



Submitted on: 25.07.2023

Harnessing Pandora's Box: At the Intersection of Information Literacy and AI

Stefanie Hilles*

University Libraries, Miami University, Oxford, Ohio, United States of America
hillessa@miamioh.edu

Ginny Boehme*

University Libraries, Miami University, Oxford, Ohio, United States of America
boehmemv@miamioh.edu

Katie Gibson*

University Libraries, Miami University, Oxford, Ohio, United States of America
gibsonke@miamioh.edu

Roger Justus*

University Libraries, Miami University, Oxford, Ohio, United States of America
justusra@miamioh.edu

**Corresponding author*



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Abstract

A group of four librarians from varied disciplinary backgrounds came together to examine issues of artificial intelligence and large language models. We are of the opinion that Pandora's box has been opened. Students will use AI, so it is important that we engage our students to promote a deeper learning and awareness of this technology and its limitations. As a result, we participated in a semester-long AI workshop sponsored by our institution's writing center. We explored various aspects of generative pre-trained transformers (GPTs), particularly where it intersects with information literacy and visual literacy. We created learning activities closely tied to learning outcomes derived from the Association of College and Research Libraries' (ACRL) Framework for Information Literacy in Higher Education and ACRL's Framework for Visual Literacy in Higher Education. Each centers on a frame or set of themes and contains an overview of the information or visual literacy issue as it relates to ChatGPT or DALL-E. We designed each with customizations appropriate for the different approaches to these literacies across disciplines.

Keywords: Artificial Intelligence, information literacy, visual literacy, instructional design, library instruction

Introduction

Artificial Intelligence (AI) software and products have gone from mostly theoretical concepts to applications that are now able to impact and transform the traditional boundaries of human-to-computer interaction (Mollick, 2022). The ability of students to use AI technology to assist with research, test-taking, and writing gave rise to numerous concerns amongst educators, including worries over the possible destabilization of the educational system as a whole (Heaven, 2023). No matter the level of concern, one thing is agreed upon: Pandora's Box has been opened, and while it is too early to have a real understanding of the long-term impact of the new technology, the need for resources and information for educators is clear. This was the impetus for Miami University's Howe Center for Writing Excellence to create a faculty learning community to examine the implications of AI on student learning and how instructors could better use the technology to assist with their teaching (Howe Center for Writing Excellence, n.d.).

Project Background

The learning community consisted of three groups (two of faculty, one of librarians), focusing on developing material and resources to begin the discussion of AI and its use at Miami University. The faculty groups covered two main topic areas:

- What is Writing For? Facilitating K-16 Conversations about Teaching Writing in an Age of AI – developed by Education department faculty to prepare pre-service and in-service K-12 teachers and college faculty to engage critically and reflectively with AI writing tools.
- AI and Writing in an Age of Rapid Social Change: Opportunities and Challenges in Social Science Courses – developed by the Sociology and Gerontology department faculty who explored how to use concerns about AI as a springboard for improving writing assignments in sociology, gerontology, and organizational studies.

Our group represented the library and decided to look at the issue through the prism of information literacy (IL) and visual literacy, addressing the following questions:

- How do we create writing and research assignments that encourage our students to critically engage with information?
- How can we harness these AI tools to create deeper learning instead of futilely trying to outright ban their use?
- How should librarians and other teaching faculty approach information literacy and digital literacy when these AI tools are becoming more commonplace?

To meet these goals, we designed a set of six lesson plans, divided evenly between information and visual literacy, that can be used in college-level classrooms to critically examine AI within the context of building information and visual literacy skills.

AI Tools

We chose two AI tools to be the focus of our lesson plans: ChatGPT and DALL-E. Both products have been at the forefront of the public discussion of AI due to the implications for their use in education (Roose, 2023). Both ChatGPT and DALL-E are developed by OpenAI, a non-profit research and development company based in San Francisco, California, whose primary mission is to develop artificial general intelligence for everyone. Both tools are available in free and paid formats (OpenAI, n.d.-a).

The current version of ChatGPT was released in November of 2022. ChatGPT (Generative Pre-trained Transformer) is a Large Language Model (LLM) which generates natural-language text based on user prompts. The tool has been trained on billions of texts scraped from the internet and uses a complex algorithm to predict what word comes next in a sequence. It uses a learning model called Reinforcement Learning from Human Feedback to refine responses based on feedback from human trainers, which enables the AI to communicate in a more human-like manner. While this allows the

program to generate responses in a natural language format, it also has limitations, such as learning from the human rather than the model and data, reuse and repetitions of phrases, and constraints around the data set, which currently contains very little information more recent than September 2021 (OpenAI, n.d.-d, n.d.-c). Both the free version of ChatGPT (ChatGPT 3.5) as well as the paid version with the new 4.0 engine (ChatGPT Plus) were available to all three working groups in the faculty learning community for the development of the lesson plans.

Where ChatGPT uses a predictive model to generate human-like text responses, DALL-E uses a similar model to generate images pixel-by-pixel. The training dataset for this tool consisted of billions of images with accompanying text descriptions, and DALL-E is able to generate images based on user-submitted prompts. It was first introduced in January 2021 and updated to the DALL-E 2 version in November 2022, allowing for a more realistic generation of images along with greater resolution of the final images that are generated (OpenAI, n.d.-b). Similar to the limitations found in ChatGPT, DALL-E is limited by how the reference images have been labeled and is more suggestible to how the prompt has been written for the generator (OpenAI, 2023).

Both products also have been the focus of attention from governmental and private organizations concerning issues around data privacy, intellectual property, and even the inaccuracy in the responses they generate (Nine, 2023; Schreiner, 2022; Strickland, 2022; Vynck, 2023; Zakrzewski, 2023). Just as problematic are the issues around what data has been used to train the products and the biases contained in it. These are not only a result of the tools' original programming, but also come from users when their prompts are incorporated into the models. While OpenAI has made efforts to limit the harmful usage and outputs that are generated, it remains a problem. These issues make using these products for assignments in an educational setting a challenge that requires careful examination. Applying standards for information and visual literacy gives educators a roadmap to helping students better understand not only the complexities around these products but help develop a plan to use them to their fullest potential while mitigating the risks.

The Framework for Information Literacy

In 2016, the Association of College and Research Libraries (ACRL), which is a division of the American Library Association, published the Framework for Information Literacy in Higher Education (ACRL, 2016). The IL Framework replaced the previous Information Literacy Competency Standards, which had been in place since 2000, and was intended to be more adaptable to the fast-changing and fluid nature of our current information landscape than the previous guidelines.

The IL Framework is discipline-agnostic, and is composed of six major IL concepts, or "frames" as they are called:

- **Authority is Constructed and Contextual** - The credibility and expertise of an information source or an author is dependent upon many different factors, and learners must be able to critique structures of authority which unfairly privilege some sources over others.
- **Information Creation as a Process** - Creation and dissemination of information occurs in many different formats that each convey different messages and meanings, and learners need to have an understanding of the value that varying disciplines place on particular formats.
- **Information Has Value** - Information sources have variable values in differing contexts, and production and distribution of information is affected by various social, political, economic, and legal pressures.
- **Research as Inquiry** - Research is iterative and requires enough of an understanding of a topic to enable learners to find knowledge gaps, and ask new and increasingly complex questions based on those gaps.
- **Scholarship as Conversation** - Research is not done in a vacuum, and that all types of scholarly discourse are in fact a form of conversation in which different and new discoveries, perspectives, and interpretations are weighed against each other across time.
- **Searching as Strategic Exploration** - Focuses on searching and retrieval of different kinds of information, and recognizes that this entire process is highly contextualized depending on

different qualities, aspects, and experiences of both the searcher and the various sources of information being interrogated.

Each of the six frames is divided into knowledge practices and dispositions, the former being behaviors that students can use to demonstrate their learning and the latter being the attitudes or values that students are expected to have as they become competent information users and consumers.

The Framework for Visual Literacy

The Framework for Visual Literacy is a companion document to the Framework for Information Literacy. Published in 2022 by the ACRL Visual Literacy Standards Task Force, it supersedes the previous ACRL Visual Literacy Competency Standards for Higher Education, published in 2011. The Framework for Visual Literacy identifies four "emerging themes":

- **Learners participate in a changing visual information landscape** - People are inundated with visuals more so than ever before in our digital world. These visuals have a lifecycle, "which includes the creation, distribution, description, consumption and iteration of a visual" (ACRL, 2022). At each stage, humans can add meaning to, or manipulate, visuals.
- **Learners perceive visuals as communicating information** - Visuals impart meaning through design choices and formal elements. "Learning to read visuals requires deconstructing and interpreting [these] different elements and contexts of visual communications in order to comprehend their aesthetic, evidentiary, and persuasive functions" (ACRL, 2022).
- **Learners practice visual discernment and criticality** - Interpreting visuals requires critical thinking and evaluation by the viewer.
- **Learners pursue social justice through visual practice** - People can practice social justice by "decentering whiteness, heteronormativity and other hegemonic practices in visual collections and canons, improving accessibility of visuals and platforms, and opposing exploitative practices that deprive visual creators of intellectual property control or Indigenous communities of sovereignty" (ACRL, 2022).

The fourth theme was added in response to criticism that the IL Framework lacks a specific social justice frame. The authors of the Framework for Visual Literacy have woven social justice throughout the document because "social justice should not be siloed as a discrete entity for visual literacy learning" (ACRL, 2022).

As with the frames of the Framework for Information Literacy, the four themes of the Framework for Visual Literacy are subdivided into knowledge practices and dispositions. These knowledge practices and dispositions are then crosswalked to the frames in the IL Framework. It should be noted that knowledge practices and dispositions can be crosswalked to more than one frame. For example, the knowledge practice, "Examine visuals for signs of alteration, such as cropping or use of digital filters, and consider the intent and consequences of any changes made," is crosswalked to "Authority is Constructed and Contextual" and "Information Creation as a Process."

Knowledge practices and dispositions are also crosswalked to social justice. For example the disposition, "Prioritize ethical considerations for cultural and intellectual property when creating, sharing, or using visuals," is crosswalked to "Information Creation as a Process," "Information has Value," and "Social Justice."

Knowledge practices and dispositions that fall under the social justice theme "Learners pursue social justice through visual practice" are all found somewhere in the previous three themes to demonstrate that social justice is inherent to all parts of visual literacy (ACRL, 2022). For example, the aforementioned disposition, "Prioritize ethical considerations for cultural and intellectual property when creating, sharing, or using visuals," can be found under both the "Learners participate in a changing visual information landscape" theme and the "Learners pursue social justice through visual practice" theme.

Interpreting the Frameworks

Due to time constraints, we decided that three lesson plans would be created using the IL Framework, with each focusing on a single frame: "Research as Inquiry," "Scholarship as Conversation," and "Searching as Strategic Exploration." However, since all of the frames are all highly interconnected, with many of the knowledge practices and dispositions broadly applicable to more than one frame, the remaining three IL frames are incorporated where appropriate to the overall learning objectives and at the instructors' discretion.

We created three additional lesson plans that cover visual literacy concepts. Since the Framework for Visual Literacy has fewer frames—or themes—the visual literacy lesson plans are able to cover each one. The new visual literacy Framework is broader in its approach and makes a concerted effort to engage other areas of study than did the previous Standards (ACRL, 2022). This provided the opportunity for us to create lesson plans appropriate for not only the arts but a variety of courses.

Lesson Plans

[The six lesson plans](#) are designed with the same overall structure (Boehme et al., 2023). They start with an introduction, followed by the learning objectives, and then an outline of the activity. Each lesson plan has clear example prompts—which are also open to customization—and teaching notes with our recommendations for classroom implementation.

Lesson Plans for Information Literacy

The lesson for "Research as Inquiry" focuses on the iterative process of asking a question and then using existing or new knowledge to refine and to reformulate the question. Students are provided with a prompt to feed into ChatGPT and then are asked to revise the prompt in order to return a result with either more information or more correct information. Example prompts for computer science, astronomy, and math education are provided. Instructors can weave in the additional frame "Authority is Constructed and Contextual" by discussing how LLMs and other AI tools work and how they reinforce bias. Examining the creation and modification of prompts to feed into an AI also gives a lead-in to conversations around "Information Creation as a Process" and "Scholarship as Conversation." Discussions about the information ChatGPT provides and the quality of this information can also be incorporated. And, while the examples provided are for math and science, the plan can be adapted to any discipline as long as the prompt asks students to revise their initial question based on the ChatGPT response.

The "Scholarship as Conversation" lesson has the goal of working with students to increase understanding of the scholarly conversation in their discipline of study (the rhetorical conventions, citation practices, etc.). The activities ask students to brainstorm the conventions of scholarly conversations in their discipline using a class reading, a seminal article in their field, or an academic article on their research topic as a starting point. Students then compare a ChatGPT-generated "academic essay" on the same topic to see how well it can replicate those conventions. The instructor then leads a discussion with students, going over the gaps in the ChatGPT output. Are academic conventions—the citation style, in-text citations, the general structure of the article, rhetoric, etc.—correctly implemented and audience-appropriate? For example, students should look for the tool's frequent problem of "confabulation," which is when the AI creates plausible-sounding but false information, such as a bibliography full of fake references. These discussions should also address issues in the related frames. "Authority is Constructed and Contextual" opens the door to conversation on whose voices are used in the datasets used to train LLMs, what biases are being reinforced, and what authority are we turning over to ChatGPT as a participant in the scholarly conversation. These conversations should also extend to examinations of the existing academic conversations on a topic. What biases exist and are reinforced by academic publishing practices in a particular discipline? It is important to note that OpenAI collects the prompts submitted by users, so as time passes ChatGPT might improve in its ability to replicate the scholarly conventions of a field. This phenomenon can also be brought up in the discussion.

The "Searching as Strategic Exploration" lesson plan focuses on exploring research topics using ChatGPT. Students are asked to compare a ChatGPT-generated keyword list for a particular topic against a human-generated list for that same topic, and to critique both approaches. They then have the opportunity to use both lists in a relevant research database and critically examine the results. Instructors can easily incorporate additional frames as desired. A question that is likely to be asked is why students should not just ask ChatGPT for a list of resources directly. "Authority is Constructed and Contextual" can be addressed here by discussing confabulation and incorrect information being created in the responses. "Information has Value" and "Information Creation as a Process" can also be covered by discussing open access materials, their dissemination, and their possible inclusion in ChatGPT's dataset. Instructors can also use these questions as a starting point in a discussion about the currency of ChatGPT's training dataset, as well as algorithmic bias in general.

Lesson Plans for Visual Literacy

Lesson plans around the visual literacy framework take a different approach. They focus on key literacy concepts but utilize a different set of AI tools, namely image generators like DALL-E. Each lesson also provides opportunities to explicitly explore multiple themes. All learning objectives are taken from the knowledge practices and dispositions identified in the ACRL Framework for Visual Literacy. Each knowledge practice and disposition is also crosswalked to its related frames from the ACRL Framework for Information Literacy.

The first lesson covers two themes, "learners perceive visuals as communicating information" and "learners practice visual discernment and criticality." It asks students to compare and contrast two artworks. Before the lesson, the instructor chooses an artwork, crops it, and then uses DALL-E's Outpainting function to complete the image via AI. Next, the instructor takes the two images and asks students to determine which artwork was created entirely by the artist and which one was partially generated via DALL-E based on the use of formal elements and the principles of design. After giving a brief explanation of how AI image generators work, students are put into two groups based on their choices, asked to formulate their arguments, and participate in a classwide debate. The point of the lesson isn't to correctly identify the AI; rather, it's to make students think about how artists and AI employ the formal elements and principles of design. It also has the potential to demonstrate to students the challenges inherent in determining whether an image was generated by AI or created by a human being.

The second lesson also deals with two themes, "learners participate in a changing visual landscape" and "learners perceive visuals as communicating information." It takes on ethical considerations related to issues of copyright and intellectual property by asking student groups to research an image generator's copyright policies and publicly available critiques of those policies, including recent court cases and rulings. After students research these aspects, they present their findings to the class in groups, facilitating a classwide discussion at the end. This lesson is intended to engage students with the current complexities of AI copyright, including who owns the images generated by AI and inclusion of artists' work in the dataset without their consent.

The third lesson addresses one theme, "learners pursue social justice through critical practice," by investigating bias in the datasets of AI image generators and how their use can reinforce bias. Students are put into groups and tasked with researching how bias is present in the dataset and the strategies used by the image generator to mitigate this bias. Student groups then present their findings to the class and participate in a classwide discussion. By participating in the lesson, students learn how bias systematically exists in a system assumed to be neutral.

Flexibility of the Lesson Plans

As of this writing these lesson plans have not been implemented in classrooms, but the goal is for them to be used in a wide variety of classes and disciplines. All of the activities are designed for in-person classes with faculty-led reflection and discussion. However, they were specifically intended to be flexible and adaptable at the discretion of the instructor. They can easily be adapted into online modules where students interact with the AI-generated content prior to having discussion on a

discussion board. Or, alternatively, they could be used in a flipped classroom model where students interact with the ChatGPT or DALL-E content outside of class, followed by an in-class discussion.

Recommendations for Practice

When designing these lesson plans, several general recommendations for instructors and librarians became abundantly clear.

- **Know the tool:** Instructors need to have a full understanding of what these tools are, and more importantly, are not before using them in the classroom. A key fact to remember is that ChatGPT doesn't actually know or retrieve any information. It's simply a well-read machine that strings together words based on probabilities. Much of what it returns sounds good and plausible, but it's not guaranteed to be correct. Likewise, DALL-E is not capable of creating anything, it simply generates images by predicting the next color pixel based on the prompt provided by the user.
- **Interdisciplinarity is key:** We are all subject experts in different areas, and we can't recommend that approach enough. We all learned so much about each other's disciplines during this whole process, and our materials would not be as useful if we each worked independently. We recommend forming interdisciplinary groups to explore the use and teaching of AI at individual organizations.
- **Keep student privacy at the forefront:** Don't require students to sign up for a ChatGPT or DALL-E account. There are some major data privacy issues surrounding these tools, and it's much better for instructors to create a general dummy account for students to use instead.
- **Test your prompts:** As the lesson is being created and before it's taught, instructors should be testing the prompts they intend to use. This technology is moving so quickly that the tools are constantly being updated. Be sure to know what the tool is going to do with a prompt, and if something has changed, how that will be addressed in the classroom.

Conclusions

These lesson plans are the culmination of a semester-long project. During the planning and research process, we discussed creating materials that focus on the remaining three IL frames as well as additional activities that address visual literacy—such as having students write a formal analysis on an artwork, comparing the analysis to one generated by ChatGPT, and seeing if they could determine which analysis was written by AI and which was written by one of their peers. Due to the time constraints placed on the project, we were not able to fully develop these ideas during this first iteration. However, this topic is ripe for continued research, development, and collaborations. This is our first-step approach to dealing with AI's constant evolution. As word or pixel prediction algorithms develop and improve into true artificial intelligence, librarians and educators will increasingly need to look at ways to teach within this new information landscape. Information and visual literacy frameworks are a set of tools to start down this path.

Acknowledgments

Howe Center for Writing Excellence, Miami University Libraries

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