Embracing Generative AI in Research and Teaching

Challenges, Opportunities, and the Path to Informed Scholarship

Generative AI tools like OpenAI's ChatGPT and Google's new AI-generated search overviews are rapidly changing how students begin academic research. These tools can produce human-like answers to complex questions within seconds, redefining the standards of convenience and speed in information seeking.

As the 2025 academic year approaches, educators and librarians face a critical inflexion point: how to respond to students' growing reliance on AI for research. This white paper explores the challenges and opportunities posed by generative AI in the research process, the risks of misinformation and opaque sources, and strategies for guiding students toward credible, curated resources. It also examines the evolving role of abstracting and indexing (A&I) databases in an AI-augmented scholarly ecosystem, and provides practical recommendations to empower librarians and faculty.

THE RISE OF GENERATIVE AI IN STUDENT RESEARCH: CHALLENGES AND OPPORTUNITIES

Students today are increasingly "starting" their research projects by consulting generative AI systems for quick overviews or brainstorms. This trend brings both significant challenges and intriguing opportunities for learning.

On the **challenge** side, there is concern that students may become overly dependent on AI-generated answers and forgo the deep engagement with scholarly literature that true research requires. For example, one university found AI-based "bots" were used in up to 20% of student assessments, prompting instructors to rethink assignments to deter easy shortcuts. If students accept an AI's first answer as definitive, they risk bypassing the critical processes of evaluating sources, analysing differing viewpoints, and synthesising information. Over-reliance on AI can thus dilute research skills and even encourage academic dishonesty (e.g. passing off AI-written text as one's own work). Librarians and faculty have already observed these pitfalls and begun responding – from requiring handwritten essay drafts in class to asking students to justify how they revised AI outputs.

On the **opportunity** side, educators see potential for AI to *enhance* the research process when used judiciously. Some academics speculate that generative AI could be treated akin to a calculator – a tool permitted for routine tasks so that students can devote more time to high-level analysis. For instance, ChatGPT and similar tools can help students **generate ideas** for research topics, relevant keywords, and connecting concepts in the early stages of inquiry. AI can thus spur brainstorming, helping students explore related concepts and terms they might not have considered. Indeed, when prompted properly, generative AI tools might surface interdisciplinary angles or suggest background readings, acting as a *guide* for further exploration. This capability can be especially helpful for novice researchers who struggle with formulating search queries.

However, educators should frame these tools as a *starting point*, not an endpoint, for research. Generative AI may serve as an **assistant for preliminary exploration**, but students must still perform the scholarly heavy lifting: locating authoritative sources, critically evaluating content, and building knowledge through credible evidence. In other words, AI should *complement, not replace*, human inquiry. This balance is vital to navigate the risks of misinformation and guide students toward trusted academic resources.

NAVIGATING THE RISKS: MISINFORMATION, OPAQUE SOURCES, AND CITATION PITFALLS

While generative AI systems are remarkable in their fluency, they come with well-documented risks that can undermine the quality of student research. Chief among these are the spread of **misinformation**, lack of **source transparency**, and significant **citation challenges**.

Hallucinations and Wrong Answers

Generative AI is prone to *"hallucinating"* – confidently producing information that is factually incorrect or entirely fabricated. ChatGPT, for instance, does not actually *retrieve* verified facts; it **generates text based on patterns** in training data. As one *Scientific Reports* study by William Walters and Esther Isabelle Wilder emphasises: *"ChatGPT is fundamentally not an information-processing tool, but a language-processing tool. It mimics the texts — not necessarily the substantive content — found in its information base."*

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This means answers can *sound* authoritative while being completely erroneous. Students, especially those new to a topic, may struggle to discern these subtle errors. As our own research at IFIS Publishing found, <u>ChatGPT's answers "feel right" to humans and can *trick users into thinking the output is correct*,</u> even when it is not.

In complex or nuanced subjects, the AI might oversimplify or misinterpret concepts. Relying on friendly chat for research guidance can send students in the wrong direction from the very start of a project. As a precautionary example, IFIS experts even caught ChatGPT erroneously stating that well-known deceased figure (Queen Elizabeth II) was alive – a blatant error most would catch, but a reminder that less obvious mistakes may slip through unnoticed. The **implication for educators** is clear: students must be taught not to uncritically trust AI outputs and to verify information through reliable sources.

Omission of Sources and Transparency Issues

A major drawback of AI-generated answers is the typical **lack of source citation** or context. ChatGPT's responses usually do not reveal where information came from, and Google's AI search overviews (as of 2025) provide only limited references to sources. This opacity conflicts with academic norms of traceability. Students might be misled into thinking they have "done research" after reading an AI summary, without understanding that they have not engaged with any actual scholarly sources. Moreover, without seeing sources, students cannot judge the credibility of the information. An AI might assert a medical claim or a historical fact, but was it drawn from a peer-reviewed study, a wiki article, or a random blog? There's no straightforward way to know.

Citation issues

When students ask AI for references, the system may **invent realistic-looking citations that are completely fake**. In their sobering <u>2023 study</u>, Walters and Wilder had AI generate literature reviews on various topics and then examined the references. They found that **55% of the citations ChatGPT-3.5 provided were fabricated**, referring to works that simply do not exist (GPT-4 fabricated 18% of its citations). Even the "real" citations had high error rates – 43% of GPT-3.5's genuine references had substantive mistakes (wrong author, title, etc.), and GPT-4's real citations had errors 24% of the time. The authors conclude that *"the same level of trust is not appropriate with generative AI tools"* as with traditional academic tools.

Librarians have taken note. A <u>2024 survey conducted by the Association of College and Research Libraries (ACRL)</u> found over 75% of librarians said it's urgent to address AI's ethical issues, with *"generating false citations"* highlighted as a major worry. Clearly, if students naively copy AI-provided references into their bibliography, they risk severe academic consequences and misinformation.

Misinformation and Context Loss

Even when AI outputs are not outright fabrications, they can mislead by removing context or nuance. An AI might correctly state a research finding but not mention limitations or opposing findings, leading to a skewed understanding. In outreach conducted with the IFIS Faculty Advisory Board, members strongly warned against using ChatGPT to summarise academic papers, noting it could tempt students to cite material without actually reading the full study or understanding its context. Stripping away context can distort meaning – a risk whenever complex research is boiled down to a quick AI blurb. Additionally, generative AI models have *inherent biases* based on their training data. They tend to reflect the prevalence of viewpoints in their data sources, which may underrepresent minority perspectives or emerging research that hasn't gained internet visibility.

Risk to Human Creativity and Original Thinking

Beyond the well-documented risks of misinformation and fabricated content, experts caution that heavy reliance on AI tools could also undermine the uniquely human qualities essential to research. Professor Fidel Toldrá of the Instituto de Agroquímica y Tecnología de Alimentos (CSIC) - an IFIS Advisory Board Member - explained *"the major challenge is to verify that the information provided by AI is correct and representative."* But equally important, he stressed, is safeguarding the role of human originality. *"The point of view of human thinking is important, especially the use of imagination and creativity, which are typical of humans."*

Overdependence on AI-generated outputs may inadvertently discourage the curiosity, critical exploration, and innovative leaps that drive scholarly discovery. These qualities cannot be outsourced to an algorithm.

Librarians are thus urging **AI literacy** education: students should learn to question, "Where is this answer coming from? What might be missing?" and recognise that AI content is vulnerable to distortion. As the Association of Research Libraries (ARL) put it in 2024 guidelines, we must help users understand AI's biases and limits and *"promote ethical and transparent practices"* in its use.

Generative AI can easily lead students astray with confident-sounding misinformation, hidden or fake sources, and incomplete context. The onus falls on educators and librarians to illuminate these pitfalls. By explicitly discussing examples of AI errors (e.g. fabricated citations or incorrect "facts"), we can instil healthy scepticism. Students should be encouraged to **treat AI outputs as hypotheses or prompts to investigate**, not as proven knowledge.

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GUIDING STUDENTS TO CREDIBLE RESOURCES IN AN AI-AUGMENTED WORLD

Even as AI tools proliferate, one fundamental truth remains: quality research depends on **credible sources**. Librarians and faculty play a crucial role in guiding students to reliable, expert-vetted information resources. This is where curated databases like IFIS Publishing's **FSTA** - Food Science & Technology Abstracts and **NutriHealth** shine.

The Value of Human-Curated Databases

FSTA and its sister database NutriHealth are examples of Abstracting & Indexing (A&I) databases that have been carefully curated by subject experts. Every journal included in FSTA and NutriHealth has been **vetted using a 60-point checklist** to exclude predatory or low-quality publications, ensuring that the search results students get are from credible, peer-reviewed science. Currently, there is a disturbing amount of junk science out there – one study estimates **8,000+ predatory journals publishing ~420,000 papers per year**, nearly **20% of the world's research output**. If a generative AI has been trained on indiscriminate internet data, it may inadvertently incorporate such **pseudoscientific content** into its answers.

This is a *huge* risk. Do we really want students basing their literature reviews on a pool that might contain one-fifth dubious science? The answer is clearly no. By contrast, every article indexed in IFIS's curated A&I databases comes from vetted sources. IFIS's team of information experts and food scientists not only curates the content but also **tags each article with relevant descriptors** and subjects, enhancing discoverability and relevance. The result: when students use these databases, they are effectively searching a **trusted subset of the scholarly literature**, where quality and relevance have been optimised.

Controlled Vocabulary and Precision

Controlled Vocabulary and Precision: Another advantage of A&I databases is their use of **controlled vocabulary** (thesauri) and indexing, which can yield more precise and comprehensive results than a plain natural-language query to an AI. For example, FSTA's indexing is built on the world's largest food science thesaurus. This means that whether a paper uses the term "ascorbic acid" or "vitamin C," or whether an author says "foodborne illness" vs. "food poisoning," the database links these concepts under standardised subject headings. A search using the controlled term will retrieve all relevant documents, even if different terminology is used.

In contrast, generative AI and general search engines rely on natural language processing. They are adept at parsing everyday language queries, which makes them user-friendly for quick answers. This has merit, as it lowers the barrier for inexperienced

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searchers to start finding information with simple questions. However, *easier does not always equate to better*. Controlled terms group synonyms and related concepts, so important papers aren't missed due to wording differences. AI models might miss such connections unless specifically trained on domain ontologies. It's also worth noting that controlled vocabularies are continually updated by experts; IFIS, for instance, stays on the cutting edge of new food science terminology to incorporate novel concepts into FSTA's indexing. Librarians can explain to students that a quick AI search might give a *surface-level snapshot*, but a database search will give a **rigorous mapping of the research landscape**, which is crucial for a literature review or an in-depth project.

Bridging AI and Library Resources

How can educators leverage AI's convenience but still channel students toward authoritative resources? One strategy is to explicitly **pair AI with library databases** in assignments. An instructor might allow students to use generative AI *initially* to brainstorm research questions, identify key concepts, or build more advanced search strategies – but then require that all sources cited in the final paper come from scholarly databases or library collections. This way, AI is a **pre-research tool**: it might suggest that a student researching "plant-based diets" also look into "protein complementation" or "vitamin B12 sources." The student can take those hints and search FSTA or NutriHealth to find *validated articles and data*.

Librarians can create guidance on moving from AI to library resources by suggesting *"if ChatGPT suggests a fact or citation, always verify it by searching for that study in library collections."* By cross-checking, students may find the AI reference was made-up – **a teachable moment reinforcing why library databases are indispensable.**

Another approach is to incorporate AI output *as an object of evaluation*. A librarian could show an AI-generated summary on a topic alongside an abstract from FSTA on the same topic, asking students to compare which seems more detailed or credible. This kind of exercise engages students' critical thinking and naturally highlights the benefits of using curated resources. It aligns with core information literacy frames, like "Authority is Constructed and Contextual", prompting students to examine **who or what is the authority** behind information, an anonymous AI or a peer-reviewed journal article.

In guiding students to credible resources, the message should not be "don't use AI at all" but rather **"use it wisely and back it up with quality sources."** As IFIS's Boyd Butler put it, *"everyone concerned with quality science"* must ensure AI *"complements, rather than replaces, human intelligence."* The library's curated databases are a manifestation of that human intelligence – the collective judgment of experts about what knowledge is reliable. By integrating these resources into the AI-influenced workflow of students, we uphold academic standards and help students develop robust research habits that will serve them in the long run.

CONCLUSION: BALANCING INNOVATION WITH INFORMATION INTEGRITY

Generative AI is here to stay, and its presence in student research is only growing. As we have explored, this technology offers unprecedented convenience and new ways to kickstart inquiry. Yet it also brings serious risks of misinformation, source obfuscation, and skill erosion if used carelessly. The response from the education community should not be panic or prohibition, but <u>thoughtful **integration and guidance**</u>. By understanding the capabilities and limits of AI, librarians and faculty can help students leverage these tools *productively* while firmly steering them towards **established scholarly practices** – verifying facts, consulting authoritative databases, and citing real evidence.

Abstracting and indexing databases will continue to play a critical role as guardians of quality in this hybrid research environment. They represent the "source of truth" that can ground AI's flights of fancy. As an educational charity, IFIS Publishing is committed to supporting librarians, educators, and students through this transition. We recognise that critical research skills – the ability to find, evaluate, and use information ethically – are more important than ever in the age of AI. Our ongoing efforts include providing up-to-date resources (blogs, white papers, training materials) on these topics and ensuring our databases remain at the cutting edge of reliability and usability.

By combining **thought leadership** with **practical toolkits** on the ground, we can turn the advent of generative AI into a teachable moment, one that ultimately *strengthens* students' information literacy. Librarians have successfully navigated waves of information technology changes in the past, from the rise of Google to Wikipedia to social media. Generative AI is the latest wave, and by riding it with wisdom and initiative, we ensure that the core values of scholarship – accuracy, transparency, and critical inquiry – remain firmly in place.

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