Wired to the World

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Navigating the AI Revolution: A Personal Journey in Research and Instruction

I remember using electronic databases on dummy terminals when I studied Electrical Engineering at Georgia Institute of Technology in the early 1990's. The amount of time I spent locating relevant resources, reading them, synthesizing the information, and writing the standard five paragraph essay or a technical report numbered in the hours and days. Fast forward roughly thirty years and artificial intelligence (AI) tools proliferate at each step of the scientific method. Current AI tools can identify the gaps in a particular field, suggest research questions in a particular field based off the full text of existing articles, write a search string for multiple academic databases or a systematic review, list relevant resources given a research question or single article, analyze data, and review the references for a paper to identify citations with errata.

My journey in using AI tools in research and instruction began in the fall of 2021 with a personal research session (PRS) with a Physics graduate student. He relayed that his Physics advisor told him to find all scientific papers citing "On Continued Gravitational Collapse" and he discovered that Web of Science did not contain the original article. Unbeknownst to me at the time, Web of Science was the premier database for the Physics department to conduct forward and backwards citation research. Without knowing why the information was needed or how it would be used, I compiled a table of citation counts from search tools which included bibliometrics before meeting with the student e.g., Semantic Scholar (https://www.semanticscholar.org/), Google Scholar (https://scholar.google.com/), lens.org, Dimensions.ai (http://app.dimensions.ai/), and scite. ai (https://scite.ai/home). After I reviewed the selections with the student, he chose scite.ai.

Scite.ai, a.k.a. scite, mines the full text of articles, pre-prints, and other resources and pinpoints where citations occur in the document. Scite then evaluates and labels the citations as supporting ("We agree."), contrasting ("We disagree or find issues with X."), or mentioning ("X did Y") referred to as smart citations.
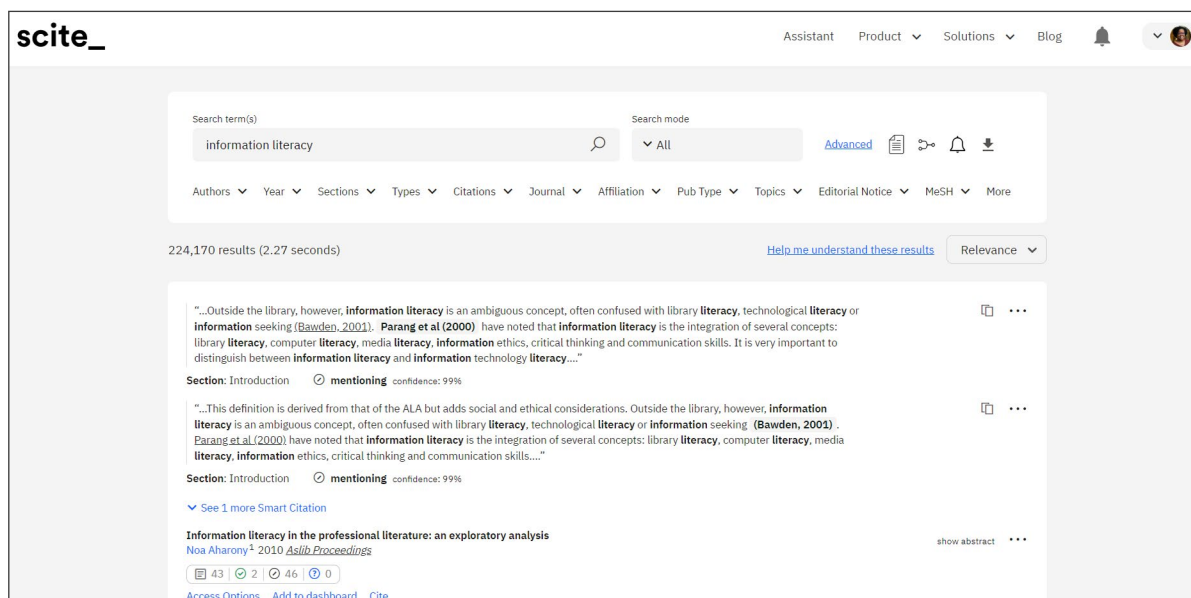

Figure 1: Screenshot of a search within Scite.ai

In doing so, Scite changed citation analysis from quantitative to qualitative in that the user can search for a phrase or use Boolean search string and retrieve a list of papers with roughly two to three sentences where the key terms occur within a citation and where the citation occurs within the document. It is a quick way to get a sense of what authors are saying about a particular topic or get an overview of specific terminology and how it is used in a field.

For instance, if I were to search for "information literacy" within Scite, the screen would show a mix of papers and smart citations (see Figure 1).

My preference is to change the search mode from All to either Citation Statements or Papers. Searching the citation statements, the snippets relay what authors are saying about a search term or phrase and where the comments occur within the article. Beyond finding relevant resources and reviewing the scholarly communication around a particular topic, scite added the scite Assistant in April 2023 which incorporates a GPT 4.0 API with the full-text articles Scite ingested. With scite Assistant, a user can type a question, phrase, or term and it searches the full text of articles within scite to garner a response which includes inline citations with the list of articles on the right-hand side of the screen.

In Figure 2, I typed "achievement motivation in STEM or engineering" to get a sense of the research conducted on the topic as well as an overview. I can modify the settings within scite Assistant to specify the reference year range, publication type, response length, number of publications to consult, identify specific journals to search if desired, and the particular citation style to use for the inline citations. In addition, I can export the references consulted as a CSV, BibTex, or RIS file. This is the proverbial tip of the iceberg in how researchers can use scite. Custom dashboards can be used as a saved search to find additional resources. The reference check reviews the citations in an uploaded article to find references with errata or articles that were retracted by the publisher.

Beyond scite, I have utilized other AI tools in research to understand technical terminology, build background knowledge, source materials for esoteric topics, analyze data, and verify sources. In the classroom, both in one-shot sessions and credit-bearing courses, I've introduced different AI tools to help students learn new topics and develop innovative research strategies. Outside the classroom, I've collabo-
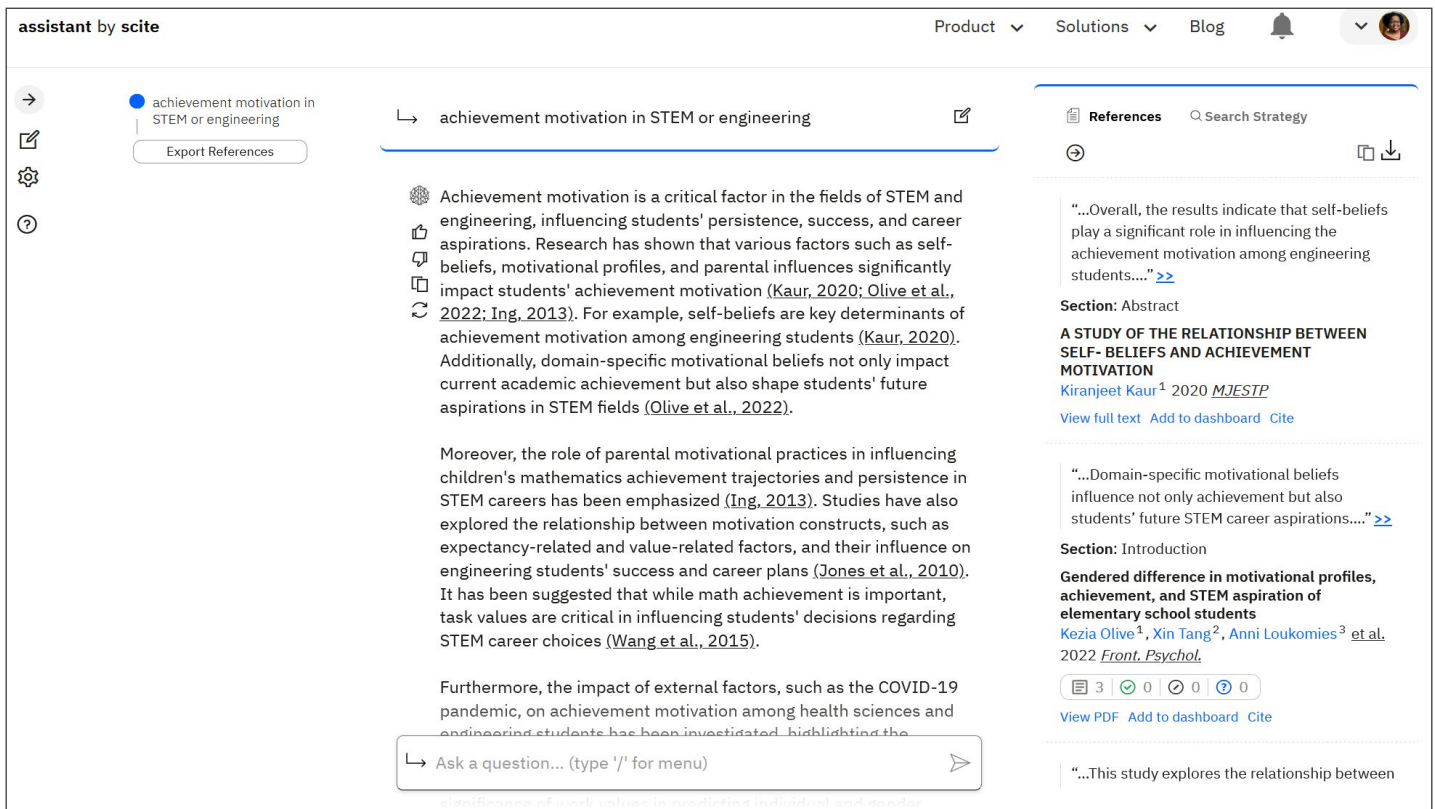

Figure 2: Screenshot of using scite Assistant

rated with graduate students, researchers, faculty, and other librarians to refine their research methodologies and processes using diverse AI tools. In doing so, I found elicit.org, a.k.a. Elicit, in Spring 2022.

The premise at that time for Elicit involved asking a research question and Elicit finding eight articles that addressed or answered the research question provided. Originally, Elicit compiled the results in a table with the article title, takeaway from the abstract, population characteristics, and other columns included. Elicit's "Find papers" function provided a quick way to find relevant articles for a given research question or topic (see Figure 4).

In the past two years, elicit.org transformed from a free tool to elicit.com which has a limited free option, a plus paid subscription for independent researchers, and pro paid subscription targeted for individuals conducting systematic reviews.

Both the look and feel (graphical user interface) and functionality changed and continues to be updated over time with Elicit. A summary of the top four (free) or eight papers (paid subscription) appears now before the table of results. Additionally, the user can add additional columns to the table to extract additional information and even create custom columns. Beyond the "Find papers" function, a user can extract data from PDFs or list concepts that appear across papers. However, extracting data
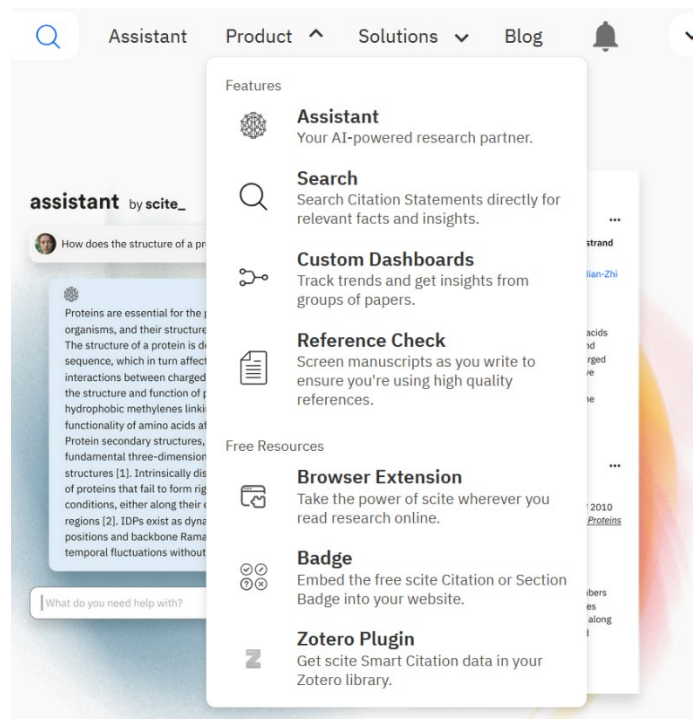
Figure 3: Screenshot of additional capabilities within scite

from PDFs requires uploading PDF files of articles. Currently, publishers and journals are still deciding policies around AI for authors, editors, reviewers, and users. Certain publishers and journals forbid uploading articles into any AI system in their renewal contracts. As a result, I recommend only using open access articles when extracting data from PDFs (see Figure 5).

Figure 4: Screenshot of elicit.org taken on September 9, 2022

Figure 5: Screen capture of finding papers in Elicit taken on August 1, 2024

Figure 6: Screen capture of typing an article title in Inciteful

Beyond scite and Elicit, if I am researching an esoteric topic and find myself with only a handful of articles, I turn to inciteful.xyz, a.k.a. Inciteful. There are three primary reasons to use Inciteful. One, Inciteful has not changed from when I first started using it in 2022 till now. Two, using the Paper Discovery tool within Inciteful, I can find additional resources with a single article title or by typing in key terms to select a single article. Last but not least, no account is needed to use Inciteful. In this example, I decided to use a paper from an earlier screen capture, "A study of the relationship between self-beliefs and achievement motivation." As I start to type the title, Inciteful uses predictive text to try to resolve the text with a potential article title as shown in Figure 6.

After the user selects a title, Inciteful shows the metadata associated with the article with the number of citations, the works cited by the article, if the article is open access, papers in the graph, and citations in the graph. With the Paper Filters section, if the similar papers shown don't align with the expected topic, I can enter additional keywords to increase the relevance. In this case, I wanted more articles associated with achievement motivation and entered that as a keyword. In a single web page (https://inciteful.xyz/p/W2269756629?keywords=achievement%20motivation), Inciteful lists similar papers that cite the same papers as the original article, most important papers by Inciteful's PageRank, review papers, recent papers by the top 100 authors, the most important recent papers, top authors, upcoming authors, institutions, top journals, and similar journals. With this singular tool, I can help undergraduates target possible graduate schools that cover their research area, help graduate students find journals to publish their research, identify possible collaborators for faculty and researchers, as well as find additional resources for research. The possibilities are endless with Inciteful.

For writing literature reviews, I recommend using Research Rabbit (https://researchrabbitapp.com/). I introduced Research Rabbit along with scite, Elicit, and Inciteful to my older sister Mona Lisa Dickson as she was completing her Ed.D. at Clemson in
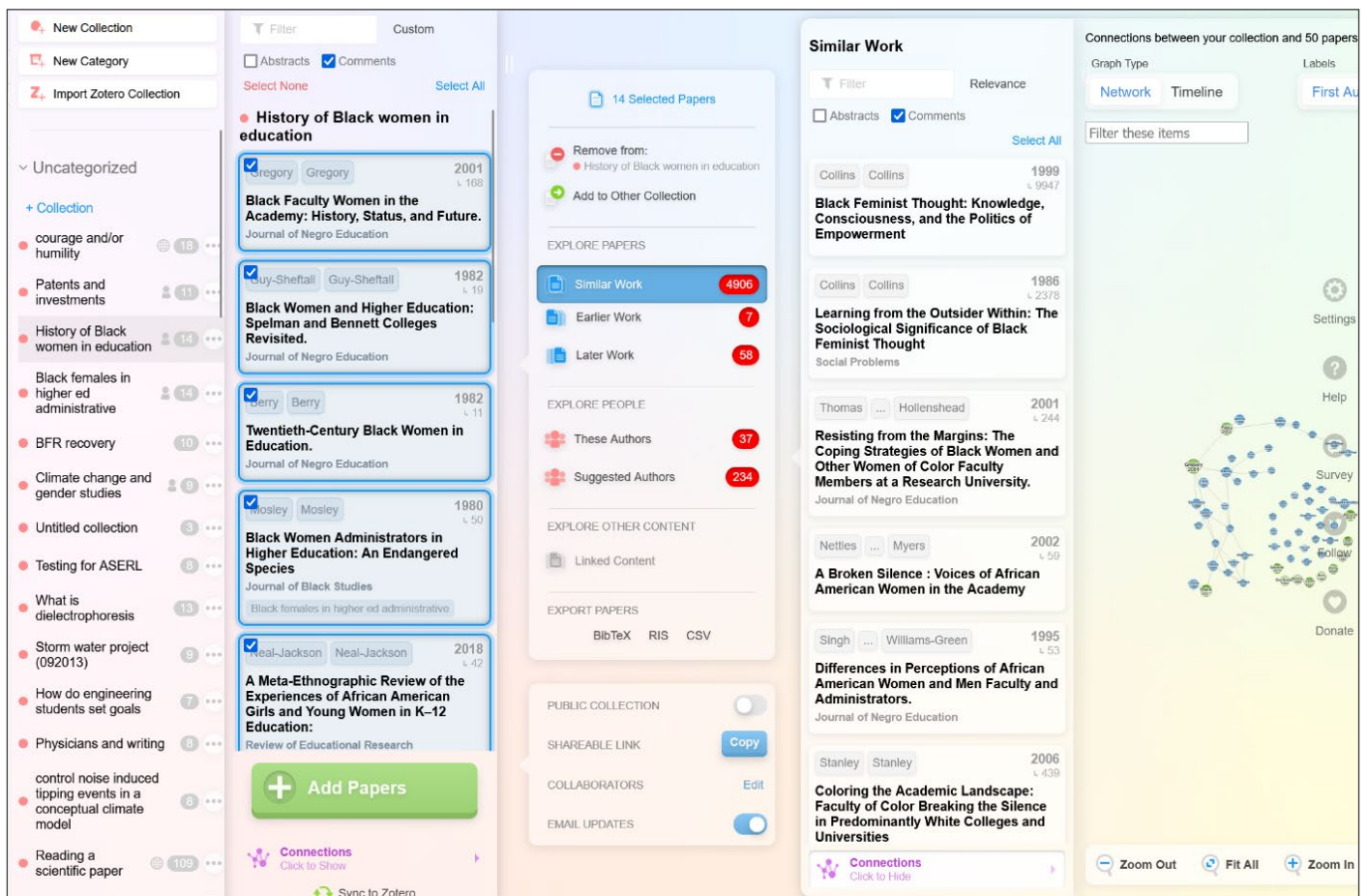

Figure 7: Screen capture of Research Rabbit

Figure 8: Example of using Adobe Firefly to create an image

Spring of 2022. Her cry of "I could have used these in my class this past fall! Why didn't you tell me about this?" was met by my response of "Research Rabbit wasn't released from beta till Fall of 2021." No matter the topic or field, I can create a collection in Research Rabbit from a search string or a list of terms, as well as import papers from Zotero or upload a BibTex or RIS file. From that collection of seed papers, Research Rabbit generates a list of similar works, earlier works, and later works as well as pulls a list of the authors from the seed papers and lists suggested authors. If a user clicks on Similar Work, the resulting articles appear with a network of the articles and their connections to the right. If an article is selected, a new block will appear on the right with the author(s), article title, link to the PDF if available, year published, the number of citations, and the abstract. I find myself traveling down the proverbial rabbit hole diving deep into different arenas. I can select additional articles to add to the collection or even another collection and Research Rabbit will fine tune the lists based on the updated collection.

With the advent of ChatGPT in November 2022 and increased awareness of generative AI, numerous other AI tools entered the research space. Essentially, there are six different generative AI tools that I use now depending on the type of information that I need, the currency/timeline of the content, and functionality e.g., Groq (https://groq.com/), Le Chat Mistral (https://chat.mistral.ai/chat), Claude (https://claude.ai/new), Perplexity (https://www.perplexity.ai/), ChatGPT (https://chat.openai.com/), and Gemini (https://gemini.google.com/).

To be frank, I don't use generative AI tools to find resources. As most STEM research exists behind paywalls, using a large language model (LLM) may not suffice, as the training data may not be current. Using a generative AI tool which web crawls for information or uses retrieval-augmented generation (RAG) provides a different perspective but may pull from unreliable sources. Nevertheless, I've found that generative AI tools that pull from a more scholarly corpus of information may present more relevant results, for instance scite pulling from the full text of articles or changing the focus in Perplexity to Academic, but not the validated lists of results similar to scite's search, Elicit, Inciteful, Research Rabbit, and even other tools like LitMaps (https://www.litmaps.com/), Connected Papers (https://www.connected-papers.com/), and Open Knowledge Maps (https://openknowledgemaps.org/).

From a research perspective, I mainly use generative AI tools to get an overview of a technical topic, define technical terminology, create a complex search string, or outline a topic. Outside of research over into the instruction and personal realm, I've used generative AI to create a baseline syllabus, generate learning objectives, create a lesson plan, create a rubric for an assignment, plan a trip, check grammar and spelling, analyze data, quickly summarize a fictional novel, as well as identify fiction books to read based on an author, theme, or character type.

For generative AI in terms of images, I have found a home using Adobe Firefly (https://www.adobe.com/products/firefly.html). I created the image for the title slide for my last conference presentation "Improve your research workflow with AI tools" with

the prompt "black female improving your research workflow with ai tools."

In the past two--almost three--years, various AI tools have crossed my path and I have experimented with many and maintain a list of cool tools to play when time permits. If you are getting started with AI, my advice would be to find your proverbial lane. Are you a liaison librarian doing one-shots and need inspiration to create engaging activities? Are you teaching students, faculty, and staff on how to use different tools to improve their research workflow? Are you at the reference desk needing to find quick resources for students without having to think about "Which database would be best for this topic?" Are you in a public library and need to find a science fiction book with a female lead character based in Spain? During a demo with public librarians, I used Groq (generative AI LLM) to find a list of books that met that criteria and Perplexity (generative AI that web crawls) to create a table with a link to the Good Read's reviews and scores for the books. Are you updating the social media at your library and need to find different tools to create images or brief descriptions of your programming? Whatever your role, identify the AI tools that best fit your needs and set aside the time to learn them. Different websites list AI tools by area, type, and/or function and Git Hub contains a list of AI directories at https://github.com/best-of-ai/ai-directories. If you reflect back to your first day working in a library and think about where you are today, there are so many different databases, software, apps, and tools that you learned over your entire career. What will it take to learn and add one or more AI tools to your repertoire?