis	1

Responses	Number of Interviewees (n = 11)
Resource Researcher/Reviewer	5
Network/Campus/Resources Connector	3
Collaborator	2
Curator, Collections Manager	2
Funding Opportunities Researcher	1
Scholarly Communications	1

In the post-interview survey (n = 9), most participants categorized their research partnership as “Research” (n = 8), many considered it “Librarianship” (n = 6), and just over half (n = 5) considered it both “Research” and “Librarianship.”

Impact of Research Partnerships

Several participants described how engaging in research partnerships impacted their librarianship and/or research, especially how they build relationships in both academic and non-academic communities, approach research consultations, design and teach courses and workshops, and build library collections in their disciplinary areas. One colleague commented, “there’s more awareness about the capability that I have as a librarian” after they participated in a research partnership. Another noted that their overall reference interview skills improved after they had to ask questions to understand what their research partners intended to accomplish. Another shared how participating in a research partnership framed

discussions that they lead as an instructor of a credit-bearing course, and “informed some of the ways that I talk to students about the topic.”

One librarian shared, “every time [I’ve participated in—or contributed to—a research partnership], I learned about a different area of research or a course. It has really informed how I do collections [work].” Several interviewees noted a specific partnership that fulfilled both a librarianship and a research goal. One colleague knew a partnership “was going to have an outcome that was positive for me, in both of those spheres.” Although this study did not include interviews with collaborators to assess librarian impact on the research partnership, most librarians perceived their participation was beneficial to the team.

The post-interview survey asked participants to rate the level of importance in areas of their work that research partnerships influenced using a 5-point Likert scale (see Appendix A, post-survey question #5). Overall, colleagues rated “Librarianship” (mean = 2.67), “Teaching” (mean = 2.57), and “Consulting” (mean = 2.56) the highest, followed by “Advising” (mean = 2.0) and “Mentoring” (mean = 3.0). Those who chose “Other area” (mean = 3) specified “Coaching” and “Future research” as the most influential areas of their work.

As for aspects of collaborations that proved most valuable to them, respondents rated “Lessons learned of what not to do in the future,” “Establishing clear boundaries,” and “Having consistent and clear communication throughout the project” the highest (mean = 3), and then “Research output (paper, presentation, exhibit)” (mean = 2.88), “Skills gained through the partnership” (mean = 2.78), “Connections made with others on campus” (mean = 2.43) (see Appendix A, post-survey question #6). Participants rated “Supporting library priorities” (mean = 1.71) and “Change in approach to other areas of work” (mean = 1.5) as the least valuable aspects of their participation as research partners.

Advice for Librarians Considering Research Partnerships

During our interviews, several librarians offered advice to other colleagues who might consider participating in a research partnership, including general suggestions such as “make sure that you’re taking ownership of your time and your scholarly profile,” and “[consider] how much this is going to improve [your] relationship with the [disciplinary] department.” Interviewees also advised colleagues to establish boundaries and communicate clearly about them; understand the time commitment involved with each project; consider the benefits of participation for tenure and promotion; ask or negotiate how credit will be awarded; define roles; identify communication preferences for everyone on the research team; consider one’s own passion for the topic and potential enjoyment of the project; and determine the availability of institutional support. Finally, one participant recommended, “you should not feel like you’re obligated to say yes to someone’s research project because you have your own agenda and your own research goals.”

Discussion

Overall, the librarians in this study filled multiple roles in research partnerships. As noted in Table 5, those roles include literature searching expert, campus connector to services and resources, or mediator of library collections or datasets. Due to their librarianship and disciplinary training, some participants defaulted to performing literature searches and authoring literature reviews; however, as previously noted, they advise that libraries ensure from the

onset that they are acknowledged as research collaborators rather than filling roles otherwise delegated to graduate research associates.

In this study, individual expertise is often leveraged to add value to the research partnership. Table 4 lists the specific skills librarians contributed to the research partnerships, indicating that 63% ($n = 7$) of those interviewed mentioned that their disciplinary knowledge or specific skills were reasons they joined. Also high on this list was adding to their technical skills and their grounding in information literacy knowledge and pedagogy. Tables 1 and 2 highlight the librarians' rationale for joining research partnerships, with top reasons including exploring topics of interest, and understanding the methodology or wanting to grow in a particular methodology. Librarians in this study also pointed out that a strong motivator was research interest or producing scholarship to meet tenure requirements. Empowering librarians to decide which partnerships they enter and the role they play on the team based on professional and personal goals helps to establish boundaries. Recognition from partners, as well as organizational support of librarian contributions, can make participation a valuable experience.

Interestingly, very few mentioned specific soft skills when discussing impact on the research partnership. Only two participants mentioned project management skills or leveraging connections around campus as roles they took on in the research partnership. In some cases, it could be that the principal investigator for the project would take responsibility for these aspects of the research partnership, and the librarian would join the project to contribute other areas of expertise. Alternatively, it could be that librarians naturally take on these roles but underplay their importance in the overall success of the project, viewing their work as just part of their job duties. If that is the case, providing training or guidance for librarians to help them highlight the impact of these skill sets and build on existing areas of expertise could be an area for professional development for those considering joining research partnerships. A third possibility is that librarians are concerned that an administrative or project management role would overshadow specialized research skills they could bring to the partnership. This would correspond with our colleagues' who recommended librarians be considered research collaborators and not assistants when entering partnerships.

Defining Scope and Establishing Support

Based on our findings, establishing clear expectations for roles, communication, time, and credit factors into the success of research partnerships. Each of these considerations will prove important for libraries or librarians interested in research partnership engagement. As our library has not yet defined the scope or established programmatic support for librarian involvement on research teams, our colleagues developed their own criteria for making decisions about joining partnerships and determined for themselves whether they considered their partnership to fall within the scope of their librarianship or their research. In the absence of clear guidance, our colleagues reported consulting with their supervisor or a colleague in the library when considering whether to join a research partnership; however, they varied greatly in how they rated its importance. Similarly, in the absence of assessment metrics, the benefits of participation in research partnerships to our library organization are anecdotal.

As libraries consider institutionalizing research partnerships as Research Libraries UK (Evidence Base, 2021) has advocated, defining scope and establishing support will be essential.

However, librarians should be empowered as much as possible to determine if, how, why, and when they want to participate in a research partnership to ensure both the individual and the organization benefit from the time and effort expended. In short, in an ideal situation, guidance from library administrators and supervisors would be available for the librarians who want to be involved in a research partnership. This guidance would help to examine the balance of the partnership's impact and the effort of librarian contributions as well as alignment with library organizational strategic goals before librarian time is committed.

Some examples of libraries that have piloted research support programs include the University of Minnesota and the University of Central Florida. At Minnesota, research sprints offered ways for librarians to support research teams through short, fast-paced interactions (McBurney, et al., 2020). Their approach, based on one implemented at the University of Kansas (2024), was paused during the COVID-19 pandemic but was restarted with a tighter focus in 2023. Some key takeaways that researchers noted were the librarians' contributions toward project management, team dynamics, and specific expertise on digital scholarship tools (McBurney, et al., 2024). Librarians in the same study noted that their expertise was underutilized, and the time-intensive nature of the work may not provide enough benefits to justify participation. Similarly, the University of Central Florida libraries, which has used an embedded librarian approach since 2012, paused their endeavors just before the COVID-19 pandemic to examine if the time involved provided enough benefits for the libraries' continued support (Arthur & Tierney, 2013).

Recommendations for Other Libraries

Other libraries that want to support this level of engagement should articulate the value of research partnerships internally, determine the alignment of research partnerships within the expectations of librarianship and/or research, and define assessment metrics to gauge the impact and benefits of research partnerships for the organization and for individuals. In addition, libraries should clarify whether participation in a research partnership is an individual decision or an organizational decision; integrate expectations or limitations around research partnerships into the onboarding process for librarians; and provide support for additional work that might arise (e.g., grant management or publication fees). Addressing these matters will also help organizations determine if specific language should be added to position descriptions for librarians participating on research teams as part of their job duties.

Furthermore, libraries should establish guidance to help those either seeking to join potentially time-intensive research partnerships or managing the capacity challenges arising from participating in multiple partnerships. They should also develop a template that individuals can use to create a research partnership agreement or a memorandum of understanding (MOU) that can be renegotiated if needed during the partnership. Even organizations that recognize the value of these partnerships but opt to support it on an ad hoc basis should provide guidance about scoping research partnerships into librarians' positions, defining levels of engagement, and determining credit expectations.

In cases where libraries want to support this type of work, they should examine various approaches for leveraging librarian skill sets, such as providing support on systematic reviews as a scalable service. For example, the University of Minnesota Libraries offer boot camps for librarians outside the health sciences who want to build this skill set (2024). Both the

University of Minnesota and Cornell University have librarians participating on systematic review teams, where they are engaging and highlighting librarians' information literacy expertise to add value to the research partnership (Kocher & Riegelman, 2018).

Based on our findings, librarians interested in engaging in research partnerships should assess their own knowledge base and skill sets to determine what, specifically, they may bring to the partnership, what additional professional development they might need, and whether they have the time and capacity to actively contribute. Namely, librarians need to account for the balance between library strategic priorities and their own individual expertise to determine the value of the required time commitment. Our interviews indicate that campus partners did not always know individual team members' strengths, and, in some cases, the librarian spent time educating them about skills or expertise beyond the traditional view of librarianship. Defining the expectations for a librarian partner's contributions and role from the outset will attend to matters of capacity, time commitment, and boundaries, as well as prevent "role creep." In some instances, librarians may be better off consulting or referring research teams to others within the libraries or in other campus units rather than committing to a time-intensive collaborative project, especially if there are no tangible benefits to the individual (e.g., internal or external collaboration experience, publications, grant funding, time-release from primary job responsibilities, or alignment with expertise). Transparent expectations for contributions and outcomes for all involved in the research partnership are crucial throughout the partnership to ensure balance as the project progresses.

Some limits of this study include a limited sample size from a single institution. However, we ensured consistency of questions and interviewed individuals with a variety of different experiences with research partnerships. The intent of this study is not to generalize beyond our specific context, but to understand themes present at a research-intensive institution; our findings indicate that there is alignment with other research in the field.

Conclusion

Research partnerships continue to be discussed in the field of librarianship as beneficial to librarians for increasing awareness of their existing knowledge and skills, developing new knowledge and skills, and building relationships and networks. Motivated by these ongoing conversations, our study findings revealed that our colleagues benefitted in these, and other, ways, such as including lessons learned from the experience about setting boundaries and communication. Overall, our colleagues' experiences validate the conversations in the field on the overall value and benefits of participating in research partnerships.

Additionally, our study suggests that more conversation is needed to structure research partnerships in libraries through defining scope and establishing support. Having clarity and guidance will inform librarians' decision-making, management of time and capacity, and categorization of the work. Our study illustrates the disparate criteria considered in making decisions, the lack of resources for librarians to consult, and the inconsistent classification of their participation as either research or librarianship (or both). This ultimately has implications given the small percentage of their time allotted for research. Moreover, having clarity and guidance will better enable libraries to assess the benefits of this engagement to both the organization itself and its impact on the campus research community.

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Appendix A

Interview and Survey Instruments

Interview Questions

1. When you choose partnerships, what are the criteria you are using to decide whether or not to join a research project?
2. Did you prepare yourself for research partnerships? If so, how — webinars, courses, workshops, conference presentations, publications?
3. Think of ONE research partnership when answering ALL of these questions. It could be recent, most impactful, strongest outcome, greatest learning experience, etc. Discuss the project/partnership parameters. Follow up: How did it start? How has it evolved? Themes we asked interviewees to address:
 - Why are you interested in being involved in research partnerships?
 - How do you approach communication with a team?
 - How were expectations determined?
 - Boundaries on time/resources—How did you decide to join the research partnership/MOU?
 - Roles—Did they change over the time of the project?
 - What skills did you bring or were you able to leverage your expertise or what additional skills are needed?
 - Credit/Publications
4. What did you learn that informs future decision making around research partnerships?
5. What advice would you give a colleague who is considering a research partnership?
6. How have research partnerships influenced other areas of your work?

Post-Interview Survey

1. Degrees that you have. (Check all that apply):
 - Masters in library science or archives
 - Masters in another field (MBA, MFA, MS, MA)
 - PhD
2. Rate the importance of each consideration in your decision-making process for joining a research partnership: Not at all important (0), Slightly important (1), Moderately important (2), Very important (3), Extremely important (4).
 - Available time in your schedule
 - Amount of time the project will take
 - Expertise you possess (how closely does the project match to your knowledge)
 - Aligns with library priorities
 - Who the person inviting you to the team is (is it a dean, someone important to your liaison area, etc.)
 - Team compatibility/dynamics (you say yes because of the other people involved on the project)
 - Career advancement for you
 - Interest in learning a new area
 - Long-term impact of the project
 - Campus priority alignment

- Clear contribution expectations of you
 - Other area (1)
 - Other area (2)
3. Rate how importance of consulting each resource when making a decision about joining a research partnership: Not at all important (0), Slightly important (1), Moderately important (2), Very important (3), Extremely important (4).
- A mentor
 - A colleague in the library
 - A colleague outside the library
 - Your supervisor
 - Library strategic priorities
 - University strategic priorities
 - Other area (1)
 - Other area (2)
4. Which facet of your work did this research partnership fall under? (Check all that apply):
- Librarianship
 - Service
 - Research
5. What areas of your work have being a part of research partnerships influenced? Not at all important (0), Slightly important (1), Moderately important (2), Very important (3), Extremely important (4).
- Teaching
 - Librarianship
 - Advising
 - Mentoring
 - Consulting
 - Other area (1)
 - Other area (2)
6. What proved most valuable to you from the collaboration? Not at all important (0), Slightly important (1), Moderately important (2), Very important (3), Extremely important (4).
- Connections made with others on campus
 - Research output (paper, presentation, exhibit)
 - Lessons learned of what not to do in the future
 - Supporting library priorities
 - Change in approach to other areas of work
 - Skills gained through the partnership
 - Establishing clear boundaries
 - Having consistent and clear communication throughout the project
 - Other area (1)
 - Other area (2)

Transforming the Job Market for Library and Information Science PhDs in China: An Empirical Study from an Alternative Academic (Alt-Ac) Perspective

Ye Tian and Jingbei Zhang*

This study investigated the transformation of the library and information science (LIS) doctoral job market in China from an alternative academic (Alt-Ac) perspective. Using a mixed-methods approach, we analyzed supply and demand dynamics, based on data from 21 LIS programs and 10,331 job postings. The findings revealed a rapid expansion of LIS doctoral education, with an increasing enrollment in first-level disciplines and self-established interdisciplinary second-level disciplines. On the demand side, Alt-Ac positions showed significant growth across diverse institutional settings, requiring skills in data analysis, research methodology, and interdisciplinary collaboration. These results underscore the growing viability of Alt-Ac careers for LIS doctoral graduates and the need for programs to adapt curricula accordingly.

Introduction

The field of library and information science (LIS) has undergone significant transformations globally, both in terms of doctoral education and academic careers. The establishment of the first LIS doctoral program at the University of Chicago in 1928 (University of Chicago Library, 2006) marked the beginning of the professionalization and academicization of librarianship, with the aim of cultivating research-oriented scholars to advance knowledge in this emerging field.

China's modern academic system was strongly shaped by the Soviet model, particularly its centralized governance of higher education, emphasis on specialized technical training, and alignment of university planning with national economic priorities (Li, 2001). However, over the past two decades, Chinese universities have begun to adopt the American-style tenure-track system (Si, 2023), resulting in a hybrid model. The launch of the "Double First-Class" initiative in 2017, which aims to build world-class universities and disciplines, has led to rapid growth in LIS doctoral education in terms of program quantity and enrollment. By the end of 2022, the discipline name was officially changed from "Science of Library, Information, and Archival" to "Information Resources Management," expanding its scope from three to 11 subdisciplines.

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As permanent faculty positions shrink and temporary positions expand (Qing, 2019), alternative academic (Alt-Ac) careers, referring to nonteaching roles within and beyond academia that utilize the skills and expertise acquired during doctoral training (Nowviskie, 2014), have gained prominence. The emergence of Alt-Ac paths is closely tied to the changing landscape of the academic job market, with academic positions becoming increasingly saturated and the demand for diverse skills growing in the knowledge economy. These labor-market shifts are reshaping career prospects for LIS doctoral graduates and require doctoral programs to adjust training and support accordingly.

This study draws on a systematic compilation of publicly available doctoral enrollment plans from 21 LIS departments, along with doctoral-level postings collected from the “LIS Jobs” platform developed by the authors to support a comprehensive empirical analysis of the transformation of the LIS doctoral job market in China from an Alt-Ac perspective. By examining both the supply side (doctoral student cultivation) and the demand side (employer preferences), it seeks to answer the following questions:

1. What trends have emerged in the scale and structure of LIS doctoral enrollment in China, and how have these changes shaped the supply of LIS doctoral graduates in the job market?
2. What new trends are evident on the demand side of the LIS job market, and how do Alt-Ac positions contribute to meeting employers’ evolving needs?
3. What new requirements does the transformation of the LIS doctoral job market impose on LIS education, and how can LIS programs adapt to better prepare graduates for diverse career paths, particularly in the Alt-Ac sector?

This study addresses a gap in empirical evidence on how doctoral training and doctoral-level hiring demands are linked in China’s LIS field. It provides a supply–demand account of how doctoral enrollment expansion and Alt-Ac hiring patterns have evolved since 2017.

Literature Review

Research on Alt-Ac Careers

The concept of Alt-Ac careers has evolved significantly since its introduction by Nowviskie (2014), who described them as humanities and social science PhDs working in nontraditional academic institutions. The definition has subsequently expanded to encompass a broader range of career paths between academia and industry, emphasizing practical knowledge application, social service, and cross-boundary collaboration (Kelly et al., 2023; Rogers, 2013). Alt-Ac careers are increasingly recognized, but some researchers limit the term to non-tenure-track university employment (Brechelmacher et al., 2015; Oxley, 2019), while others advocate for a broader definition (Rogers, 2020).

Alt-Ac careers have expanded alongside structural changes in academia. These include the rise of Mode 2 knowledge production, which emphasizes transdisciplinary, application-oriented research conducted in collaboration across institutional settings (Gibbons et al., 1994), the expansion of doctoral education, and growing demand for versatile professionals (Larson et al., 2014). As universities cope with these changes, they have begun to provide Alt-Ac career support and resources for graduate students (Liu, 2014), positioning Alt-Ac as an important force in the evolving doctoral labor market. Previous studies have investigated the diverse opportunities and experiences of Alt-Ac professionals across various disciplines. Jackson (2023) provided practical guidance for quantitative social scientists pursuing nonacademic

careers, highlighting ways to maximize skills and opportunities in areas such as data analysis, consulting, and policymaking. Kansa and Kansa (2015) reflected on their Alt-Ac journey in archaeology, discussing the challenges and rewards of pursuing public engagement, digital humanities, and open-access initiatives.

Professionals with advanced LIS degrees have long navigated diverse career paths within and beyond academia. Gerke et al. (2023) explored the existence and importance of mentoring and career support for mid-career, tenure-track academic librarians, identifying several areas of support and guidance that are crucial for promotion and career growth. Buarki and Al-Omar (2019) investigated the skills and employment issues of LIS alumni in Kuwait, highlighting the need for multitasking skills to meet job market requirements. Dukic (2017) examined how the different occupational backgrounds of master's students in LIS shape their motivation to choose a career in the library profession, revealing differences in motivating factors between library- and non-library-employed students. These studies underscore the diverse career paths and experiences of LIS professionals, as well as the importance of mentoring, skill development, and understanding motivational factors in shaping successful careers within and beyond traditional academic settings. As Alt-Ac careers continue to gain prominence, LIS education and professional development must adapt and provide the necessary support and resources for graduates navigating these diverse career landscapes.

Several studies have examined the skills and preparation needed for Alt-Ac success and the attitudes and perceptions toward these careers. Kent-Johnson (2024) qualitatively analyzed Alt-Ac professionalization opportunities for humanities PhD students, identifying the specific challenges and strategies in this domain, such as developing transferable skills, building professional networks, and navigating identity transitions. Lesiuk (2013) discussed the role of "small bets" and experimentation in the PhD process for those considering Alt-Ac careers, emphasizing the importance of adaptability, risk-taking, and self-directed learning. While Gemme and Gingras (2012) found that traditional academic careers remain a strong attraction for graduate students, Beres (2015) argued for embracing Alt-Ac opportunities as more than just a "consolation prize," highlighting their potential for meaningful career fulfillment and societal impact. Schechter (2017) drew on their own Alt-Ac career transition to engage the public, claim space, challenge traditional notions of academic success, and promote a more inclusive and varied vision of research.

As the literature on Alt-Ac careers grows, exploring the specific challenges and opportunities within different disciplines and sectors is crucial. More research is needed to fully understand the long-term outcomes and impacts of Alt-Ac careers, as well as the institutional and disciplinary support structures needed to facilitate successful transitions. Rogers' (2013) analysis of humanities graduate education and Alt-Ac professions revealed the abilities, career trajectories, and support structures needed for success, emphasizing the need for mentorship, networking, and professional growth. Alt-Ac professionals can shape doctoral education and talent development by linking academia, industry, and the public sphere as universities and society grow increasingly interconnected.

Chinese LIS Doctoral Education and Job Market

LIS advanced degree education in China has undergone rapid changes since the first doctoral programs in library science, information science, and archival science were established in 1990. The 2017 "Double First-Class" initiative has led to a significant expansion of LIS

doctoral programs, increasing from fewer than 10 before 2016, to 16 and 21 in 2019 and 2024, respectively (Ministry of Education of China, 2024). Currently, Chinese LIS doctoral education is in a transitional period. For decades, China's graduate education followed a national discipline system. However, since 2016, the Ministry of Education has revised the guidelines for setting discipline catalogs, changing from the traditional three-level discipline catalog of "disciplinary categories–first-level discipline–second-level discipline" (e.g., management studies–library and information science–library science) to a two-level discipline catalog of "disciplinary categories–first-level discipline" (e.g., management studies–library and information science). Simultaneously, universities have been granted the autonomy to establish second-level disciplines (e.g., data science under the LIS first-level discipline) based on labor market demands and environmental changes. Thus, significant differences in enrollment practices exist among LIS departments, with the coexistence of old and new discipline names and a mix of first- and second-level discipline enrollment. Some scholars argue that the current second-level disciplines have lost their disciplinary identity and are merely research directions (Liu & Jiang, 2019). Conversely, providing students with a "broad-based professional education" based on the first-level discipline helps them better adapt to the labor market, particularly by establishing emerging second-level disciplines to meet the needs of economic development across all sectors (Chang et al., 2022). This approach aligns with the fundamental essence of Alt-Ac, which emphasizes the acquisition of transferable skills and the ability to navigate diverse career paths beyond traditional academic roles.

As of July 2024, 21 universities offered LIS doctoral programs, admitting 251 doctoral students in the 2024 cohort (Table 1). Across 2016–2024, cumulative enrollment across cohorts totaled 1,820 students. Among these, first-level disciplines serve as the primary enrollment category (53%). In the past few years, some LIS departments have actively established new interdisciplinary second-level disciplines. For instance, Peking University offers doctoral programs in editing and publishing, while Wuhan University has programs in data sciences and confidential management. Furthermore, Renmin University of China offers programs in data management, digital humanities, and information analysis.

Moreover, several universities admit LIS-oriented doctoral students under other disciplines, including management science and engineering (MS&E) and public administration. Examples include "information resource management" at Hangzhou Dianzi University, "public information resource management" at Zhejiang University, "historical archives" at Yunnan University, "information organization" at Nanjing University of Science and Technology, and "scientometrics" at Dalian University of Technology. These initiatives leverage interdisciplinary strengths and cultivate new growth points for the field. Numerous LIS departments have extended their doctoral programs from three to four years and emphasized publishing in prestigious journals like those indexed in the Social Sciences Citation Index as part of the research output graduation requirements to prioritize high-quality development.

While dedicated research on the Chinese LIS doctoral job market is limited, previous studies provide insights into the saturation of the academic job market and the increasing demand for diverse skills (Tian, 2022). Teaching roles in the Chinese LIS academic market saturated between 2016 and 2020, but postdoctoral and full-time project assistant positions grew rapidly. Emerging markets are also rapidly developing, particularly in various types of libraries. For example, Zhejiang Normal University Library has established information

TABLE 1
LIS Doctoral Programs in China (as of July 2024)

	Name of Departments	Library Science	Information Science	Archival Science	Date of Approval for Doctoral Degree Granting
1	Department of Information Management, Peking University (PKU-IM)	V	V	X	2000
2	School of Information Management, Wuhan University (WHU-SIM)	V	V	V	2000
3	School of Information Resource Management, Renmin University of China (RUC-SIRM)	V	V	V	2006
4	School of Information Management, Nanjing University (NJU-SIM)	V LIS First-Level Discipline			2006
5	PLA National Defense University (NDU-PLA)	V LIS First-Level Discipline			2010
6	School of Management, Jilin University (JLU-SOM)	V LIS First-Level Discipline			2010
7	National Science Library, Chinese Academy of Sciences (CAS-NSL)	V	V	X	2010
8	Northwest Institute of Environment and Ecological Resources, Chinese Academy of Sciences (CAS-NIEER)	X	V	X	2016
9	College of Information Management, Nanjing Agricultural University (NAU-IM)	V LIS First-Level Discipline			2019
10	School of Management, Hebei University (HBU-SOM)	V LIS First-Level Discipline			2019
11	School of Public Administration, Xiangtan University (XTU-SPA)	V LIS First-Level Discipline			2019
12	School of Information Management, Sun Yat-sen University (SYSU-SIM)	V LIS First-Level Discipline			2019
13	Nankai University Business School (NKU-BS)	V	V	X	2019
14	School of Information Management, Huazhong Normal University (CCNU-SIM)	V LIS First-Level Discipline			2019
15	Faculty of Economics and Management, East China Normal University (ECNU-FEM)	V LIS First-Level Discipline			2021
16	School of Library, Information and Archives of Shanghai University (SHU-LIA)	V LIS First-Level Discipline			2021

	Name of Departments	Library Science	Information Science	Archival Science	Date of Approval for Doctoral Degree Granting
17	School of Information Management, Zhengzhou University (ZZU-SIM)	V LIS First-Level Discipline			2021
18	The School of Public Administration of Sichuan University (SCU-SPA)	V LIS First-Level Discipline			2023
19	Institutes of Science and Development, Chinese Academy of Sciences (CASISD)	X	V	X	2023
20	School of Information Management, Heilongjiang University (HLJU-SIM)	V LIS First-Level Discipline			2024
21	Management School, Tianjin Normal University (TNU-MS)	V LIS First-Level Discipline			2024

Note: V = program offered; X = program not offered.

analyst positions with an initial four-year term and provides research start-up funds. Dongguan Library offers literature development positions with a housing subsidy of up to one million yuan for doctoral graduates. These LIS employment market trends show the growing importance of Alt-Ac occupations and the need for doctoral programs to prepare graduates for diverse professional roles.

The literature on Alt-Ac careers and Chinese LIS doctoral education provides valuable insights into changes in the field. However, significant research gaps remain. Most studies focus on Alt-Ac careers and structural changes in doctoral education, with little empirical data on how these elements relate to academic labor market supply and demand. This research aims to bridge this gap by empirically investigating the dynamics between LIS doctoral training and Alt-Ac career trajectories in China, revealing the ongoing transformation of the LIS doctoral job market. By using advanced natural language processing techniques and quantitative analysis of original datasets, it identifies the key factors that shape the career paths and professional identities of Chinese LIS PhDs in Alt-Ac roles, considering the ongoing reforms in doctoral education and the changing demands of the job market. As China's abundant human resources have facilitated the transformation of the LIS field, these findings can offer valuable insights and experiences for the global LIS community, contributing to a better understanding of the Alt-Ac phenomenon and its implications for the future of LIS education and workforce development.

Research Methods

This study employed a mixed-methods approach, quantitatively analyzing LIS doctoral enrollment data and job recruitment information and qualitatively analyzing career trajectories. We utilized natural language processing techniques to extract and analyze large-scale recruitment text data and manual coding to cluster entities and examine the supply and demand dynamics of the Chinese LIS job market.

Data Collection

Table 2 presents an overview of the data sources and sample sizes used in this study.

Data Type	Data Source	Sample Size	Time Period
LIS Doctoral Enrollment Data	21 LIS departments	Total enrollment 1,820 students	2016–2024
LIS Job Recruitment Information	“LIS Jobs” WeChat platform	585 institutions and 10,331 job postings	2016–2023

Supply-Side Data: LIS Doctoral Enrollment Data

We collected doctoral enrollment data from 21 LIS departments between 2016 and 2024, sourced from publicly available annual enrollment plans or admission lists. We assessed LIS doctoral education’s adaptation to labor-market demand by analyzing changes in disciplinary structures, particularly the creation of new second-level disciplines.

Demand-Side Data: LIS Job Recruitment Information

The demand-side data were obtained from the “LIS Jobs” platform, developed and operated by the authors since 2015. This platform uses semantic web crawlers to gather LIS-related job postings from over 1,782 websites. The platform has been used as a data source in multiple peer-reviewed studies (Tian & Zhang, 2021; Zhi et al., 2023; Zhou & Lin, 2021). We selected 10,331 doctoral-level job postings from 585 institutions.

Data Analysis

We employed a mixed-methods approach, combining quantitative analysis of LIS doctoral enrollment data and job recruitment information with qualitative analysis of career trajectories. The data analysis process consisted of manual coding of institutions, named entity recognition (NER), and iterative clustering of similar entities.

Manual Coding of Institutions

We systematically coded 585 employers based on their institutional types, such as universities, cultural institutions, military and police organizations, government agencies, and other relevant categories. This step allowed us to distinguish between academic and alternative academic positions, providing a foundation for subsequent analysis.

Named Entity Recognition (NER)

We applied the bidirectional encoder representations from transformers (BERT)-bidirectional long short-term memory (BiLSTM)-conditional random field (CRF) model, a state-of-the-art deep learning architecture for NER, to automatically extract key entities from the 10,331 job postings, including specific departments, job titles, required disciplines and specializations, knowledge and skill requirements, and other relevant attributes. The BERT-BiLSTM-CRF model used in this study is a deep learning-based named entity recognition model that integrates the advantages of three key components:

1. BERT, as a pre-trained language model, learns contextual representations of words from massive text data;

2. BiLSTM is a bidirectional recurrent neural network that effectively captures long-distance dependencies in text sequences;
3. CRF is a probabilistic graphical model that considers the constraints between adjacent named entity labels.

By integrating these three components, the BERT-BiLSTM-CRF model can accurately identify key information even in the presence of complex language phenomena and domain-specific terminology, making it particularly suitable for analyzing unstructured text data, such as job postings.

This method has been effectively applied in the LIS sector and beyond. Tian and Zhang (2021) leveraged a BiLSTM-CRF model to analyze employment discrimination within LIS job postings in China, successfully extracting key discriminatory factors such as political status and age. Similarly, Gnehm and Clematide (2020) utilized a BERT-BiLSTM-CRF model to structure and classify job postings across German, French, and English, demonstrating the model's adaptability and effectiveness in handling multilingual data. Our experiments demonstrated the model's robustness, achieving a precision of 85.4%, a recall of 87.2%, and an F1 score of 86.3%, indicating its suitability for our research purposes.

Iterative Clustering of Similar Entities

To ensure the validity and reliability of the extracted entities, a team of five LIS doctoral candidates conducted a systematic manual review and coding of the model outputs. The team employed a multi-round iterative coding approach, discussing and resolving discrepancies until reaching a consensus, particularly for job titles and disciplinary specializations. This step refined the automatically extracted entities and ensured the consistency and accuracy of the data. The resulting structured dataset after the NER and clustering process had the following fields: {ID, Institution Type, Province, Institution, Department, Job Title, Job Description, Required Discipline, Education Requirement, Quantity, and Other Entities}. This dataset served as the foundation for our subsequent analyses, including descriptive statistical analysis to examine trends in LIS doctoral education scale, disciplinary structure, and the quantity and distribution of academic and Alt-Ac positions across different types of institutions.

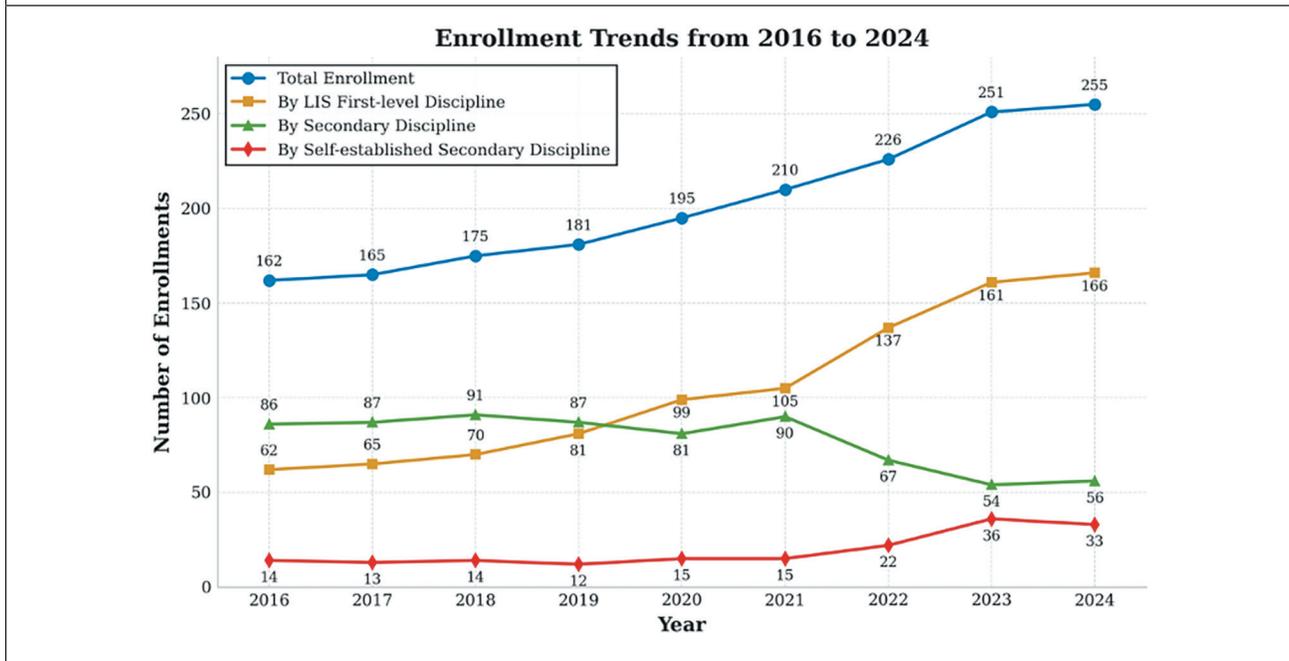
Results

Supply Side: Enrollment Scale and Structure of LIS Doctoral Programs

LIS doctoral education in China underwent significant transformations between 2016 and 2024, particularly in terms of enrollment scale and structure (see Figure 1), with LIS doctoral students growing steadily, marked by two major waves. The first occurred between 2020 and 2023, characterized by the expansion of doctoral programs, with six new LIS departments established at Hebei University, Xiangtan University, Nanjing Agricultural University, Zhengzhou University, East China Normal University, and Sichuan University. These programs have gradually stabilized their enrollment numbers from 1 to 3 students to 8 to 10 students annually. The second wave occurred after the 2021 discipline catalog standards, which led LIS departments to strategically combine secondary disciplines under the LIS first-level discipline.

A further examination of the data reveals a notable trend: since 2020, the proportion of students enrolled in the LIS first-level discipline has consistently surpassed the 50% threshold, reaching 65.1% in 2024, compared to the institutional-level proportion of 53%. Concurrently, the enrollment proportion of traditional secondary disciplines has declined markedly,

FIGURE 1
Enrollment Scale and Structure of LIS Doctoral Programs in China (2016–2024).



falling from a peak of 53.09% in 2016, to 21.96% in 2024. However, the surge in enrollment within self-established secondary disciplines, which reached a record high of 36 students in 2023, offset this downward trajectory, with a strong focus on emerging areas, including data management, information analysis, digital humanities, and publishing. As of July 2024, the LIS departments with the highest enrollment numbers are Wuhan University (52 students annually), Nanjing University (48 students annually), and the National Science Library of the Chinese Academy of Sciences (19 students annually). Collectively, these three institutions account for a substantial 46.7% of the total enrollment, underscoring the enduring influence of traditional LIS departments in attracting doctoral students. Consistent with the Ministry of Education's policies, nearly all LIS doctoral students in recent years have enrolled under the full-time system, establishing them as essential contributors to the supply side of the labor market.

To better understand the supply-side changes and their implications for Alt-Ac careers, two aspects merit further discussion.

1. The expansive LIS first-level discipline and responsive secondary disciplines as a catalyst for Alt-Ac growth.
2. Tightening academic opportunities and the resulting acceleration of Alt-Ac expansion.

First, the expansive nature of the LIS first-level discipline, coupled with the strategic establishment of secondary disciplines by LIS departments, contributes to Alt-Ac growth. By embracing diverse subfields and emerging areas of specialization, LIS doctoral programs are effectively aligning themselves with evolving market demands, equipping graduates with the versatile skill sets and interdisciplinary knowledge required to thrive in diverse professional settings beyond traditional academia. This approach to curriculum design and program development reflects and shapes the changing information professions, producing LIS doctoral graduates prepared for Alt-Ac complexities.

Moreover, the self-establishment of secondary disciplines within LIS departments demonstrates a responsiveness to market trends and a commitment to innovation. By carving out niche areas of expertise, such as data management, information analysis, and publishing, LIS programs are positioning themselves to meet the evolving needs of various industries and sectors. This flexibility in responding to market demands not only enhances the employability of LIS doctoral graduates but also contributes to the discipline's overall vitality and relevance. As Alt-Ac careers become more common, the ability of LIS programs to anticipate and respond to emerging trends will be critical in ensuring their graduates' long-term success and impact.

Second, the increasing saturation of academic positions has accelerated the expansion of the Alt-Ac movement. As traditional faculty positions become scarce, LIS doctoral graduates are discovering diverse career opportunities. Case studies reveal a wide range of alternative career destinations in university libraries (e.g., Renmin University of China, Xiamen University), specialized institutions (e.g., CPC Party School in Nanjing, PLA Archives, National Marine Information Center), public libraries (e.g., Dongguan Library, Sichuan Library), cultural heritage organizations (e.g., National Art Museum of China), and corporate archives (e.g., China North Industries Group Corporation). As the Alt-Ac movement gains momentum, LIS doctoral programs must recognize and embrace these shifting dynamics by proactively preparing graduates for diverse career paths, fostering interdisciplinary collaborations, and forming partnerships with industry and government.

Demand Side: Trends and Patterns in the LIS Job Market

To gain a comprehensive understanding of the demand-side dynamics, we manually classified all the recruiting institutions and referred to the classification standards outlined in Kelly et al.'s (2023) *Going Alt-Ac*. This process resulted in the categorization of institutions into seven major types (see Table 3). The analysis revealed that Alt-Ac positions are highly diverse, spanning various settings, including libraries, archives, journal offices, administrative departments, museums, corporate research and development departments, and more. In contrast, traditional academic library positions in Chinese universities primarily focus on reader services, reference services, and supporting the institution's teaching and research activities. Conversely, Alt-Ac positions encompass diverse emerging fields—such as information analysis, data management, digital humanities, and intellectual property—emphasizing cross-disciplinary collaboration and social services. Furthermore, Alt-Ac positions require a broader skill set from doctoral graduates, combining domain expertise with general competencies such as data analysis, project management, and team collaboration. In some unique cases, faculty positions and Alt-Ac positions with specific orientations coexist, such as in certain university libraries or medical research institutes.

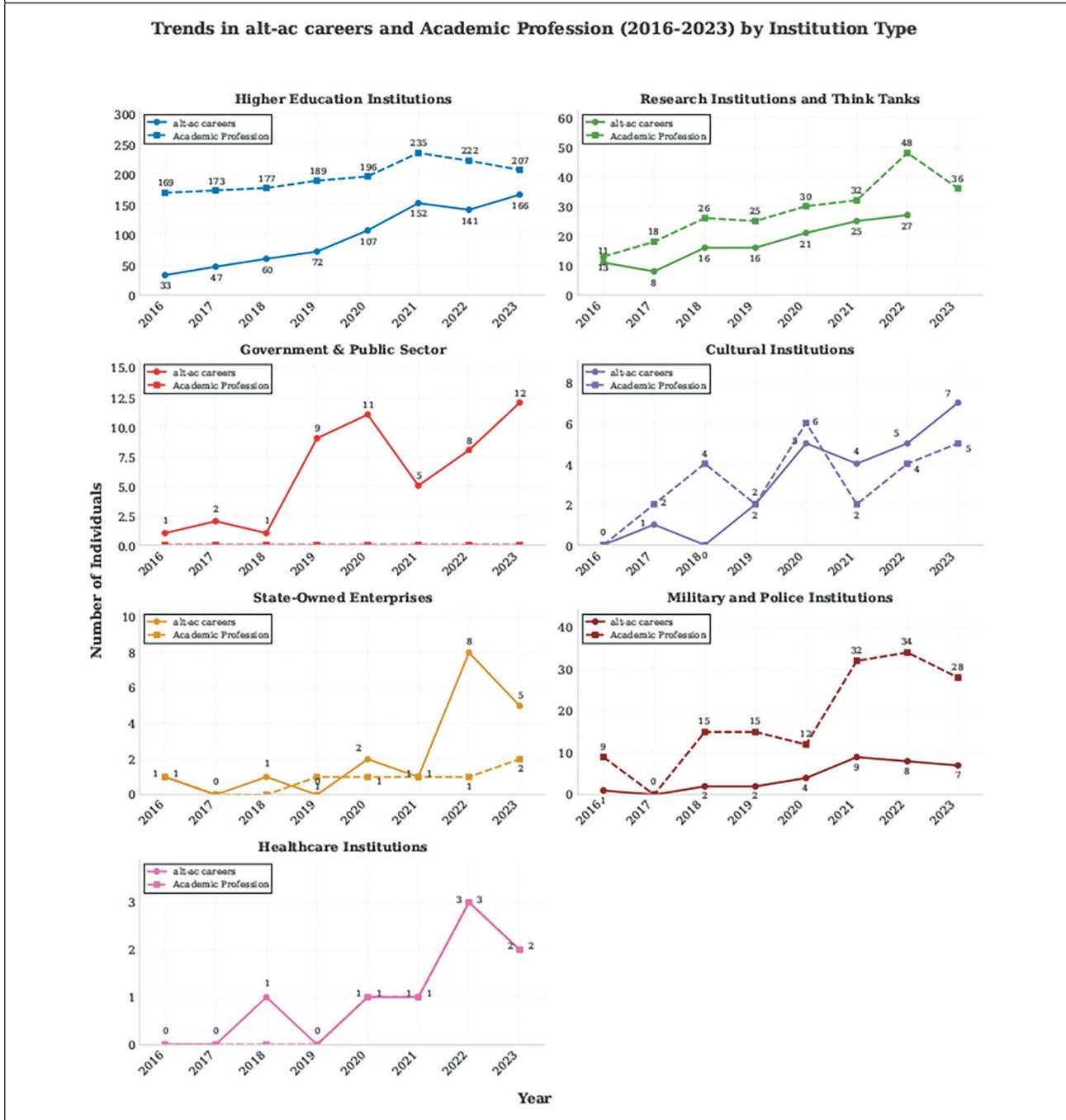
The classification of academic and Alt-Ac positions in Table 3 is based on a comprehensive review of job descriptions and institutional contexts. Academic positions are those that primarily involve teaching, research, and service responsibilities within traditional academic settings, such as university faculties and research institutes. Conversely, Alt-Ac positions are characterized by an emphasis on practical application, interdisciplinary collaboration, and engagement with diverse stakeholders beyond academia. These positions often require doctoral-level expertise but may not adhere to conventional academic norms and expectations. The research team validated the categorization of positions into academic and Alt-Ac roles through iterative coding and consensus.

TABLE 3
Distribution of Academic and Alt-Ac Positions Across Institution Types

Institution Type	Secondary Department	Position Type
Higher Education Institutions	Archives	Alt-Ac Positions
	Museums	
	Journal Editorial Offices	
	Administrative Departments (Research Management, Development Planning, etc.)	
	Libraries	
	Faculties	Academic Profession
	Postdoctoral Positions	
Research Institutions and Think Tanks	Administrative Departments	Alt-Ac Positions
	Journal Editorial Departments	
	Research Departments	Academic Profession
	Postdoctoral Positions	
Government & Public Sector	Public Institutions	Alt-Ac Positions
	CPC Party Schools	
	Civil Service	
Cultural Institutions	Public Libraries	Alt-Ac Positions
	Museums	
	Archives	
	Art Galleries	
	Postdoctoral Positions	Academic Profession
State-Owned Enterprises	Industry Intelligence Analysis Departments	Alt-Ac Positions
	Publishing Enterprises	
	Libraries	
	Archives	
	Postdoctoral Positions	Academic Profession
Military and Police Institutions	Libraries	Alt-Ac Positions
	Archives	
	Administrative Departments	
	Faculties	Academic Profession
Healthcare Institutions	Public Hospitals	Alt-Ac Positions
	Medical Research Institutes	
	Postdoctoral Positions	Academic Profession

To better understand the macro-level supply and demand dynamics, we created a trend graph comparing the growth patterns of academic and Alt-Ac positions (see Figure 2). The overall market demand for both types of positions has been on an upward trajectory, suggesting rising demand for LIS-trained expertise across sectors. The high demand for information-related professions across various industries explains this trend. Specifically, the expansion of LIS degree programs has led to a surge in the demand for faculty, thereby driving the growth

FIGURE 2
Growth Trends of Academic and Alt-Ac Positions in the LIS Job Market (2016–2023).



in demand for academic positions. Moreover, other fields, such as journalism and communication, public administration, and big data, are increasingly recognizing and valuing the LIS discipline. However, while academic positions still constitute most of the academic labor market, many of them are postdoctoral or temporary, indicating that officially budgeted posts are saturated, potentially limiting long-term career prospects in the traditional academic track.

Further elucidating the demand-side dynamics, and their implications for the LIS job market, necessitates examining the growth patterns and distribution of Alt-Ac positions

across different types of institutions. The data revealed that Alt-Ac positions have experienced significant growth across all institution types, although the pace and magnitude of growth vary. Higher education institutions have witnessed the most substantial increase in Alt-Ac positions, reflecting the evolving nature of academic libraries and the increasing importance of data-driven research and digital scholarship. Alt-Ac positions in research institutions and think tanks have also grown steadily, driven by the demand for specialized expertise in areas such as research data management, knowledge management, and policy analysis. Alt-Ac positions in government and public sector organizations have grown more modestly but still significantly, recognizing the value of LIS expertise in information policy, e-governance, and public service delivery. Cultural institutions, state-owned enterprises, military and police institutions, and healthcare institutions have all witnessed lesser growth in Alt-Ac jobs, each with its specific LIS needs.

The analysis of demand-side trends and patterns in the LIS job market highlights the growing importance and diversity of Alt-Ac career paths across various institutional contexts. Doctoral programs must adjust their curricula and career support services to meet job market demands as the LIS field evolves and expands. LIS education can help doctoral graduates succeed in academic and Alt-Ac careers by promoting interdisciplinary collaborations, transferable skills, and industry and government partnerships.

Institutional Differences in Alt-Ac Position Preferences

Alt-Ac positions in China’s LIS field are unevenly distributed across institution types. Table 4 reports the nine position categories across seven institution types; Appendix A provides the full subcategory breakdown. These distributions reveal three broad patterns.

TABLE 4
Distribution of Alt-Ac Positions by Category and Institution Type

Category	Higher Education	Research Inst. & Think Tanks	Government & Public	Healthcare	Military & Police	Cultural	State-owned Enterprises
Subject services & research support	287	20	2	0	25	0	0
Collection development & digital humanities	116	18	0	3	0	53	0
Scholarly communication & publishing	58	34	2	0	20	0	0
Academic & industry research	69	60	60	0	35	42	11
Research data management	58	72	8	8	0	4	3
Intelligence & patent analysis	78	133	15	0	16	0	110
Archival management & compilation	70	35	17	8	6	0	32
Information systems & technical services	30	43	0	0	34	15	0
Administrative management	8	69	20	20	10	5	2
Total	774	484	124	39	146	119	158

Pattern 1: Research support and collections (higher education; cultural institutions). Higher education accounts for the largest volume of postings (774). Demand concentrates in subject services and research support (287) and collection development and digital humanities (116), with further demand in archival management and compilation (70) and scholarly communication and publishing (58). At the subcategory level, these roles center on research support and scholarly infrastructure (e.g., information literacy education; institutional repository; see Appendix A). Cultural institutions (119) show a narrower mix, led by collection development and digital humanities (53) and academic and industry research (42), with a smaller technical component (information systems and technical services, 15). Subcategory results indicate that collection-centered work is the main driver (e.g., ancient book and special collections; see Appendix A).

Pattern 2: Intelligence and data services (research institutions/think tanks; state-owned enterprises). Research institutions and think tanks (484) are led by intelligence and patent analysis (133) and research data management (72), alongside substantial shares in administrative management (69) and academic and industry research (60). Appendix A shows that this sector's intelligence demand often appears together with knowledge-management and data-mining tasks, while research administration is also prominent. State-owned enterprises (158) are markedly more concentrated. Intelligence and patent analysis dominates (110), and archival management and compilation forms the second-largest category (32). In Appendix A, industrial intelligence and project/archival functions account for much of this demand, indicating a narrower hiring profile compared with research institutions.

Pattern 3: Administration, policy, and systems (government/public; healthcare; military/police). Government and public sector postings (124) center on academic and industry research (60), with secondary demand in administrative management (20), archival management and compilation (17), and intelligence and patent analysis (15). Appendix A indicates that policy- and data-oriented research roles are a major component of this category. Healthcare postings (39) concentrated in administrative management (20), with research data management (8) and archival management and compilation (8) as the next category. Military and police institutions (146) split demand between academic and industry research (35) and information systems and technical services (34), with additional postings in subject services and research support (25) and scholarly communication and publishing (20). Subcategory results show a clear technical component (engineer roles) alongside research and internal dissemination roles (Appendix A).

These patterns have direct implications for doctoral training, as they reflect distinct combinations of skills and tasks. University and cultural settings draw heavily on research support, collections, and scholarly communication; research organizations and enterprises concentrate on intelligence- and data-related work; government, healthcare, and military/police settings place greater weight on administrative functions, policy-oriented research, and technical systems. Doctoral programs can respond by helping students identify target sectors early, demonstrate relevant competencies through applied projects or placements, and translate LIS skills into sector-specific language.

Analysis of Alt-Ac Position Requirements: Skills and Qualifications

We further investigated the specific skills and qualifications required for Alt-Ac positions discussed in the previous section. To gain a comprehensive understanding of the job

requirements, we employed the BERT-BiLSTM-CRF model to perform entity recognition on the job descriptions, including sections such as “characteristic duties and responsibilities.” Due to the unique nature of different institutions, only one-third of the job announcements included detailed job responsibilities, with military and police institutions rarely providing such explanations. Table 5 presents the top 30 most frequently mentioned entities after entity recognition and manual clustering.

Entity	Frequency
Research skills	107
English proficiency	99
Journal publication	88
Data analysis and mining	86
Statistical analysis tools	81
Programming skills	74
Literature and data collection	72
Team collaboration	70
Scientific research training	66
Coordination and communication	61
Information analysis	60
Project management	53
Digital technology	52
Communist Party member	48
Bibliometric (patent) analysis	47
Strategic planning	40
Patent agent certification	39
Age not exceeding 35	37
Organizational planning	36
Stress resistance	36
Project report writing	33
Intelligence monitoring	33
Science and technology consulting	31
Text mining	27
Professional literature	26
Journal manuscript planning	25
Curatorial skills	22
Innovative thinking	18
Knowledge services	16
Insight	15

Based on the data presented in Table 5, we classified the identified entities into five categories to analyze the skills and qualifications required for Alt-Ac positions.

1. **General Skills:** General skills encompass diverse competencies that are applicable across various Alt-Ac positions. These include “English proficiency” (99), “data analysis and mining” (86), “statistical analysis tools” (81), “programming skills” (74), “literature and data collection” (72), “information analysis” (60), “digital technology” (52), and “text mining” (27). The high frequency of these skills highlights the increasing importance of language proficiency, data literacy, technical competence, and information management abilities in the Alt-Ac job market. LIS doctoral programs should emphasize these transferable abilities to improve graduates’ employability in varied institutional settings.
2. **Research Capabilities:** Research capabilities are central to many Alt-Ac positions, particularly those in higher education institutions and research institutes. Key entities in this category include “research skills” (107), “journal publication” (88), “scientific research training” (66), and “project report writing” (33), highlighting the importance of equipping LIS doctoral students with a strong foundation in research methodology, academic writing, and scholarly communication. Alt-Ac professionals are expected to contribute to knowledge production and dissemination, often collaborating with researchers from various disciplines. Therefore, developing a strong research skill set is crucial for success in these roles.
3. **Professional Knowledge:** Alt-Ac positions often require specialized professional knowledge specific to the LIS field and the institutional context. Entities such as “bibliometric (patent) analysis” (47), “patent agent certification” (39), “intelligence monitoring” (33), “science and technology consulting” (31), “professional literature” (26), “curatorial skills” (22), and “journal manuscript planning” (25) reflect the diverse domain expertise sought by employers, highlighting the need for LIS doctoral programs to provide students with opportunities to develop deep subject knowledge and practical skills aligned with the needs of different institutional sectors. Collaboration with industry partners and interdisciplinary coursework can help connect academic training and professional practice.
4. **Personal Qualities and Soft Skills:** Beyond technical competencies and domain knowledge, Alt-Ac positions also strongly emphasize personal qualities and soft skills. Entities such as “project management” (53), “team collaboration” (70), “coordination and communication” (61), “strategic planning” (40), “organizational planning” (36), “stress resistance” (36), “innovative thinking” (18), and “insight” (15) highlight the importance of leadership, teamwork, communication, problem-solving, and resilience in Alt-Ac roles. LIS doctoral programs should incorporate opportunities for students to develop these essential soft skills through experiential learning, internships, and professional development workshops. In addition to technical competencies, candidates are expected to adapt to heterogeneous role demands, given the project-based nature of the work and frequent cross-sector collaboration.
5. **Specific Position Preferences:** Some Alt-Ac job announcements express specific preferences or requirements for candidates. For example, positions within Chinese institutions frequently mention “Communist Party member” (48) and “age not exceeding 35” (37). These preferences may reflect the unique organizational culture, values, and demographic considerations of the employing institutions. Such preferences are not universal throughout Alt-Ac positions, but they emphasize the significance

of understanding the institutional setting and personalizing one's application and professional development.

The analysis of Alt-Ac position requirements revealed a range of skills and qualifications that LIS doctoral graduates must possess to succeed in these roles. The findings emphasize the necessity for an integrated approach to doctoral education that develops general skills, research ability, professional knowledge, and personal attributes. LIS doctoral programs should regularly review and adapt their curricula to meet Alt-Ac job market demands, preparing graduates who can adapt to diverse professional contexts.

Implications for LIS Doctoral Education

The findings of this study highlight the need for LIS doctoral education to better align with the evolving labor market for alternative-academic (Alt-Ac) careers. Doctoral training that implicitly assumes a primarily tenure-track trajectory may not sufficiently prepare graduates for the diverse skill sets and work contexts associated with Alt-Ac roles. Accordingly, LIS doctoral programs may benefit from complementing deep disciplinary expertise with broader preparation for interdisciplinary collaboration, applied research, and professional practice across varied organizational settings.

Drawing on our literature review and empirical results, we propose a framework to strengthen LIS doctoral education for Alt-Ac job seekers along four dimensions:

1. **Training objectives:** Clarify program goals beyond academic placement by explicitly incorporating transferable competencies (e.g., research design, data analysis, project management, and stakeholder communication) alongside scholarly productivity.
2. **Curriculum design:** Balance theoretical foundations with applied learning by integrating interdisciplinary coursework and structured experiential opportunities (e.g., practicums, internships, or project-based collaborations) that mirror Alt-Ac work environments.
3. **Career development support:** Institutionalize career guidance through mentorship and professional networks by leveraging Alt-Ac alumni, strengthening faculty awareness of nonfaculty career pathways, and providing dedicated advising resources within LIS departments.
4. **Policy and institutional ecosystem:** Expand support beyond individual programs by fostering partnerships among universities, professional associations, and employers, and by advocating for institutional and policy mechanisms that recognize and value doctoral-level contributions in Alt-Ac roles.

Limitations and Future Directions

This study has several limitations. First, the conceptualization and operationalization of Alt-Ac careers in LIS would benefit from further clarification and greater disciplinary consensus, particularly regarding boundary cases that blur academic and professional roles. Second, job-posting data may contain noise and may not fully reflect hiring outcomes or informal recruitment channels, which can affect measurement validity. Third, cross-institutional comparisons may be influenced by unobserved confounders (e.g., regional labor-market conditions, institutional resources, or differences in program structures) that are difficult to control with available data. Future research could improve robustness by triangulating postings with

additional data sources (e.g., placement records, employer interviews, or longitudinal career trajectories) and by developing refined classification schemes for Alt-Ac roles in LIS.

Conclusion

This study provides an empirical examination of the transformation of the LIS doctoral job market in China from an Alt-Ac perspective. On the supply side, analysis of 21 LIS doctoral programs indicates rapid enrollment expansion following the 2017 “Double First-Class” initiative, alongside a structural shift toward first-level disciplines and self-established interdisciplinary second-level tracks (e.g., data science and digital humanities). On the demand side, analysis of 10,331 job postings shows notable growth in Alt-Ac opportunities across multiple institutional settings—including academic libraries, research institutes, government agencies, and technology companies—with employers increasingly emphasizing skills related to data analysis, research methods, and interdisciplinary collaboration.

Beyond the Chinese context, our findings speak to broader discussions in the international LIS community regarding the relationship between doctoral education and changing career structures. The framework proposed here—focused on training objectives, curriculum design, career development infrastructure, and broader ecosystem support—offers a set of actionable considerations for LIS programs seeking to prepare graduates for diverse career pathways as the information professions continue to evolve amid artificial intelligence and digital transformation.

Taken together, the results address the study’s three research questions: (RQ1) LIS doctoral enrollment in China has expanded rapidly with a growing emphasis on first-level and interdisciplinary training, reshaping the supply of graduates; (RQ2) Alt-Ac positions constitute a significant and growing component of employer demand beyond conventional faculty roles; and (RQ3) this transformation suggests that LIS doctoral programs should broaden their educational mission to prepare graduates with transferable skills, applied experience, and adaptability for an expanding range of professional contexts.

Competing Interests

Author Ye Tian is the developer and administrator of the “LIS Jobs” platform, which was used as a data source in this study. The platform aggregates publicly available job postings and is operated on a non-commercial basis. The authors declare that this relationship did not influence the study design, data analysis, interpretation, or reporting of results.

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APPENDIX A								
Subcategory Distribution by Institution Type								
Category	Subcategory	HE	RI	Gov	Health	MP	Cult	SOEs
Collection Development & Digital Humanities	Ancient Book and Special Collections	41	4	0	2	0	14	0
	Digital Humanities	26	11	0	0	0	3	0
	Document Development	16	3	0	1	0	14	0
	Ancient Book Restoration	23	0	0	0	0	10	0
	Collection Curation	10	0	0	0	0	12	0
	Total	116	18	0	3	0	53	0
Research Data Management	Data Literacy	26	22	0	1	0	2	1
	Data Curation	23	25	0	2	0	0	0
	Data Ethics	7	11	5	3	0	2	0
	Data Policy	2	7	3	1	0	0	0
	Data Security	0	7	0	1	0	0	2
	Total	58	72	8	8	0	4	3
Subject Services & Research Support	Information Literacy Education	85	0	0	0	0	0	0
	Subject Librarians	48	5	0	0	20	0	0
	Science and Technology Novelty Search	64	5	1	0	0	0	0
	Academic Evaluation	59	3	1	0	0	0	0
	Subject Intelligence	31	7	0	0	5	0	0
	Total	287	20	2	0	25	0	0
Archival Management & Compilation	Archival Compilation	43	5	3	0	4	0	2
	Archival Big Data	5	16	10	1	0	0	3
	Project Archival Management	0	10	0	0	0	0	16
	Archival Informationization	0	4	1	7	2	0	11
	University History Research	22	0	3	0	0	0	0
	Total	70	35	17	8	6	0	32
Intelligence & Patent Analysis	Intellectual Property	52	24	15	0	0	0	0
	Intelligence Analysis	24	11	0	0	9	0	40
	Knowledge Management	0	66	0	0	0	0	0
	Industrial Intelligence	0	0	0	0	0	0	65
	Data Mining	2	32	0	0	7	0	5
	Total	78	133	15	0	16	0	110

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Category	Subcategory	HE	RI	Gov	Health	MP	Cult	SOEs
Information Systems & Technical Services	Semantic Technologies	10	25	0	0	0	0	0
	Engineers	0	0	0	0	4	0	0
	Knowledge Service Systems	4	15	0	0	0	2	0
	Systems Maintenance	13	3	0	0	0	1	0
	Smart Library	3	0	0	0	0	12	0
	Total	30	43	0	0	4	15	0
Scholarly Communication & Publishing	Journal Editing	26	8	1	0	20	0	0
	Institutional Repository	24	1	0	0	0	0	0
	Open Publishing	1	12	0	0	0	0	0
	Science Communication	0	11	1	0	0	0	0
	OA Transformation Agreements	7	2	0	0	0	0	0
	Total	58	34	2	0	20	0	0
Academic & Industry Research	Academic Research	56	9	2	0	0	18	11
	Industry Research	13	34	15	0	0	3	0
	Policy Research	0	17	20	0	0	6	0
	Researchers	0	0	0	0	35	3	0
	Data Research	0	0	23	0	0	12	0
	Total	69	60	60	0	35	42	11
Administrative Management	Research Management	4	68	0	0	0	0	0
	Development Planning	4	0	0	19	10	5	0
	General Management	0	1	13	1	0	0	0
	E-Governance	0	0	7	0	0	0	2
	Total	8	69	20	20	10	5	2

Note: HE = Higher education; RI = Research institutions and think tanks; Gov = Government and public sector; Health = Healthcare; MP = Military and police; Cult = Cultural institutions; SOEs = State-owned enterprises.

Survey on Undergraduate Student Use of Generative AI: Implications for Information Literacy in Academic Libraries

Megan Margino Marchese and Andrew Marchese*

In 2024, 250 undergraduate students from a variety of majors completed an anonymous survey about their experiences using generative artificial intelligence (GenAI). Survey findings provide details on how students are using GenAI for college coursework, students' views of acceptable GenAI uses for assignments, and their opinions on GenAI and plagiarism. Results highlight a wide range of student perspectives, underscoring the need for greater foundational knowledge of GenAI among students. Data from this survey also reveals connections between AI literacy and information literacy through the concepts of evaluating information and using information ethically.

The Association of College and Research Libraries (ACRL) (2016) describes academic librarians' responsibilities to include helping students navigate a "dynamic and often uncertain information ecosystem" (p. 2). The rapidly evolving presence of generative artificial intelligence (GenAI) has presented such uncertainty throughout higher education. Seen as a technological development as significant as the creation of the internet, GenAI has the potential to dramatically change how students access information (Mollman, 2023). While GenAI tools are constantly evolving, many currently do not provide information context, such as authorship, sources, and publication dates. In the absence of these details, users would have difficulty fulfilling key competencies of information literacy, including reflectively discovering information and understanding how information is produced and valued (ACRL, 2016, p. 3).

While recent research explains the benefits and pitfalls of GenAI in higher education, there are limited details on how undergraduate students across a range of academic disciplines are using GenAI, including: (1) students' use of GenAI throughout the writing process; (2) students' opinions on ethical use of GenAI and its connection to plagiarism; and (3) the relationship between students' current GenAI usage to information literacy concepts. To gather this information, a survey was administered to undergraduate students at Farmingdale State College, State University of New York (SUNY). By gaining insight into students' current

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relationship with GenAI, academic librarians will better understand how to address this topic in information literacy instruction and reference interactions.

Literature Review

The release of ChatGPT in November 2022 marked a significant advancement in the field of generative artificial intelligence (GenAI). Large language models (LLMs), such as ChatGPT, use advanced natural language processing to craft plausible, personalized, human-like responses to complex prompts in formats such as text, code, images, videos, and sounds (Chan & Hu, 2023; Chen et al., 2023; Farrokhnia et al., 2023; Guner, et al., 2024; Halaweh, 2023; Oldham, 2024; OpenAI, 2022; Wu et al., 2023; Zhu et al., 2023). While AI tools existed prior to ChatGPT, they could not replicate the human creative process (Oldham, 2024). Now, however, GenAI tools have reasoning capabilities and can generate realistic material such as detailed essays, stories, poems, music, etc. (Wu et al., 2023; Zhu et al., 2023). In addition to its creative capabilities, ChatGPT is accessible and easy to use and understand (Tiwari et al., 2023; Zhu et al., 2023). Holding the potential to change the landscape of many fields in both positive and negative ways, GenAI also presents the possibility of transforming higher education.

Potential Positive GenAI Uses for College Students

Relative to college coursework, GenAI has several potentially useful applications. It can be used as a learning tool with the ability to personalize learning for each user by employing simple language and engaging in an interactive dialogue (Chan & Lee, 2023; Chen et al., 2023; Lo, C.K., 2023; Rahmam et al., 2023; Xiao et al., 2023; Zhu et al., 2023). It could also be used as a study tool to create practice exercises, quizzes, study guides, and summarizing texts (SUNY FACT², 2023). Many also cite GenAI as a useful starting point for thinking processes, such as getting inspiration and brainstorming research topics, as well as being an organizational tool to outline ideas (Chan & Lee, 2023; Chan & Hu, 2023; James & Filgo, 2023; SUNY FACT², 2023; Xiao et al., 2023). Regarding editing final products, GenAI can provide feedback on grammar and style errors, citations, and whether the intended goal of the assignment has been accomplished (Chan & Hu, 2023; Halaweh, 2023; Lo, C.K.; 2023; SUNY FACT², 2023; Zhu et al., 2023). In consideration of inclusivity, GenAI's customized prompt feedback can meet each user's individual needs, both supporting students' self-regulated learning and educators' ability to adapt instruction for different types of learners (Chan, 2023; Chan & Lee, 2023; Chen et al., 2023; Crompton & Burke, 2023; Oldham, 2024; Rahman et al., 2023; Valova et al., 2024; Xiao et al., 2023; Zhu et al., 2023).

Potential Problematic GenAI Uses for College Students

In addition to positive uses of GenAI, there are also significant concerns about its negative impact on higher education. Using GenAI to complete college coursework poses a strong potential for plagiarism and violation of academic integrity (Chan, 2023; Chan & Hu, 2023; Chan & Lee, 2023; Guner et al., 2024; James & Filgo, 2023; Halaweh, 2023; Rahman et al., 2023; SUNY FACT², 2023; Valova et al., 2024). For example, GenAI can provide diverse responses to the same question, generate text in a certain style or tone, and can accomplish creative tasks (Adetayo, 2023; Halaweh, 2023; Lo, C.K., 2023; Lund & Wang, 2023; SUNY FACT², 2023; Wu et al., 2023; Zhu, 2023).

While GenAI output can include useful and accurate information, it can also contain errors, misinformation, disinformation, implicit bias, offensive or harmful content, and outdated information (Chan & Lee, 2023; Chan & Hu, 2023; Farrokhnia et al., 2023; James & Filgo, 2023; Halaweh, 2023; Haensch et al., 2023; Lo, C. K., 2023; Lund & Wang, 2023; Oldham, 2024; SUNY FACT², 2023; Tyson, 2023; Wu et al., 2023; Xiao et al., 2023; Zhu et al., 2023). Though GenAI is trained on data that contains copyrighted information, the source of the information is often unknown, and it is difficult to determine who created the information and for what purpose (Wu et al., 2023). Further, ChatGPT responses are known to include realistic-looking citations that do not actually exist, called “hallucinations” (Lo, C.K., 2023; SUNY FACT², 2023; Tyson, 2023; Wu et al., 2023).

There are also concerns that students’ overreliance on GenAI will negatively impact their critical thinking ability, learning, retention, writing development, creativity, and overall intellectual growth (Chan, 2023; Chan & Hu, 2023; Chan & Lee, 2023; Halaweh, 2023; SUNY FACT², 2023; Valova et al., 2024). Some critics believe that habitually using GenAI for coursework will diminish students’ ability to think independently and express themselves through writing (Oldham, 2024; Valova et al., 2024). Others, however, argue that students can think critically when using ChatGPT by modifying prompts, engaging in a dialogue of follow-up questions, and analyzing and assessing GenAI content (Xiao et al., 2023; Zhu et al., 2023). Though some users understand the importance of critically evaluating GenAI-produced content, its declarative statements lack expression, nuance, or caveat, and can convince users of its credibility (Kidd and Birhane, 2023). This underscores the importance of GenAI users’ ability to evaluate information.

GenAI and Information Literacy

Effective use of GenAI necessitates a discerning approach to information by exercising key concepts of information literacy, such as learning how to critically acquire new information and understand how information is made (Acosta-Enriquez et al., 2024; ACRL, 2016; Haensch et al., 2023; Shepherd & MacLeod, 2023). Recent literature discusses how AI can be incorporated into the ACRL *Framework for Information Literacy for Higher Education for Higher Education* (James & Filgo, 2023; Lo, L., 2023). Specifically, the potential for GenAI inaccuracies and its unreliability in documenting information sources directly relates to the ACRL Framework (ACRL, 2016; Del Castillo & Kelly, 2024; Frederick, 2023; James & Filgo, 2023; Lo, L., 2023).

Many believe that librarians should play a role in teaching students AI literacy, including its strengths and weaknesses, how content is generated, its ethical use, how to evaluate its responses, and how to formulate effective queries (Chan, 2023; Chan & Lee, 2023; Chen, 2023; Cox & Tzoc, 2023; Del Castillo & Kelly, 2024; Lo, L., 2023; Lo & Vitale, 2023). These skills are of particular importance to college students; Gen Z has been found to be more likely to trust information found online compared to other generations (Chan & Lee, 2023). As the presence of AI is increasing in many fields, it is also important to provide students with AI training to adequately prepare them for the workforce (Chan, 2023).

GenAI Usage Data

Looking at data on GenAI usage among young adults, the Pew Research Center found that 56% of 18- to 29-year-olds were using AI several times per week (Tyson & Kennedy, 2024). In a Microsoft (2024) survey, 29% of young adults between the ages of 18-24 have used AI, while

27% of that age group has experimented with AI. Sidoti and Gottfried (2023) found that 25% of high school juniors and seniors have used AI. Additionally, Valova et al. (2024) surveyed 102 high school and college students studying computer systems and technologies, finding that 21.6% use ChatGPT.

Regarding data exclusive to college students, a survey by [Intelligent.com](https://www.intelligent.com) (2023) found that 30% of students in the U.S. have used GenAI to complete college assignments. At Texas A&M University, Amani et al. (2023) found that 73% of engineering students surveyed have used ChatGPT. At UMass Amherst, 40% of the STEM majors surveyed have used ChatGPT (Tyson, J., 2023). Surveys also showed that students use GenAI as a tool for personalized learning, brainstorming, guiding ideas, research support, coding, assessments, and to complete varying amounts of assignments (Amani et al., 2023; Tyson, J., 2023; Valova et al., 2024).

Though existing research provides some aspects of students' GenAI use, there are currently limited details on students' knowledge of AI literacy, their opinions on acceptable uses of GenAI for college coursework, and their views on learning how to responsibly use AI in college. Further, there is a lack of data on how students' self-reported GenAI use relates to information literacy concepts.

Research Questions

1. What are undergraduate students' experiences using generative AI tools?
2. What are undergraduate students' experiences using generative AI to complete college assignments?
3. What are undergraduate students' experiences using generative AI throughout different stages of the writing process?
4. What are undergraduate students' opinions on the ethical and responsible use of generative AI for college assignments?
5. What are undergraduate students' interests in learning how to ethically and effectively use generative AI?

Methods

This study utilized an anonymous survey to collect responses from undergraduate students at Farmingdale State College, SUNY. The survey was created using Qualtrics and was designed based on a review of the current literature of AI use among college students. Questions were primarily Likert-scale, with four open-ended questions. The survey included branched questions, and respondents received between 14 and 22 questions depending on the responses they provided. For example, if a respondent answered that they have never used GenAI, they did not receive questions that asked about details of their GenAI use.

During the spring 2024 semester, the survey was emailed to instructors across all academic departments of the college to request their voluntary participation in announcing the survey in class or posting a link in their learning management system course page. Library student employees also distributed paper copies of the survey in the library. Additionally, the survey was announced to student clubs via email, and a QR code was displayed on flyers throughout campus.

Because portions of the survey asked respondents about the use of AI to plagiarize, several precautions concerning anonymity were taken. The informed consent notified students that the survey was anonymous, no personally identifiable information would be asked, IP

addresses would not be collected, and data would only be reported in aggregate in any dissemination of results. Participation in the survey was voluntary, any question could be skipped, and students under 18 years of age were excluded.

Results

The survey received 250 responses from students across a range of class standings and ages (see Figures 1 and 2).

Survey respondents included students from 33 different majors, representing the college's four schools: The School of Arts and Sciences (55 respondents); the School of Business (54 respondents); the School of Engineering Technology (45 respondents); and the School of Health Sciences (26 respondents) (see Figure 3). Not all responses listed a major.

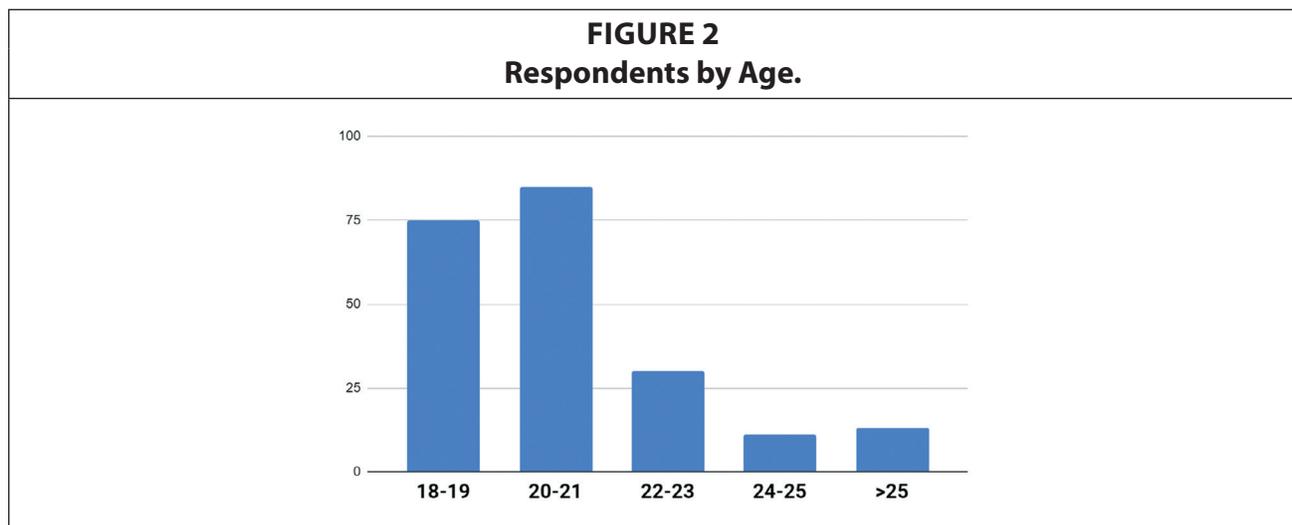
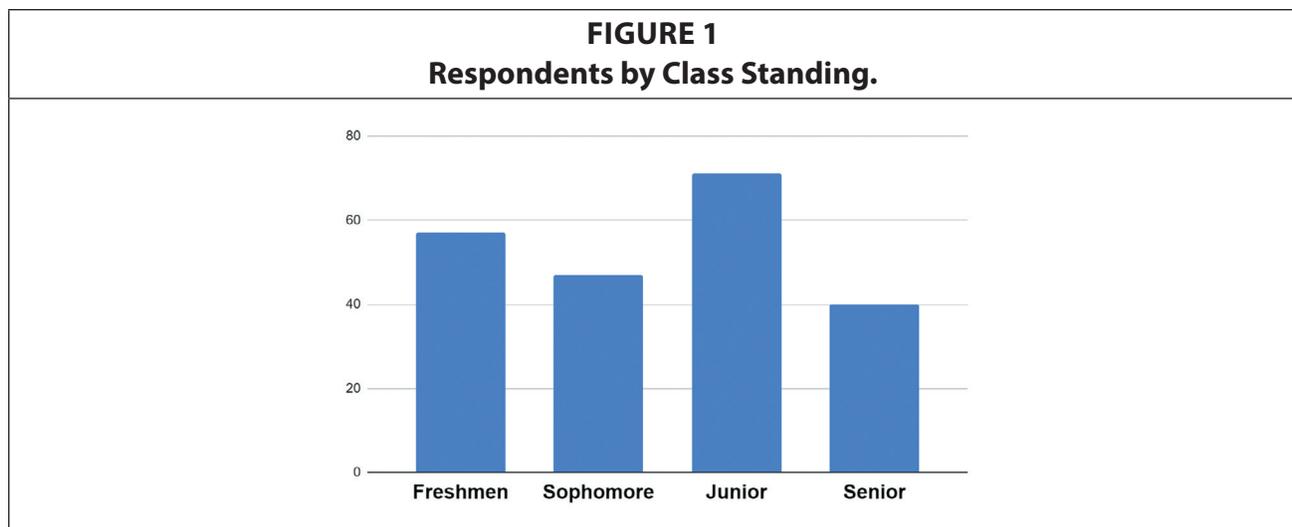


FIGURE 3
Respondents by Major.

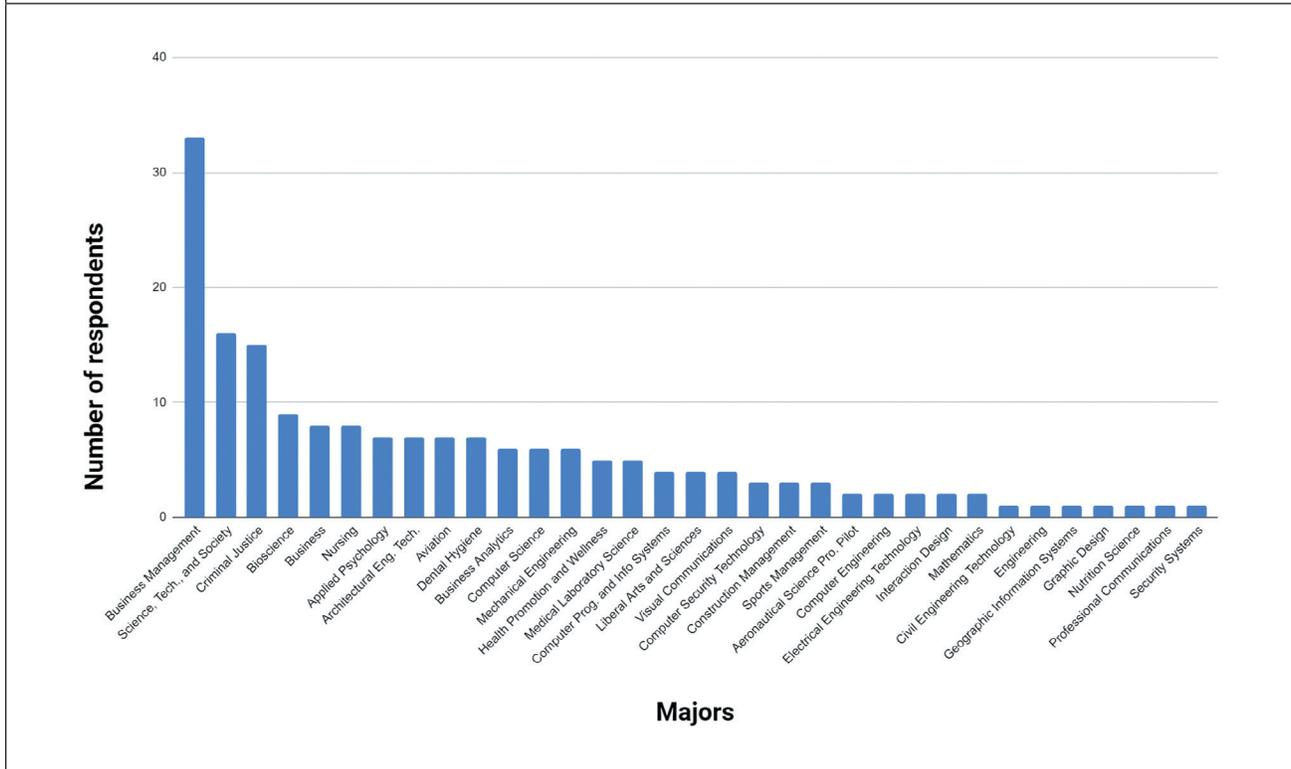
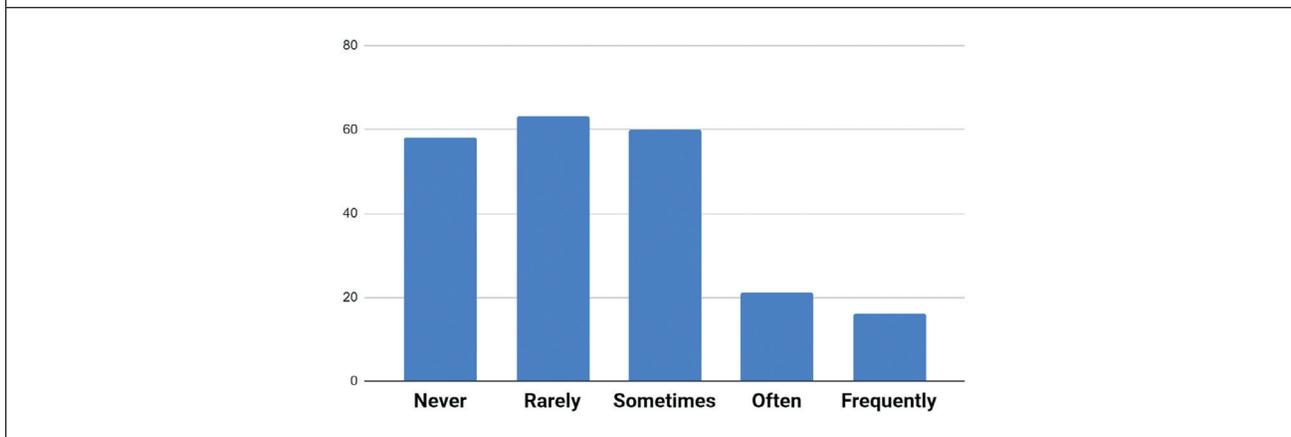


FIGURE 4
Respondents' Overall GenAI Usage.



GenAI Usage

Levels of GenAI usage were similar across different majors and schools of study. Seniors are the highest group to report using GenAI often (19.5%) (see Figure 5).

Considering usage by age, students aged 22 and older were more likely to use GenAI frequently compared to younger students (see Figure 6).

FIGURE 5
GenAI Usage Among Different Class Standings.

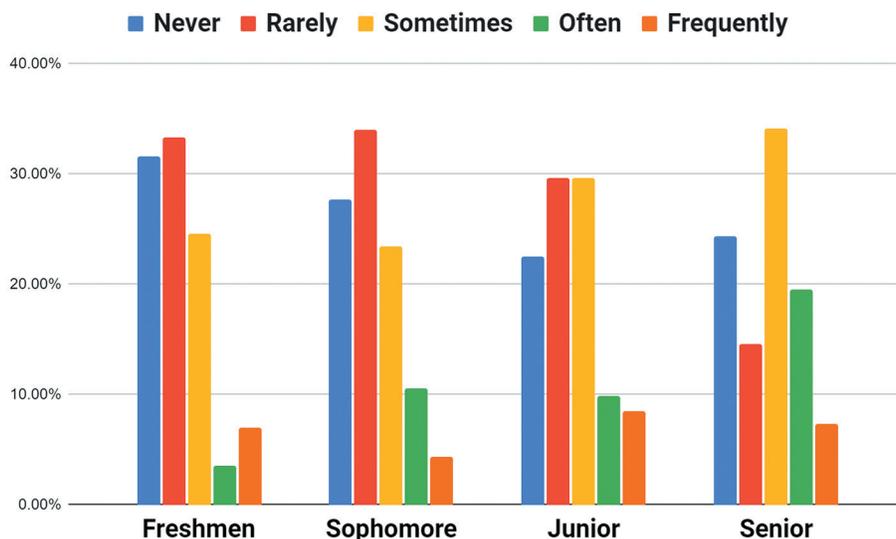
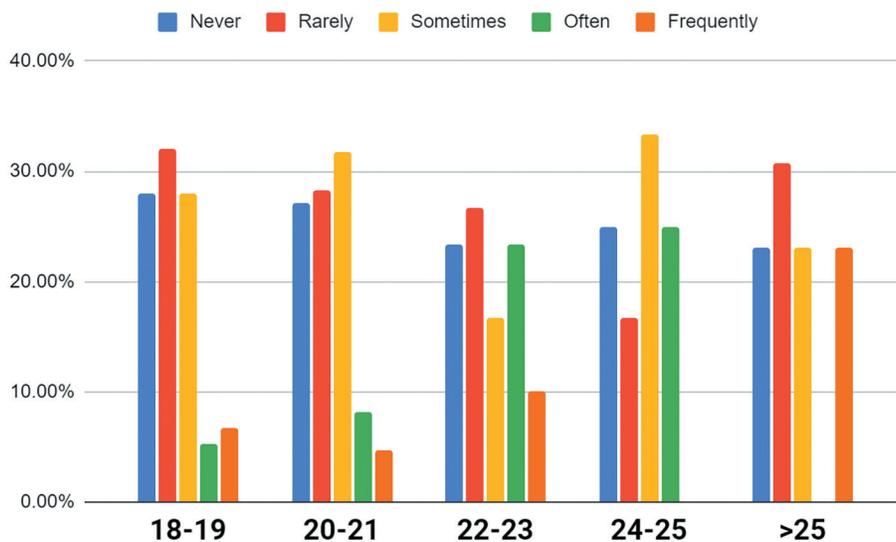
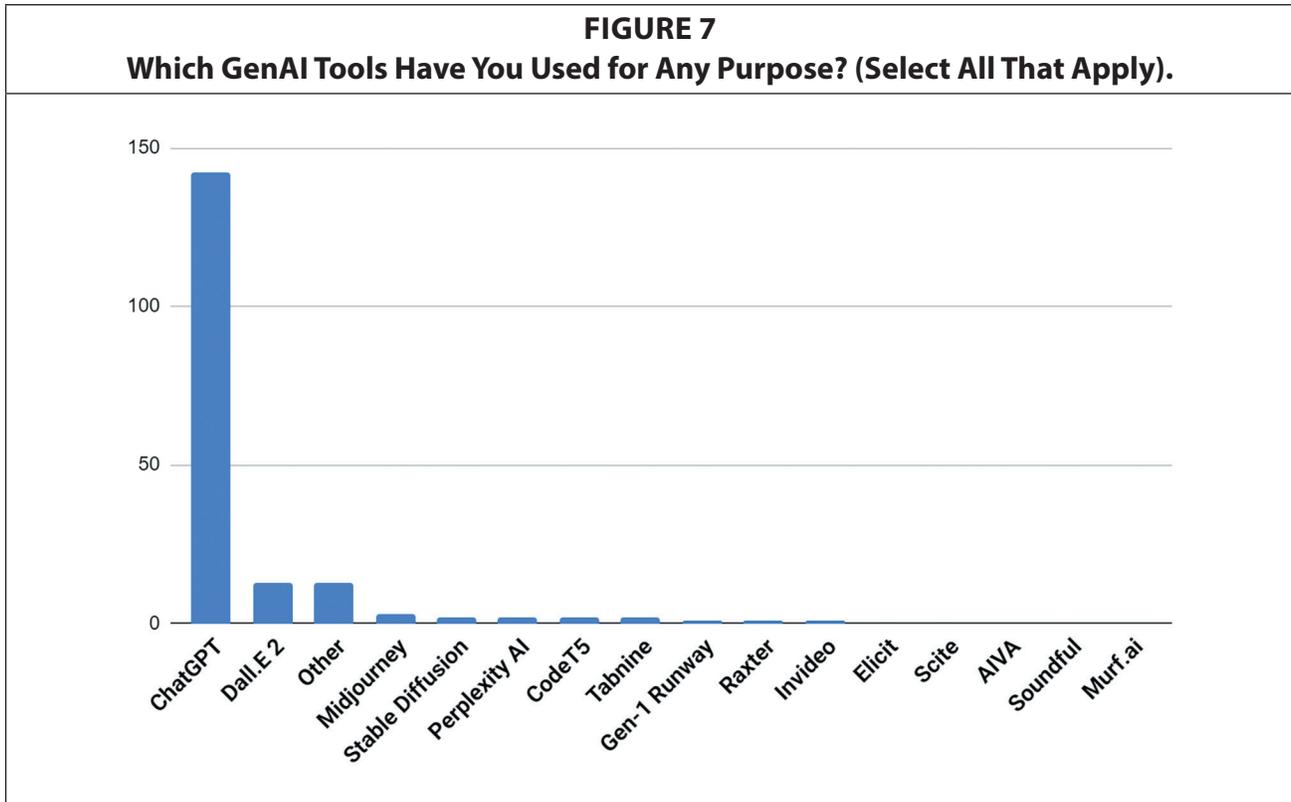


FIGURE 6
GenAI Usage Among Different Ages.



Use of GenAI Tools for Any Purpose

When asked which GenAI tools they have used for any purpose, the overwhelmingly majority of respondents reported using ChatGPT (142 responses). Responses that selected “other” identified the following tools: Grammarly (3), Microsoft Copilot (2), Claude (1), [Character.ai](#) (1), Dream Tavern (1), Quillbot (1), Photoshop AI Generative fill (1), and Adobe Suite AI tools (1) (see Figure 7).



Opinions from Non-Users of GenAI

When completing the survey electronically, respondents who had never used GenAI did not receive questions that asked details about their AI use. Instead, they received two questions regarding their awareness and knowledge of GenAI (see Figures 8 and 9).

Types of GenAI Usage

Respondents who had used GenAI were asked to identify how they use it. Thirty percent reported personal use of GenAI only, without having used it for college-related assignments (see Figure 10).

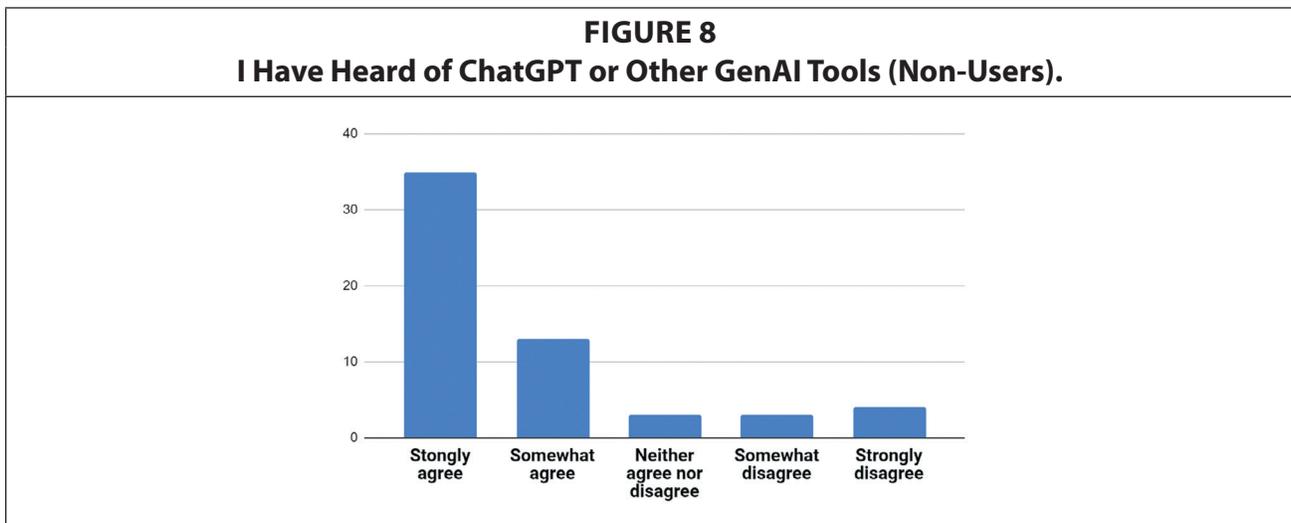


FIGURE 9
I Am Aware of the Functions of ChatGPT or Other GenAI Tools (Non-Users).

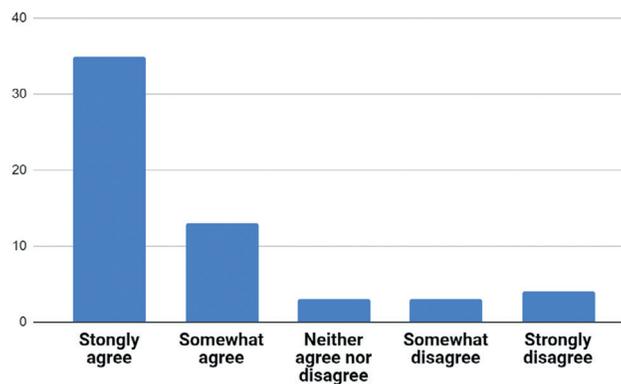
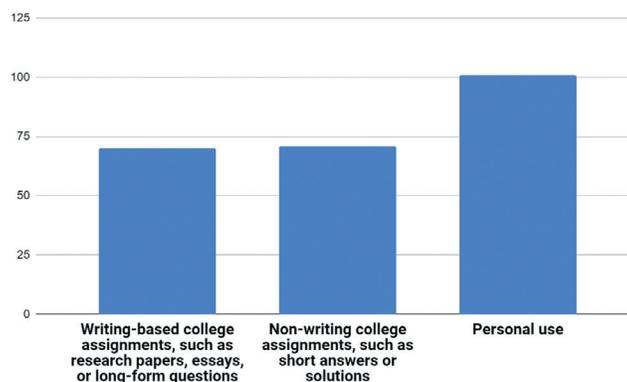


FIGURE 10
Identify How You Have Used ChatGPT or Other GenAI Tools (Select All That Apply).



Use of GenAI for College Assignments

Looking at respondents who used GenAI for college-related purposes, the overwhelming majority also use ChatGPT (88) responses. Responses that selected “other” identified the following tools: Adobe Suite AI tools (1), Grammarly (1), Chegg (1), Photoshop AI Generative Fill (1), and Quillbot (1) (see Figure 11).

Types of GenAI Usage for College Coursework

Respondents were asked to select all the ways they have used GenAI to complete college assignments. Respondents who selected “other” described additional ways they use GenAI, such as rephrasing their ideas, achieving word limits, self-learning, and locating images (see Figure 12).

Copying and Pasting GenAI Responses

Respondents who said they use GenAI to copy and paste responses for an assignment received three additional questions that asked about the amount they have copied. Twenty students answered these additional questions (see Figures 13–15).

FIGURE 11
Which GenAI Tools Have You Used to Complete College Assignments?
 (Select All That Apply).

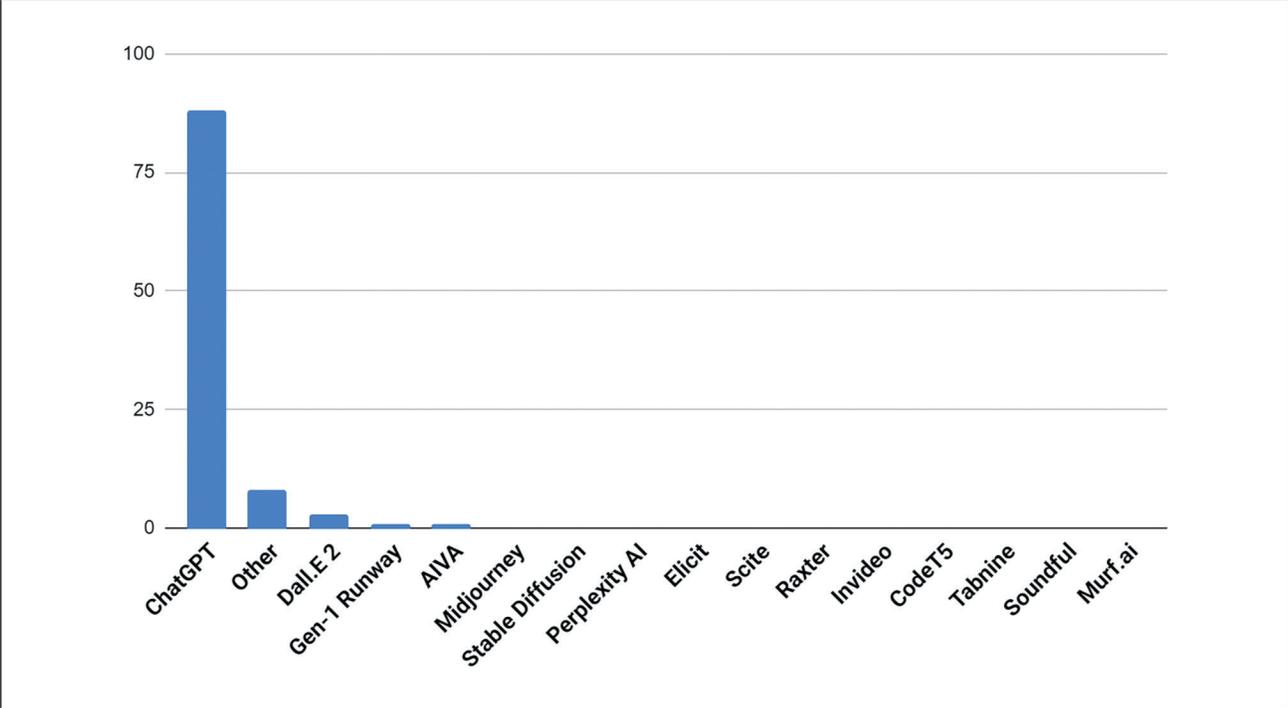


FIGURE 12
Identify How You Have Used ChatGPT or Other GenAI Tools for College Assignments
 (Select All That Apply).

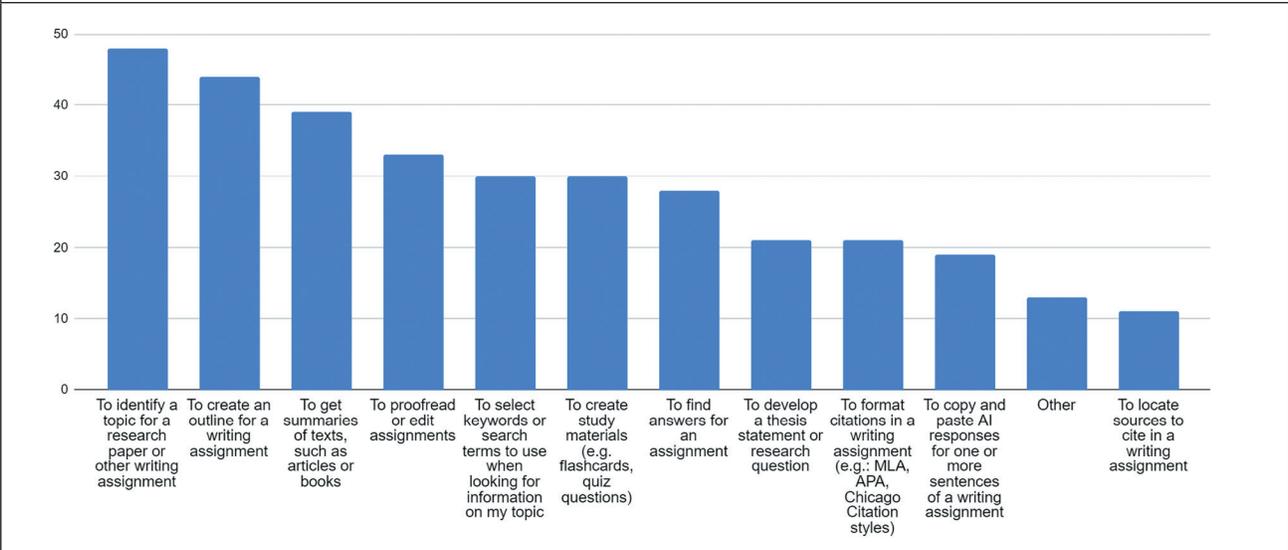


FIGURE 13
I Have Copied and Pasted ChatGPT or Other GenAI Responses for 25% or More of an Assignment.

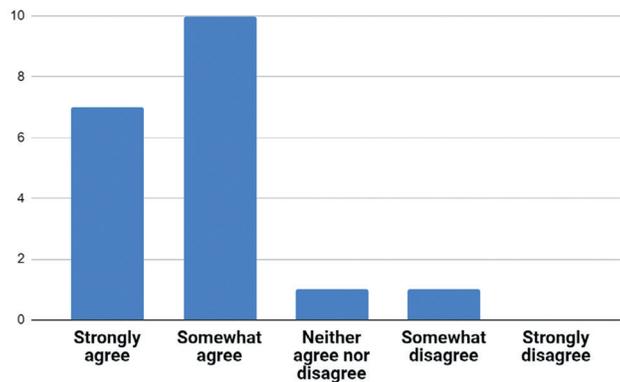


FIGURE 14
I Have Copied and Pasted ChatGPT or Other GenAI Responses for 50% or More of an Assignment.

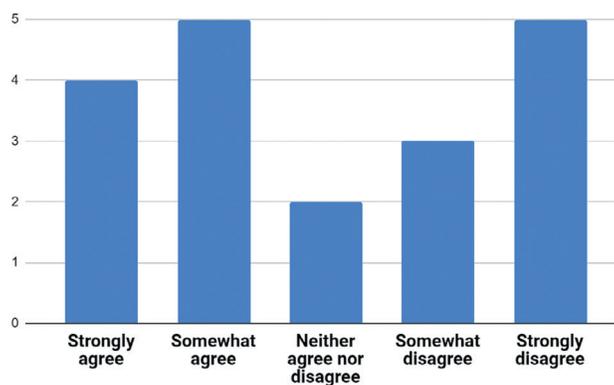
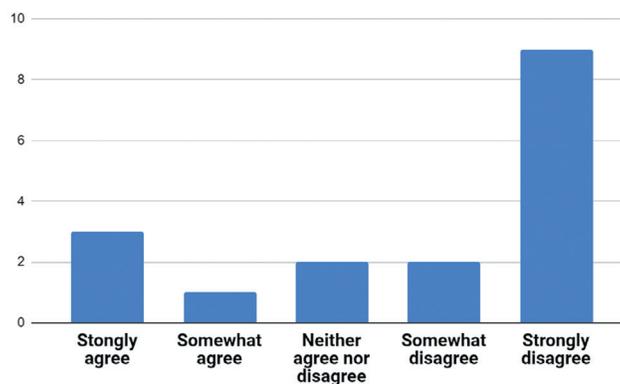


FIGURE 15
I Have Copied and Pasted ChatGPT or Other GenAI Responses for 75% or More of an Assignment.



Checking for Accuracy and Editing Responses Opinions on Usefulness

Most respondents found GenAI to be useful in completing college assignments (see Figure 18). An open-ended question prompted students to explain their answer regarding GenAI usefulness. Many students use GenAI as a guide to help them get started with assignments. They use it to get ideas, create outlines, and brainstorm topics. Another prominent theme was using GenAI as a learning tool, including using it to simplify complex wording, to get background information about a research topic, and to get explanations for concepts. One student remarked, “AI is always available to teach. A professor is not.” Several comments also discussed using AI to help them understand the assignment requirements and to check if their work has met the requirements of an assignment.

Using AI to improve writing was another prominent topic regarding GenAI usefulness. Students wrote that AI helps give new approaches to their writing and grammar. Many comments used the term “writing sophistication,” explaining that they ask AI to make their writing sound better and to find better ways to say something. Comments also mentioned using AI to proofread their work. Students talked about AI as a tool to complete their work in general. They use it to expand upon their ideas, to supplement their work, to get tips on

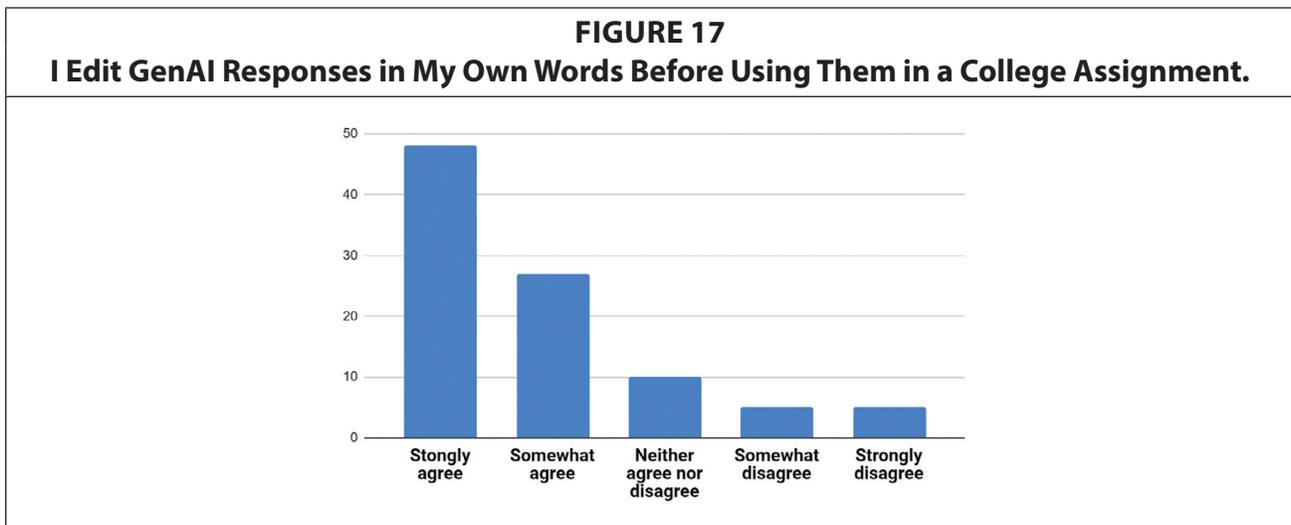
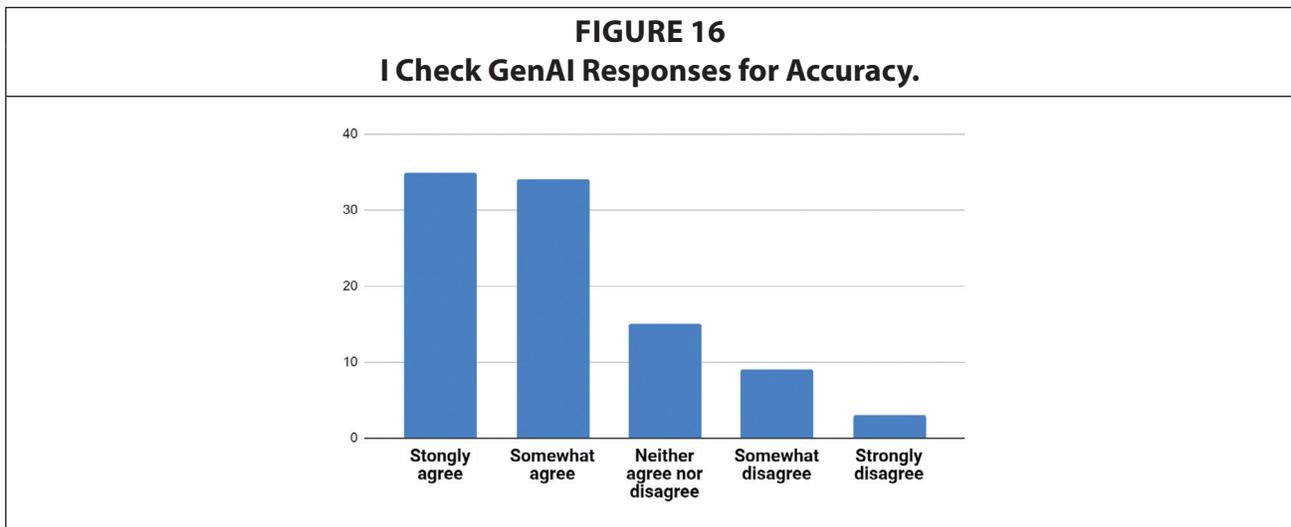
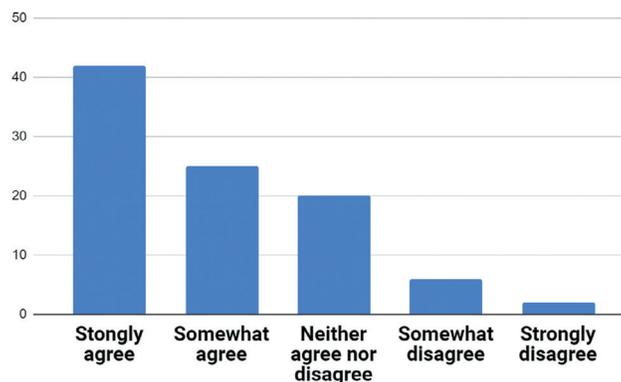


FIGURE 18
I Have Found GenAI to be Useful in Completing College Assignments.



how to complete their work, and to assist with difficult questions. They also noted ChatGPT's usefulness for saving time, mentioning that it is quick and helps with deadlines.

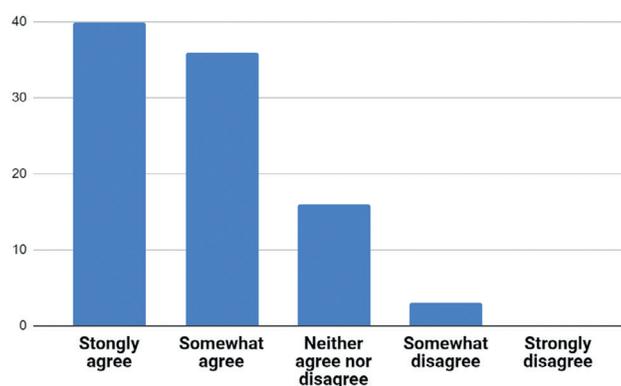
Other comments discussed the unreliability of GenAI's usefulness due to its potential to provide incorrect information. One said, "sometimes it works, sometimes it doesn't." Recognizing that GenAI does not have the same capabilities as humans, one comment noted, "Having friends, tutors, professors, or the Writing Center look over one's assignment is more reliable. These people can better understand the nuances of the assignment and of language and better formulate creative and constructive feedback for students than internet-based AI currently can."

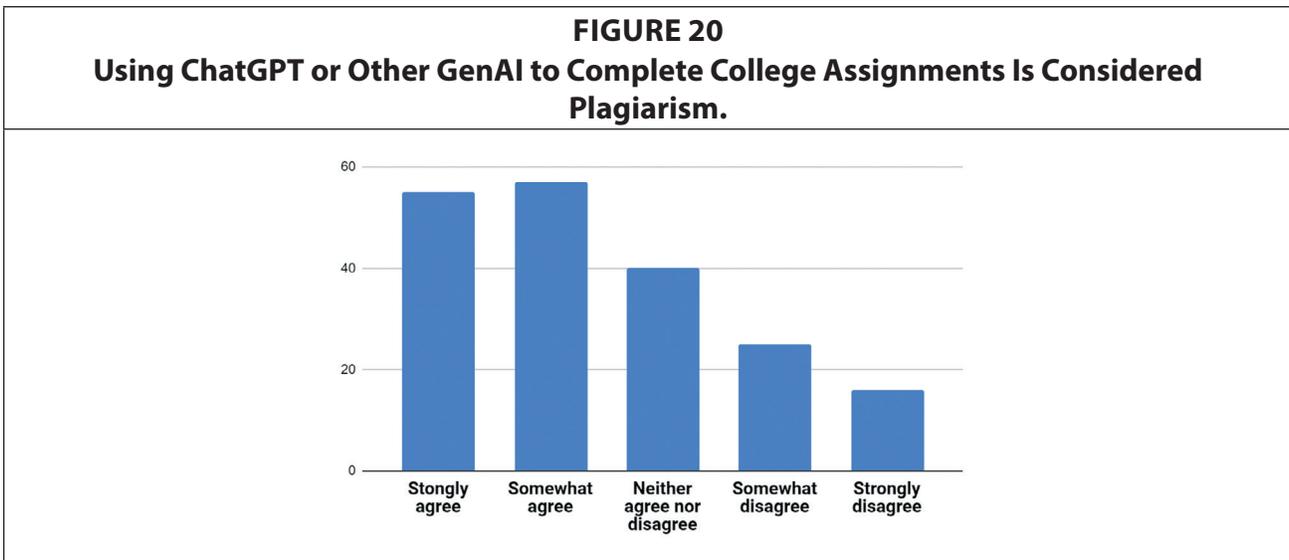
Opinions on Ethical Use and Plagiarism

Respondents were asked to rate the degree to which they feel their GenAI use is ethical (see Figure 19).

All respondents, regardless of experience using GenAI, were asked to rate the degree to which they felt using GenAI to complete college assignments is considered plagiarism (see Figure 20). The questions on ethical use and plagiarism were both followed by open-ended responses, prompting respondents to explain their answers. Overlapping themes emerged

FIGURE 19
I Consider My Use of GenAI to Be Ethical.





from these comments, including views on GenAI acceptable uses, its use as an academic source, and opinions on originality, citations, student learning, and accuracy (see Tables 1-9).

Opinions on Acceptable Uses Vary

Many respondents expressed the belief that they ethically use GenAI for college coursework because they alter and expand upon AI-generated content. They explain that they “don’t use it to write a whole paper,” and using AI for coursework is okay “as long as you don’t copy word for word.” One felt that they ethically use AI because the “final use always ends up being transformative.” Another wrote “I word the statement in my own way or explain what I have learned.” Comments reveal that students feel it is their responsibility to ensure they are using AI ethically, noting “knowing where to set the boundary is essentially the only thing keeping you from plagiarizing.” Table 1 shows how respondents identified cases of acceptable and unacceptable uses of GenAI in relation to college coursework.

Views of Acceptable GenAI Uses	Views of Unacceptable GenAI Uses
<ul style="list-style-type: none"> • Developing ideas, getting inspiration, getting started (writing and artwork) • Generating outlines, organizing work • Improving grammar • Studying • To learn, to get explanations of concepts • To get definitions • Using AI as a guide and a “helping tool” • Paraphrasing AI responses • If AI responses are reinforced with personal opinion • To check writing, check answers • When courses encourage or require its use as a tool • If used “within reason” 	<ul style="list-style-type: none"> • An entire assignment being copied • Word-for-word copying of AI responses • Prompting AI to generate an entire paper • Submitting AI responses with no human interaction or input • To get answers • To complete homework • When course syllabi state AI use is not allowed

Opinions of GenAI as an Academic Source

Many respondents hold the opinion that using GenAI is ethical and is not plagiarism because they view it as an academic source. Comments (see Table 2) show how students compare GenAI to Google, Wikipedia, textbooks, and journal articles.

TABLE 2 Opinions of GenAI as an Academic Source
<ul style="list-style-type: none"> • “What’s the difference between AI and Google?” • “I’m not doing something that Google couldn’t help me with.” • “If cited or referenced it should be able to be used for writing just like any other textbook, article, or other sources that are allowed to be used.” • “I restate what the AI generates, which isn’t much different from restating information from a peer-reviewed article, which is what we’re required to do.” • “Using AI is the same as searching up anything on the internet.” • “AI is like another academic source where you can find answers to questions that are not addressed in class.”

Opinions on GenAI Responses as Someone Else’s Words

Students’ opinions on AI and plagiarism are shaped by their view on whether AI-generated responses are another person’s words (see Table 3).

TABLE 3 Opinions on GenAI Responses as Someone Else’s Words		
GenAI Responses Are Not Someone’s Words	GenAI Responses Are Someone’s Words	Ambiguous
<ul style="list-style-type: none"> • “You can’t plagiarize something that wasn’t made by a person.” • “You’re not taking another human’s words, it’s computer generated.” • “It is not anyone’s words, it’s technically your own words because it’s unique for every person.” • “AI has no autonomy or claim to the work it creates so it’s not really plagiarism.” • “It’s not the student’s own answer but it’s not someone else’s either.” • “It’s not plagiarism because it’s not someone else’s work.” 	<ul style="list-style-type: none"> • “Technically you are copying someone else’s work, even if it’s a computer generating it.” • “Regardless of it being artificial intelligence or an actual person, it is still using another’s words.” • “I feel that people are just relying on AI to answer their questions and technically you are copying someone else’s work while doing it, even if it’s a computer generating it.” • “The algorithm takes information online (hence other people’s work).” 	<ul style="list-style-type: none"> • “Plagiarism is defined as claiming another person’s work as your own. Technically ChatGPT isn’t another person, but you are still claiming it as your own.” • “It could be considered plagiarism because the words aren’t your own. However, the content generated by AI does not necessarily belong to anyone else.” • “Some people have ChatGPT paraphrase their own work which isn’t really plagiarism.”

Opinions on the Originality of GenAI Responses

Students’ feelings on whether AI responses are original also impacts their views on AI and plagiarism (see Table 4).

TABLE 4 Opinions on the Originality of GenAI Responses	
GenAI Responses Are Original	GenAI Responses Are Not Original
<ul style="list-style-type: none"> • “ChatGPT gives a unique response to a specific question. It is not a copy and paste from an internet source such as Google. So, I don’t think this can be called plagiarism.” • “If [AI] is taking work directly from a site, then yes, but if it is all generated and has never been written or worded in that way, why would it be plagiarism?” • “Since it’s not another person’s exact words on the internet, I wouldn’t consider it plagiarism. But I don’t really know.” 	<ul style="list-style-type: none"> • “It’s trained on previously existing data, meaning it’s not coming up with an original answer.” • “It is not generating anything new.” • “GenAI does not provide original responses because it is trained on existing data.” • “AI is simply regurgitating information that is unsourced on the internet.” • “From my understanding, ChatGPT uses sources from articles all over the web and makes a paper out of it. I would consider this to be plagiarism.”

Opinions on the Presence of Citations in GenAI Responses

Some respondents discussed the lack of citations in ChatGPT responses as a reason for viewing the use of GenAI for assignments as plagiarism (see Table 5).

TABLE 5 Opinions on the Presence of Citations in GenAI Responses
<ul style="list-style-type: none"> • “It’s plagiarism because ChatGPT takes information WITHOUT CITATIONS included.” • “AI copies information from other websites without giving credit.” • “Because AI is simply regurgitating information that is unsourced on the internet.” • “It is taking info from other sources without citing it.”

Overreliance on GenAI Inhibits Learning

Other respondents felt that using GenAI for assignments is unethical because its overuse can negatively impact learning (see Table 6).

TABLE 6 Overreliance on GenAI Inhibits Learning
<ul style="list-style-type: none"> • “It’s not the student’s own writing or work, they aren’t learning if they use AI to do the work for them. I’m highly against using AI for college assignments. A very lazy student who is failing his or her class could use AI to pass the class and it makes it very unfair for students who don’t use AI and are intelligent students.” • “It takes away from the learning that students need.” • “ChatGPT should not be used to write things for you (ex. essays). It is wrong to cheat but also, you are hurting yourself in the end from overreliance. You lose your writing skills/ability.” • “I think it doesn’t allow students to really understand the topic well.”

Opinions That Using GenAI Is Not Your Work

Some respondents viewed the use of GenAI for assignments as not completing your own work, fitting the definition of plagiarism (see Table 7).

TABLE 7
Opinions That Using GenAI is Not Your Work

- “If you are using AI to actually complete assignments instead of doing them yourself, this is no different than copying someone else’s work.”
- “Plagiarism is using work that isn’t yours and claiming it is yours. This fits that criteria.”
- “I do not think it’s right to have something or someone else completing work for you.”
- “I think using AI is cheating and everyone should do research instead of taking the lazy way out.”
- “It’s not your work so how could you turn it in for a grade saying it’s yours?”
- “The computer is generating the answer or explanation, not your mind.”
- “You’re not coming up with the ideas yourself. You’re taking credit for work that you didn’t not create.”

Opinions That GenAI Can Be Inaccurate

Additionally, some respondents feel that using GenAI for assignments is unethical due to the possibility of inaccurate responses (see Table 8).

TABLE 8
Opinions That GenAI Can Be Inaccurate

- “It can be used for ideas but it isn’t good to rely on for correct information.”
- “If you are straight copy pasting, lots of issues such as inaccuracy of information and not relying on your own skills and thoughts”
- “ChatGPT can completely miss the topic or accidentally plagiarize.”
- “Not really your own research for the answers and probably not accurate either.”

Opinions of AI Literacy as a Skill

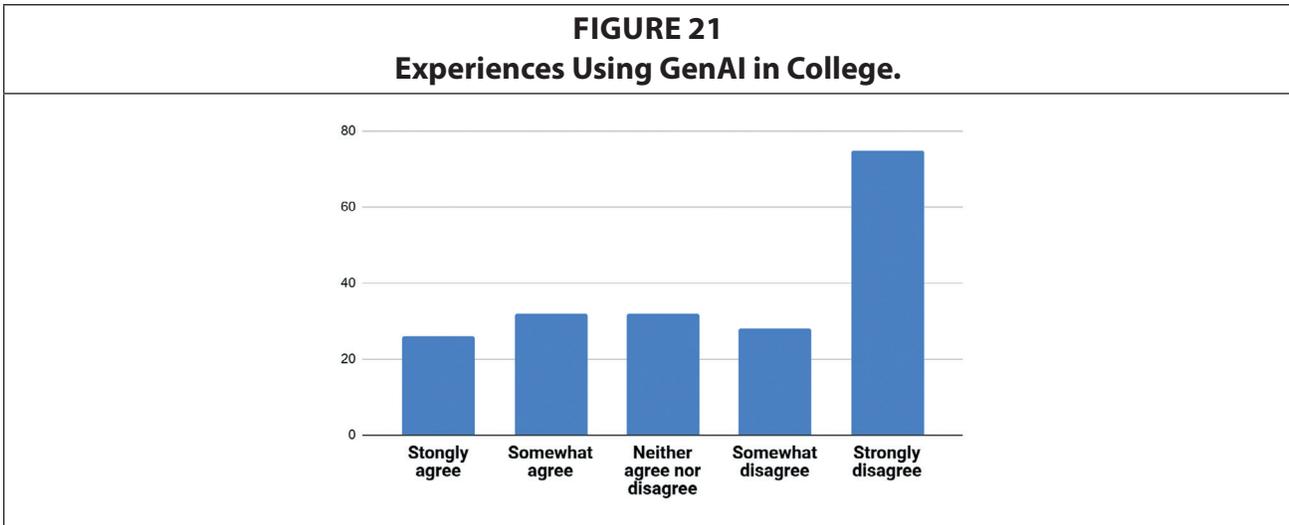
Other respondents expressed the opinion that using GenAI for coursework is not plagiarism because its use is a useful life skill and is sometimes used for classes (see Table 9).

TABLE 9
Opinions of AI Literacy as a Skill

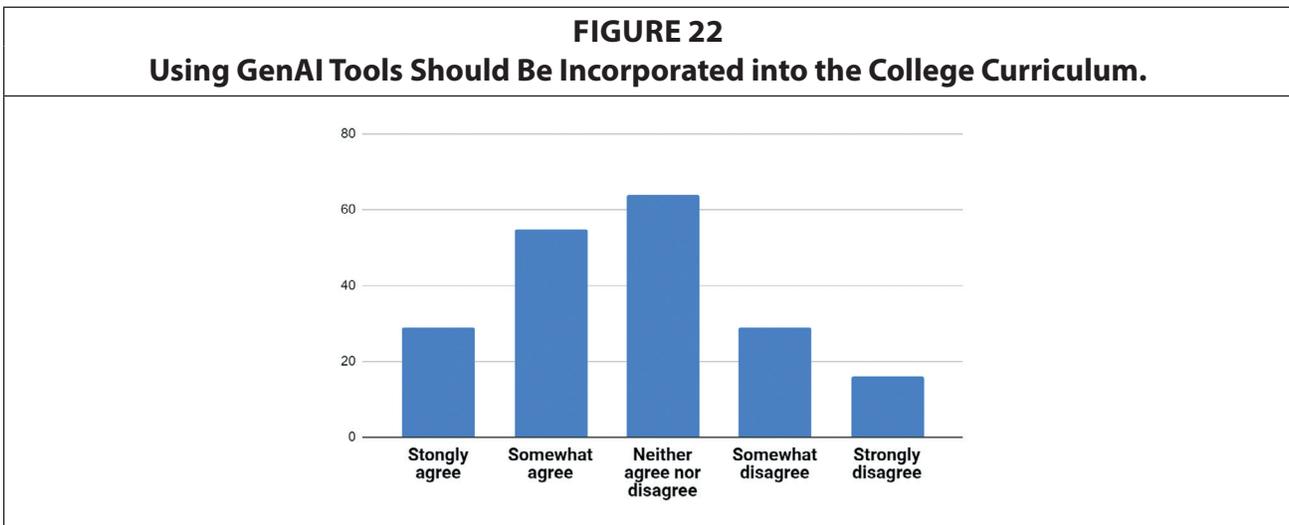
- “In marketing and senior courses this is encouraged to use as a tool in our tool boxes for the world or jobs.”
- “A student who never uses ChatGPT but cannot come up with anything new is worse than an intelligent student who uses ChatGPT but can produce something unique and valuable.”

Experiences Learning GenAI in College

Respondents were asked to rate the degree to which they have learned how to use GenAI as part of their college coursework (see Figure 21). In response to this question, some students attached ChatGPT-related assignments to paper copies of the survey. These assignments required students to fact-check AI responses by comparing information to reputable sources and to evaluate AI responses. These examples show how traditional writing assignments are evolving due to GenAI.



GenAI Tools in the College Curriculum



How Should GenAI Be Taught in College?

All respondents were asked how colleges should teach students how to use GenAI, if at all (see Figure 23).

Regarding the selection, “colleges should teach students how to use GenAI in specific classes,” respondents were offered an option to provide an open-ended comment explaining their response (see Tables 10 and 11).

FIGURE 23
In What Ways, If Any, Should Colleges Teach Students How to Use GenAI?
 (Select All That Apply).

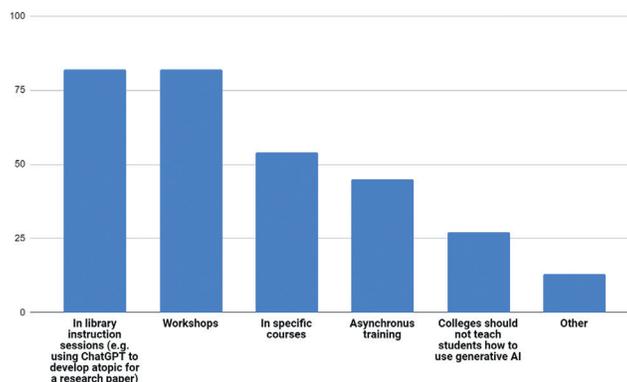


TABLE 10
Academic Areas Identified for GenAI Instruction

- Computer science, computer programming
- Technology-heavy courses
- Architecture
- Engineering
- Senior project (writing intensive)
- Writing courses
- Visual communications, art
- First-Year Experience

TABLE 11
Opinions on Educating Students How to Use GenAI

- "I think technology and these systems will be popular in the coming years as we have seen, therefore educating students about this can be very beneficial."
- "Colleges need to prepare for AI because it will be used and is beneficial for everyone, not just students."
- "Any student looking to work with AI as a major should be taught how to use it."
- "It's important to show students how to use [AI] so they don't fall behind in the field of graphic design. Generative AI will be in the design field whether we like it or not."

Lastly, some comments emphasized the widespread use of AI, noting that "people are going to use it no matter what" and "it would be wild and outrageous to completely reject the use of it."

Discussion

Overall GenAI Usage

This survey reveals insights into how students use GenAI and thereby contributes to librarians' understanding of how to address GenAI regarding information literacy. Survey responses provide evidence that students hold a wide range of experiences and opinions using GenAI.

While 26% of respondents report having never used it at all, others are frequent users. Respondents who are GenAI users report varying degrees of use, including 30% identifying personal use only, without having used it in relation to college. Varying types of GenAI use was also reported among respondents who used GenAI for college-related purposes. This data highlights significant differences in students' opinions about ethical and responsible use of GenAI for college assignments.

Looking to the future, students' degree of GenAI usage is expected to drastically increase in the next several years; many believe that the future of higher education will include incorporating GenAI, rather than prohibiting it (Chan, 2023; Chan & Lee, 2023; Chen, 2023; Cox & Tzoc, 2023; Del Castillo & Kelly, 2024; Haensch et al., 2023; Lo, L., 2023; Lo & Vitale, 2023; Statista, 2024). The likely permanence of GenAI emphasizes the value of these survey results, which indicate a clear need for students to have increased basic knowledge of GenAI. Students' misconceptions of the process by which GenAI chatbots generate responses impacts their decisions on whether to use GenAI for college coursework and the extent to which it is used. This can potentially lead to students' misuse of information, underscoring the importance of information literacy skills.

Pairing AI Literacy with Information Literacy Instruction

Respondents identified library instruction sessions and workshops as leading selections for how colleges should teach students to use GenAI. One comment suggested its incorporation into the First-Year Experience course:

It should be part of College Seminar or whatever that intro to college class is. Go over it, what is and is not okay to do with it. How it can be helpful, how to check to make sure it isn't hallucinating. And especially how to use it as a tool, and not as a crutch.

This opinion, along with the overall results of the survey, shows the need for students to better understand GenAI and its relevance to college. When considering basic information regarding ChatGPT and other GenAI tools, AI literacy can be closely tied to information literacy in the following areas:

1. The importance of knowing where information comes from
2. Considering plagiarism in the context of AI
3. Questioning the originality of GenAI responses

The Importance of Knowing Where Information Comes From

Survey responses call attention to students' varied understanding of what GenAI is and how it forms responses. While it is apparent that most students have some knowledge of GenAI, misconceptions are prevalent in survey comments, and it is evident that students need general knowledge of GenAI.

Understanding the credibility of information sources is a core component of information literacy. The Authority Is Constructed and Contextual frame of the ACRL Framework (2016) emphasizes "the need to determine the validity of information created by different authorities and to acknowledge biases that privilege some sources of authority over others' worldviews, gender, sexual orientation, and cultural orientations" (p. 4). The Framework also discusses

the need to “critically examine all evidence,” and “to ask relevant questions about origins, context, and suitability for the current information need.” However, because some GenAI tools such as ChatGPT currently do not provide reliable citations, it is difficult to investigate the information authorities of such GenAI responses. If ChatGPT is a user’s sole information source, as most of the survey responses demonstrated, the user would be unable to adhere to the authority guidelines put forth in the ACRL Framework. The survey indicates that many students are relying on ChatGPT as a source, both paraphrasing and directly copying its content. This shows the necessity for students to understand how GenAI responses are produced.

Information literacy instruction typically involves the concept of evaluating information sources. For example, through teaching differences between types of sources, why some sources are considered more credible than others, and the appropriateness of different sources for different contexts, librarians might discuss themes of author expertise, publication reputation, source documentation, publication date, and bias. By relating information literacy to AI literacy, librarians can emphasize why an absence of source information in GenAI responses is significant. Because ChatGPT is trained on data that comprises the whole of the internet, it creates responses using information from a wide range of sources, including those that are credible and accurate, as well as sources that contain inaccuracies, bias, and inappropriate content (Chan & Lee, 2023; Chan & Hu, 2023; Farrokhnia et al., 2023; Halweh, 2023; Haensch et al., 2023; Lo, C. K., 2023; Lund & Wang, 2023; Oldham, 2024; SUNY FACT², 2023; Tyson, 2023; Wu et al., 2023; Xiao et al., 2023; Zhu et al., 2023). Lack of real-time information is also an important point of which students should be aware (James & Filgo, 2023). While the authoritative tone of ChatGPT and other GenAI tools may lead students to believe they are scholarly sources, librarians can use information literacy instruction skills to address concepts of AI literacy.

Considering Plagiarism in the Context of AI

Survey respondents were generally in agreement about what constitutes ethical use regarding GenAI and coursework. Acceptable uses reported in the survey included using AI to brainstorm and generate ideas, to create outlines, to understand assignments, to check grammar and vocabulary, to check work in general, and to learn and study. Many responses also discussed paraphrasing GenAI, explaining that they felt their AI use was ethical because they rephrase responses in their own words. Despite their emphasis on paraphrasing AI-generated content, few respondents discussed having cited GenAI as a source. This discrepancy suggests that students may believe their coursework-related AI use is ethical if responses are paraphrased, regardless of whether they cited the information.

While respondents agreed that it was acceptable to use GenAI for assignments “as long as you don’t copy word for word,” they also generally believed that acceptable use of AI includes correcting grammar, editing, and improving writing sophistication. However, these uses contradict each other. Though many responses discussed the importance of not using the exact phrasing of AI responses in assignments, the use of GenAI to edit and revise writing implies that students will, in fact, submit the exact words of GenAI responses as a final product.

One justification for using GenAI to revise writing identifies students’ ideas as a focal point of the work, rather than their academic writing ability. Halaweh (2023) argues that because minimum levels of English skills are required to join any academic program, students should be able to use text editing to improve their writing. Using GenAI for grammatical purposes

could also benefit English learners in this capacity. Halaweh (2023) predicts that AI will become part of the writing process, similar to how calculators and computers have changed the fields of mathematics and science. However, different academic areas prioritize academic writing ability to varying degrees and use of GenAI should not replace student learning. For example, if students are learning essay revision skills in an English composition course, using GenAI for revision purposes would undercut student learning.

A major consideration concerning this topic is the extent to which GenAI input should be permitted in student work. If acceptable uses of AI in college coursework include both (1) generating and organizing ideas and (2) editing the final product, the distinction between students' work and AI content becomes murky. As students noted in the survey, it is largely the responsibility of the user to resist over relying on AI and ensuring that their own work is present in the final product. Students need guidance on specific allowable and prohibited uses of GenAI, which may be individual to each course.

Regarding plagiarism, definitions often use the phrases 'another person' or 'another,' when referring to the act of passing off work as your own. For example, the MLA Style Center (n.d.) defines plagiarism as "presenting another person's ideas, words, or entire work as your own." Similarly, the APA Style (n.d.) defines plagiarism as "the act of presenting words, ideas, or images of another as your own." Plagiarism definitions that use the phrasing "another person" may need to be reframed, as some students do not consider AI responses to be the words of another person. Specifically, student comments such as "you can't plagiarize something that wasn't made by a person," and "you're not taking another human's words, it's computer generated," are particularly eye-opening. These opinions show a need for students to have a better understanding of plagiarism and of AI. Definitions of plagiarism that omit language referring to 'another person' or 'another' are more effective in encompassing AI in the context of plagiarism. One such definition from The University of Oxford (n.d.) describes plagiarism as "presenting work or ideas from another source as your own ... by incorporating it into your work without full acknowledgement." This explanation prompts students to consider plagiarism based on information from any source, including GenAI, rather than only human-created content.

Questioning the Originality of GenAI Responses

Survey comments that discuss the originality of GenAI responses also signify a need for students' increased understanding of how GenAI responses are generated. While some students discussed the data training process of ChatGPT, responses from other students indicate misconceptions regarding the uniqueness of responses. The concept of a "unique response" contributed to some students' responses relating to GenAI and plagiarism. Referring to ChatGPT, students made comments such as "it's not anyone's words, it's technically your own words because it's unique for every person," and "if it is all generated and never worded in that way before, why would it be plagiarism?"

In contrast to these statements, Lucchi (2023) discusses AI and copyright law, explaining that AI-produced content "may be less unique than expected," "derivative," or "based on previously published works" (p. 9). However, the issue of whether copyright law should protect or exclude AI-generated work has not yet been settled (Gaffar & Albarashdi, 2024). This survey shows that students' perceptions of GenAI's originality impacts their views regarding AI and plagiarism and their overall use of GenAI. The discrepancy between students' perceptions

of GenAI originality compared to legal analysis on this topic demonstrates further need for students to be accurately informed on GenAI basics.

Future Directions

Based on the demonstrated need for increased student knowledge of GenAI, librarians can consider integrating concepts of AI literacy into information literacy instruction. It is important for students to be aware of basic information surrounding GenAI to limit its misuse and to prepare them for the future, both in college and in the workforce. In response to the survey results, the author developed a lesson on AI literacy and information literacy for the college's First-Year Experience course, a one-credit course required for all new students. Content included the basics of AI, including how responses are generated, potential problems, possible ethical uses, an AI-inclusive definition of plagiarism, and how to use information literacy skills to evaluate GenAI responses. Working in groups, students applied this information to evaluate a ChatGPT response and answer questions about its authorship, accuracy, evidence, date of publication, and how to fact-check the information. Additional research considerations include gathering data on students' ability to apply information literacy skills to their GenAI use and understanding faculty opinions of acceptable uses of GenAI regarding college coursework.

Limitations

The survey asked questions about students' use of AI for college coursework, which may have included situations where AI is prohibited. Depending on the context, these actions could constitute academic dishonesty and incur disciplinary action. For these reasons, students may have hesitated to participate in the study, to complete the survey, or to answer the survey honestly. To make students feel at ease, the informed consent and several questions emphasized the anonymous and voluntary nature of the survey.

Given the implicit bias present in voluntary data collection, confidence intervals for the above data are not presented. In future work, more rigorous surveying methods can be implemented to better quantify any sampling error in the survey responses. In this work, the authors chose to instead gather a larger sample of data more quickly due to the rapidly changing landscape of GenAI tools.

Conclusion

The results of the survey on undergraduate student experiences using GenAI tools has provided important insight into students' usage of AI for college assignments. Since the release of ChatGPT, there have been many questions concerning how GenAI will affect the future of higher education. This survey provides insight into how undergraduate students are using GenAI. Students' responses were varied and showed a wide range of GenAI knowledge and usage. While some respondents had never used GenAI, others were frequent users. Some students only used GenAI to brainstorm ideas and create outlines, while others discussed paraphrasing and copying GenAI responses in their assignments. Of particular significance are students' comments on the topics of using GenAI as an academic source, the originality of GenAI responses, and how GenAI applies to the definition of plagiarism. Ultimately, survey results show a need for students to have increased knowledge of GenAI, including the areas of evaluating information and using information ethically. This connection between AI literacy and information literacy provides an avenue for librarians to seamlessly address GenAI while teaching core concepts of information literacy.

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Appendix A

Survey

Research Consent Form

You are being asked to participate in a research study conducted by Megan Marchese at Farmingdale State College. You must be 18 years of age or older to participate in this research. The purpose of the study is to understand students' experiences using ChatGPT and other generative AI programs.

If you consent to participate, you will be asked to complete an anonymous survey using the Qualtrics survey platform. Survey questions will include participants' experiences using generative AI programs and opinions on ethical use of generative AI programs for college assignments. The survey will include multiple choice and open-ended questions. The survey will also include demographic questions. Participation should take approximately five minutes.

Although risks associated with this research are no greater than minimal, the survey will ask respondents about the use of AI to plagiarize. Participants may skip any question for any reason. The survey will not ask any personally identifiable information and Qualtrics will be programmed to not collect participants' IP addresses. Further, collected data, including demographic information, will only be reported in aggregate in any dissemination of results.

Benefits of participation in this research include helping the college community better understand students' experiences using generative AI. This information will provide instructors with valuable insight into how this new technology can support student learning. In particular, survey responses will inform librarians' teaching pedagogy in regard to helping students ethically and responsibly use AI throughout the process of conducting research.

Information will be collected anonymously. Participation in this study is voluntary. You may choose not to participate in the study or to drop out at any time without consequence. Participants may skip any question for any reason. If you have any questions about the research, contact the Principal Investigator or the college's IRB.

1. What is your major? _____
2. What is your class standing?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
3. What is your age?
 - a. 18-19
 - b. 20-21
 - c. 22-23
 - d. 24-25
 - e. >25
4. What is your gender identity? _____
5. What is your race/ethnicity identity? (Select all that apply):
 - a. American Indian or Alaska Native (e.g., Navajo Nation, Blackfeet Tribe, Inupiat Traditional Gov't., etc.)
 - b. Asian or Asian American (e.g., Chinese, Japanese, Filipino, Korean, South Asian, Vietnamese, etc.)

- c. Black or African American (e.g., Jamaican, Nigerian, Haitian, Ethiopian, etc.)
 - d. Hispanic or Latino/a (e.g., Puerto Rican, Mexican, Cuban, Salvadoran, Colombian, etc.)
 - e. Middle Eastern or North African (e.g., Lebanese, Iranian, Egyptian, Moroccan, Israeli, Palestinian, etc.)
 - f. Native Hawai'ian or Pacific Islander (e.g., Samoan, Guamanian, Chamorro, Tongan, etc.)
 - g. White or European (e.g., German, Irish, English, Italian, Polish, French, etc.)
 - h. My race or ethnicity is best described as: _____
 - i. Prefer not to say
6. How often do you use ChatGPT or other generative AI tools?
- a. Frequently
 - b. Often
 - c. Sometimes
 - d. Rarely
 - e. Never

The following two questions (6a–6b) were displayed to respondents who answered 'e' in Question 6, indicating that they have never used GenAI tools:

- 6a. I have heard of ChatGPT or other generative AI tools.
- a. Strongly agree
 - b. Somewhat agree
 - c. Neither agree nor disagree
 - d. Somewhat disagree
 - e. Strongly disagree
- 6b. I am aware of the function of ChatGPT or other generative AI tools.
- a. Strongly agree
 - b. Somewhat agree
 - c. Neither agree nor disagree
 - d. Somewhat disagree
 - e. Strongly disagree
7. Which generative AI tools have you used for any purpose? (Select all that apply):
- a. ChatGPT
 - b. Dall.E 2
 - c. Midjourney
 - d. Stable Diffusion
 - e. Perplexity AI
 - f. Gen-1 Runway
 - g. Elicit
 - h. Scite
 - i. Raxter
 - j. Invideo
 - k. CodeT5
 - l. Tabnine

- m. AIVA
 - n. Soundful
 - o. [Murf.ai](#)
 - p. Other: _____
8. Identify how you have used ChatGPT or other generative AI tools. (Select all that apply):
- a. Writing-based college assignments, such as research papers, essays, or long-form questions
 - b. Non-writing college assignments, such as short answers or solutions
 - c. Personal use

The following eight questions (9–16) were displayed to respondents who answered ‘a’ and/or ‘b’ in Question 8, indicating that they have used GenAI to complete college assignments:

9. Which generative AI tools have you used to complete college assignments? (Select all that apply):
- a. ChatGPT
 - b. Dall.E 2
 - c. Midjourney
 - d. Stable Diffusion
 - e. Perplexity AI
 - f. Gen-1 Runway
 - g. Elicit
 - h. Scite
 - i. Raxter
 - j. Invideo
 - k. CodeT5
 - l. Tabnine
 - m. AIVA
 - n. Soundful
 - o. [Murf.ai](#)
 - p. Other: _____
10. Identify how you have used ChatGPT or other generative AI tools for college assignments. (Select all that apply):
- a. To identify a topic for a research paper or other writing assignment
 - b. To select keywords or search terms to use when looking for information on my topic
 - c. To develop a thesis statement or research question
 - d. To create an outline for a writing assignment
 - e. To locate sources to cite in a writing assignment
 - f. To format citations in a writing assignment (e.g.: MLA, APA, Chicago Citation styles)
 - g. To find answers for an assignment
 - h. To copy and paste AI responses for one or more sentences of a writing assignment

The following three questions (10a–10c) were displayed to respondents who answered ‘h’ in Question 8, indicating that they have copy and pasted GenAI responses for college assignments:

- 10a. I have copied and pasted ChatGPT or other generative AI responses for 25% or more of an assignment.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - 10b. I have copied and pasted ChatGPT or other generative AI responses for 50% or more of an assignment.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 - 10c. I have copied and pasted ChatGPT or other generative AI responses for 75% or more of an assignment.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 11. I check generative AI responses for accuracy.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 12. I edit generative AI responses in my own words before using them in a college assignment.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 13. I have found generative AI to be useful in completing college assignments.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
 14. Explain your answer to the previous question:
-

15. I consider my use of generative AI to be ethical.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
16. Explain your answer to the previous question:

The following six questions (17–22) were displayed to all respondents of the survey, regardless of their experience using GenAI:

17. Using generative AI to complete college assignments is considered plagiarism.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
18. Explain your answer to the previous question:

19. I have learned how to use generative AI as part of my coursework.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
20. Using generative AI tools should be incorporated into the college curriculum.
 - a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
21. In what ways, if any, should colleges teach students how to use generative AI? (Select all that apply):
 - a. In specific courses (identify courses here): _____
 - b. In library instruction sessions (e.g., using ChatGPT to develop a topic for a research paper)
 - c. Workshops
 - d. Asynchronous training
 - e. Other: _____
 - f. Colleges should not teach students how to use generative AI
22. Share any additional thoughts you have about using ChatGPT and other generative AI programs to complete college assignments:

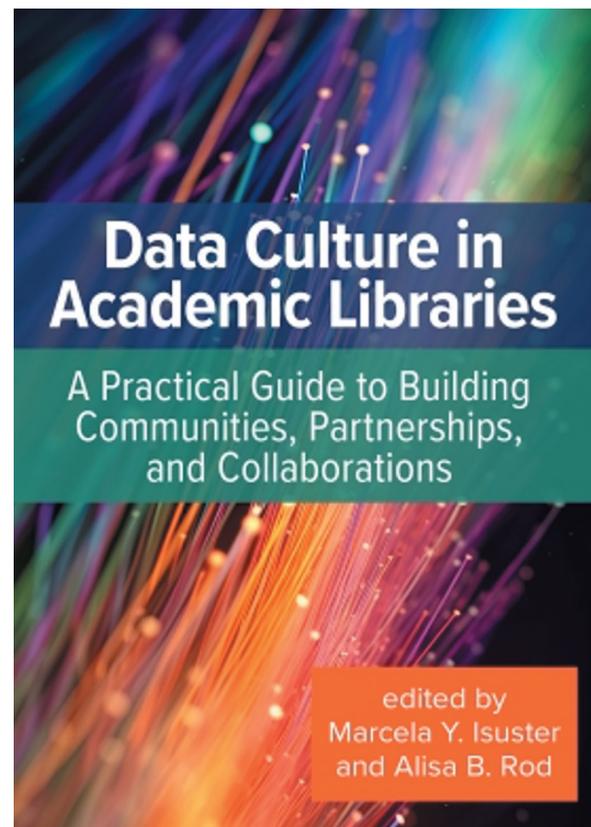


Data Culture in Academic Libraries: A Practical Guide to Building Communities, Partnerships, and Collaborations, Marcela Y. Isuster and Alisa B. Rod (eds.), Association of College and Research Libraries, 2025. 326 pp. Softcover, \$98.00. 9798892556156.

Data-related research is, as editors Marcela Y. Isuster and Alisa B. Rod note, increasingly “a driver of social capital in the academic context” (p. ix) and an impetus of rising demand for data literacy and innovative, expansive data-related research services. To address these needs, academic libraries are increasingly focusing on the strategic development of *data culture*, which refers to “the norms, values, skills, and behaviors that shape how data is produced, shared, and used in a given context” (p. ix). This practical guide is a novel contribution; it offers academic and data librarians working in diverse roles concrete ways to approach fostering data culture and community at their own institutions, as well as broader ways of examining what data is, how it is produced and collected, and how to teach its ethical analysis, management, and use.

The editors structure the book in five loosely thematic sections. Most chapters share emphases on practical guidance, interdisciplinary and cross-institution collaboration, and strategies for building trust within and across communities. The chapters in Section I: Data at All Levels share approaches to incorporating data best practices into the academic culture and curriculum. Section II: Data Services and Instruction offers more conceptual chapters describing innovative ways of thinking about data within the context of data literacy training and data services. Section III: Data Outreach offers numerous accessible, practical examples of activities, events, and initiatives that academic librarians can employ to promote data culture in their home libraries, as well as reflections on lessons learned and future directions for these projects. Sections IV: Data Communities and Section V: Data Partnerships overlap more, as they both present chapters focused on the collaborative development of data partnerships, relationships, and communities.

Befitting a practical guide, the chapters largely avoid disciplinary jargon and offer clear definitions of key terms, such as research data management (RDM), research information management (RIM), and FAIR principles (findability, accessibility, interoperability, and reuse). A key strength of the book is its clear situation of data practices and culture within a variety of institutional contexts, from large research universities to multicampus university systems and small liberal arts colleges. Librarians seeking ways to promote their own data culture initiatives will find a wealth of resources, such as checklists and considerations for hosting a Love Data Week (Chapters 11 and 12); screenshots of materials



prepared for K–12 educators using Michigan historical archive data (Chapter 1); ideas for hosting a Dear Data visualization project (Chapter 13); and considerations for creating asynchronous online research data management trainings (Chapter 6). The DataSquad model from Carleton College charts a detailed path for student-worker-led data support services (Chapter 15), and staff from UC Berkeley’s Ready4Research program describe how it prepares nontraditional students for research support roles (Chapter 3). Other chapters offer narratives of how services and outreach initiatives were built at their libraries (Chapters 8, 10, 14, 19), including two chapters outlining the history and development of the Canadian data repository Borealis (Chapters 20, 21).

Alongside this practical information are several chapters introducing conceptual frameworks. Librarians from Florida International University describe the biology-inspired model of “data mutualism” between libraries and service communities (Chapter 18). The “archival ethics of care” in Chapter 7 contextualizes the need for a critical data literacy that emphasizes “trust, accountability, and empathy” (p. 100) within the increasing digitalization of historical and archival materials available at GLAM (galleries, libraries, archives, and museums) institutions. Throughout the volume, authors reflect on the potential biases, limitations, and distortions inherent in data practices and data visualization, which are important considerations for librarians when designing training and community outreach. Data best practices are clearly positioned within broader social and institutional realities, offering a realistic understanding of the challenges, as well as the benefits, of nurturing an ethical data culture in an academic library context.

While this book represents a wide-ranging, ambitious addition to the field, it is not without its limitations. The institutions represented are almost exclusively Anglo-Western (primarily the United States and Canada), with only one institution based in Asia (New York University Shanghai, Chapter 17), and none in Africa or South America. Moreover, although the book includes a careful and thought-provoking chapter on the limitations of data on racialized and Indigenous populations in Canadian data repositories (Chapter 16), its authors acknowledge that they are not racialized or Indigenous people themselves. It would be immensely helpful if future volumes with a similar focus on practical guidance alongside theoretical approaches incorporated a greater diversity of institutions and perspectives, particularly given the relationship between a strong data culture and increased social capital that is reiterated throughout the book. Another surprising omission is a lack of focus on the enormous implications of generative artificial intelligence (GenAI) for data literacy and data culture, with only Chapter 17 paying sustained attention to this rapidly proliferating area.

These considerations notwithstanding, the ideas and approaches in *Data Culture in Academic Libraries: A Practical Guide to Building Communities, Partnerships, and Collaborations* are accessible, scalable, and adaptable for academic librarians and data professionals with a range of expertise and resourcing, including long-time professionals and those at large research universities, as well as early career librarians and those at less-resourced institutions. The rapidly changing data environment requires innovative approaches to data culture; thus, whether the goal is to support curriculum-driven data literacy, strengthen RDM infrastructure, or foster community around data best practices and ethics of care, *Data Culture in Academic Libraries* is an invaluable resource that should be seriously considered by academic libraries of all types and sizes. — Megan J. Callaghan, MLIS student, Valdosta State University, and Professional Writing Consultant, Augusta University

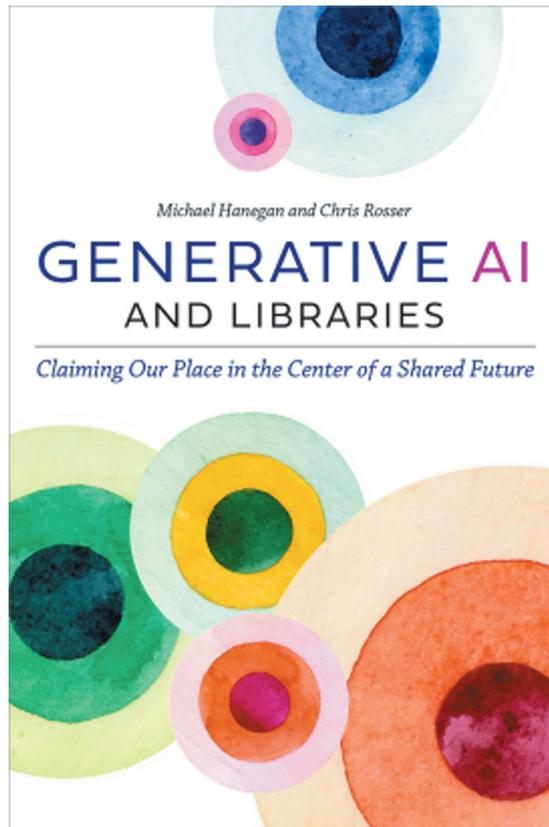
Generative AI and Libraries: Claiming Our Place in the Center of a Shared Future, Michael Hanegan and Chris Rosser, ALA Editions Core, 2025. 160 pp. Softcover, \$54.99. 9798892553100.

In *Generative AI and Libraries: Claiming Our Place in the Center of a Shared Future*, Michael Hanegan and Chris Rosser position libraries as centers of gravity in an epistemic universe being transformed by generative artificial intelligence (GenAI). They maintain that GenAI will continue to fundamentally alter our world, whether we choose to engage with it or not, and that the professional values and expertise central to librarianship are essential for shaping its influence. In clear and informative prose, the authors explore a combination of core values and frameworks for responsible GenAI integration.

The book is divided into three sections, each containing three chapters. Part I, “Foundations of AI in Libraries,” examines ethical principles to guide libraries’ response to artificial intelligence. In the first chapter, the authors establish “libraries’ unique position as trusted, mission-driven institutions that bridge knowledge, technology, and community needs” (p. 8). Chapter 2 considers artificial intelligence from a human-centered perspective, which acknowledges that librarians can help shape GenAI for the common good. This section concludes with basic definitions that clarify concepts covered in the book.

Building on these foundations, Part II, “Strategic Implementation of AI in Libraries,” discusses various practical approaches and foundations for incorporating GenAI tools, including the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model for technology adoption, an interest and readiness matrix, and a learning design framework. Part II also considers the costs and possibilities of GenAI integration, emphasizing the need for a human-centered approach that weighs the benefits of GenAI against the consequences.

The final section of the book, “The Future of Libraries in the Age of Intelligence,” explores metaliteracy as “the mode and medium for AI literacy” (p. 46). The authors introduce their own AI Literacy Framework, mapping it to the existing ACRL *Framework for Information Literacy for Higher Education*. They employ a gravitational model that places librarians’ existing skills—like critical thinking, ethical reasoning, and inquiry—at the center, with emerging GenAI literacies and competencies orbiting around them. This model allows core foundational expertise to both stabilize and shape libraries’ evolving response to GenAI. While Hanegan and Rosser are not the first to propose a structure for GenAI literacy, they posit that the “emphasis on metaliteracy and gravitational influence” sets their work apart (p. 115). In addition to the AI Literacy Framework, this final section introduces the Strategy, Tactics, Assembly, Curation, Knowledge, and Solutions (STACKS) framework, described as “a framework for thoughtful



AI implementation” (p. 119). STACKS can help librarians reflect on how, when, and why they might use GenAI tools.

Overall, the book succeeds in its goal of “developing robust frameworks and strengthening the core values that will guide libraries through this technological transformation” (p. xiii). Librarians will find numerous well-developed models, matrices, frameworks, and ethical considerations for engaging with GenAI. Some suggestions for applying these tools are included; however, case studies or reports from libraries that have implemented the frameworks are absent. The authors explain their intention is to “provide theory and frameworks because most concrete AI applications are still emerging” (p. xiii). Due to this approach, other resources, particularly those not constrained by a lengthy publication process, would be more appropriate for libraries looking for detailed how-to guidance in employing specific GenAI tools and applications.

Because of its conceptual approach, this book would be useful for librarians who operate from a big-picture perspective—especially administrators and managers, or anyone tasked with developing human-centered GenAI policies and procedures—whether they are just beginning to explore artificial intelligence or already in the process of implementing GenAI tools. The chapter on metaliteracy would be of particular interest to librarians who design or deliver instruction. As many librarians are already familiar with the ACRL Framework that it echoes, the AI Literacy Framework may appeal to those seeking to expand upon existing practices rather than reconceptualize their approach to teaching. Its emphasis on broad concepts as opposed to specific skills allows Hanegan and Rosser’s framework to serve as a valuable complement to the recent ACRL *AI Competencies for Academic Library Workers*, which were introduced after this book’s publication. With suggestions for school, public, academic, government, and special library settings, this volume would be relevant for most types of libraries and for students in LIS programs.

In a growing body of literature on generative artificial intelligence, this title is noteworthy for its hopeful tone. The authors are optimistic about librarians’ ability to positively influence the development of generative AI, if they are willing to lead the way—a welcome perspective in a conversation often dominated by fear and uncertainty. Importantly, the book opens the door to questions about the consequences if libraries choose to opt out of GenAI conversations, namely allowing other, less trustworthy institutions to control the narrative. More than just a toolkit for ethically integrating GenAI, this work is a call to action for librarians to come together and “claim the center” (p. vii) in reshaping the future. While some librarians may question their ability to do this, others will be inspired to answer the call. — *Terese Scheiderich, University of North Georgia*