Artificial Intelligence and Information Literacy: A Comparison of Methodology

Elizabeth Zak

Carthage College, Wisconsin, USA

Corresponding author: ezak@carthage.edu

Abstract: Artificial intelligence, also known as AI, is a current and effective tool. Although professionals across disciplines agree that artificial intelligence may solve problems, its effectiveness information in education is underexplored. Furthermore, understanding how artificial intelligence may relate to information literacy is essential to utilising it properly in matters of misinformation identification. This study seeks to evaluate information literacy suggestions made by AI bots, comparing them to a common and practical information literacy method. Presenting a comparison between current literacy methods and those introduced by AI bots allows researchers and educators to better understand the overlap between the two, as well as identify any differences. Evaluation of current artificial intelligence descriptions of information literacy shows that accuracy and authority are cited as the most valuable elements when assessing the truthfulness of information. While artificial intelligence provides many opportunities for growth, we must better understand its current capacity to educate.

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1. Introduction

Artificial intelligence, or AI as it is typically known, is heralded as a helpful means for both formal and informal use (Hager, 2019; Noorbakhsh-Sabet, 2019). Tools such as ChatGPT and Microsoft Copilot are helpful chatbots and virtual assistants. These chatbots demonstrate skill in a variety of areas, including recipe generation and article summarisation. Researchers and instructors alike promote AI in the classroom (Chen, 2023; Kim, 2018). AI can be used to educate: someone may use a tool such as ChatGPT to learn about almost anything. However, AI within the realm of information literacy may be a specifically beneficial tool. While AI and information literacy are often linked, they remain underexplored. AI's use in identifying verbal misinformation has been explored; however, more research is necessary (Kang, 2019; Dadvandipour, 2022). Although AI is a helpful tool, it may not always provide correct information (The Verge, 2024). In many cases, AI bots source their information from various websites. As a result, while their information may be popular, it may be incorrect. Even if AI provides accessible responses, if these responses about information literacy are incorrect, users may not learn how to accurately identify information. This could result in someone making decisions based on inaccurate information. To identify how AI may help promote information literacy, and specifically, combat misinformation, researchers must first determine how AI responds to questions about misinformation. There is currently a research gap between the presence and use of AI and the understanding of its perception of information literacy. This study seeks to rectify the gap by identifying a common question about information literacy, asking AI bots the question, and evaluating their answers. This observational study allows us to identify what suggestions AI bots provide information seekers, and whether these suggestions are similar. The researcher first found current literature discussing AI bots and their uses. The researcher formulated a question to ask AI bots, and then evaluated their responses. The researcher used the following AI bots: TalkAI, iAsk Questions, AI Chat, Free AI Chat Website, ChatGPT, Google Gemini, and Free AI Chat. After comparing the responses generated by AI bots to each other, the researcher also compared them to a popular information literacy test. Although AI bots are indeed promising in the field of information

literacy, their descriptions of information literacy are still insufficient. More research is necessary to understand the relationship between artificial intelligence bots and information literacy and misinformation.

2. Relevant literatures

Current research has explored web developments and AI in information literacy education; however, there is no research identifying the link between information literacy methodology and AI.

Researchers have explored web tools as helpful in information literacy education. Efendioğlu and Sendurur (2023) attempted to design a browser extension meant to help students with information literacy skills. They found that this tool might be useful for students but could, conversely, result in the spread of misinformation. Some researchers have evaluated the use of AI in discerning between information and misinformation (Efendioğlu, 2023). Kang and Lee (2019) designed an algorithm meant to identify verbal fake news and misinformation, arguing that more high-level research was necessary (Kang, 2019). Dadvandipour and Layth Khaleel (2022) compared deep learning algorithms against a misinformation data set and found that the BERT model was most effective in using artificial intelligence to identify verbal misinformation (Dadvandipour, 2022). Nsude (2021) identified AI as a specific field that could detect verbal misinformation. They also acknowledged that AI might be able to generate misinformation. However, they stated that while AI may create misinformation, it may also effectively combat misinformation (Nsude, 2021). Current research has used machine learning and other artificial intelligence algorithms to identify misinformation. However, research into AI's perception of appearance and discussion of misinformation is still relatively limited.

Researchers have likewise begun to evaluate the relationship between artificial intelligence and information literacy. Coleman (2024) identified and explored the link between AI and information literacy, stating that more research into information and AI is necessary. Researchers have likewise evaluated methods such as SIFT and RADAR when evaluating the response of a large language model; however, this research does not often explore the AI bots' discussion of information literacy concepts, instead focusing on responses about information itself (Blechinger, 2023; Carroll, 2024). Zak (2024) identified the CRAAP test as an effective tool when evaluating current information (Zak, 2024). Sye and Thompson (2023) explored various tools of online information literacy and identified the CRAAP test as beneficial and helpful (Sye, 2023). However, no research has explored the CRAAP test's relationship with AI.

Based on the current literature, the researcher identified the following question:

- What terminology or vocabulary do AI bots use when discussing information literacy? Is this language like that of the current information literacy methodology?
- How do current information literacy methods compare with AI-generated information literacy methodology?

3. Materials and methods

To obtain a variety of responses, the researcher decided to use multiple AI bots. The researcher chose to use free AI bots that required no login or account creation, as they are the most accessible. The following AI bots required no login, account creation, or payment: TalkAI, iAsk Questions, AI Chat, Free AI Chat Website, ChatGPT, Google Gemini, and Free AI Chat. The researcher asked these seven current free AI bots the following question.

"How can I decide whether to trust an article?"

This question allowed the researcher to identify what the AI bots considered information and misinformation without using those terms. It also provided accessible language. Specifically, the researcher chose to avoid jargon and utilise wording that the typical information seeker would use. This allowed the researcher to minimise any potential confusion. A typical information seeker would ask a similar question.

When evaluating the responses, the researcher compared responses. After comparing the content of the responses, the researcher identified which examples or tips appeared more than once, as well as the average rank in importance of each example. The researcher counted the number of times that each example appeared, the number of times that each tip appeared, and whether the AI bots provided sources or citations. If a suggestion was unique or numbered, it was counted. The researcher excluded introductions, restating the question and conclusions that restated the answers. Once again, the researcher evaluated answers based on consistency and themes: future research will evaluate the effectiveness of these instructions.

The researcher used Voyant Tools to find the readability index and vocabulary density of the responses given. Voyant Tools is a free textual analysis environment used to evaluate the contents of texts. It has been used extensively in research discussing music, natural language processing and general texts (Alhudithi, 2021; Sampsel, 2018; Welsh, 2014). Voyant Tools is also widely used in digital humanities research (Black, 2016). Voyant Tools calculates vocabulary density by identifying the number of times certain words or phrases are used. Specifically, the number of unique words are divided by the number of words in a text (Whittemore Library, 2018). The readability index was found using the Coleman-Liau formula, which calculates the United States grade reading level of a text. This formula uses the average number of letters per 100 words and the average number of sentences per 100 words to find the reading level of a text (Voyant-Tools, n.d.).

Both of these tools are instrumental in identifying how difficult or easy a text may be to readers. Therefore, Voyant Tools was a useful tool for understanding the readability index and vocabulary density of the responses given.

The researcher finally compared the suggestions to a current information literacy method. The researcher chose to use the CRAAP test as a comparison when evaluating the information literacy methods discussed by the AI bots. This method is considered effective in identifying information and misinformation (Blakeslee, 2004; Myhre, 2012). The CRAAP test was designed by Susan Blakeslee in 2004 (Blakeslee, 2004). Each letter in the CRAAP test represents scrutiny of a specific element in a piece of information. The C stands for Currency, the R stands for Relevance, the first A stands for Authority, the second A stands for Accuracy, and the P stands for Purpose. Currency refers to the time period during which the article was published. Relevance refers to the article's potential use: is it appropriate for the user's needs, or does it contain obsolete information? Authority inquires as to whether the author and publisher understand the subject, Accuracy asks if the information in an article is correct, and Purpose identifies why the article was written initially (Blakeslee, 2004). Researchers and instructors agree that the CRAAP method is a beneficial tool for evaluating websites, articles, and other sources (Myhre, 2012; Esparrago-Kalidas, 2021; Ota). While other research methods, such as the RADAR method and the SIFT method, are effective, the researcher chose to use the CRAAP test due to its popularity in education, as well as its timeless use in identifying misinformation (Holzhausen, 2022; Zak, 2024). Furthermore, the CRAAP test identifies a source's credibility, which is certainly essential when evaluating all forms of intelligence and their answers (Esparrago-Kalidas, 2021). Therefore, the CRAAP test was the best tool to use as a comparator when comparing AI responses to a question about information literacy.

To identify the effectiveness of these information literacy suggestions, the researcher determined how many of them utilised ideas or methods from the CRAAP test.

4. Results

This study will now discuss the quantitative and qualitative results. First, the descriptive statistics will be discussed, and the themes found will be explained. The researcher obtained fifty-three responses from 7 AI bots.

The researcher found that the average number of suggestions presented by each AI bot was 7.57 suggestions, with a standard deviation of 2.07; the median number of suggestions presented by each AI bot was seven; the mode number of suggestions made by each AI bot was six. The suggestions had an average vocabulary density of 2.82 and an average readability index of 13.426.

The researcher identified the following themes from each response. Examples of the themes are presented below. There were seven unique themes: Credibility, Bias, Accuracy, Currency, Purpose, Authority, and Intuition. Each of these themes was distinct from the other.

The themes and examples are presented in Table 1.

Table 1: Themes and Examples

Theme	Example
CREDIBILITY	"Check for transparency**: * Look for articles that clearly state their methodology, data sources, and any limitations."
BIAS	"Check for Bias: Identify any potential biases in the article. Does it present multiple viewpoints or only one side?"
ACCURACY	"Evaluate the content: Accuracy: Does the article cite its sources? Can you verify the information with other reliable sources?"
CURRENCY	"Currency: Is the information up-to-date, especially for topics that change rapidly?"
PURPOSE	"Consider the Purpose: Understand whether the article aims to inform, persuade, or sell something, which can affect its reliability."
AUTHORITY	"Evaluate the Author: Look into the author's credentials and expertise. Are they qualified to write on the topic?"
INTUITION	"Beware of red flags: Is the article full of sensational headlines, ALL CAPS, or bad grammar?"

The researcher found that 5 of the suggestions focused on identifying any Bias in the article, 8 of the suggestions focused on identifying the Credibility in the article, 6 of the recommendations discussed understanding the article's Purpose, 6 of the suggestions discussed Currency of the article, 11 of the suggestions discussed evaluating the Authority of the authors or the publishers of the article, 13 of the suggestions discussed evaluating the Accuracy of the article's claims, and 4 of the suggestions were to use Intuition when evaluating the article. Accuracy was the most popular suggestion, and Intuition was the least popular suggestion.

The themes found and their corresponding counts are below in Table 2.

Table 2: Themes and Count

Theme	Count
CREDIBILITY	8
BIAS	5
ACCURACY	13
CURRENCY	6
PURPOSE	6
AUTHORITY	11
INTUITION	4

The researcher finally examined how many AI bots presented the themes. Currency was the only theme found in responses from all seven of the bots, while Accuracy and Authority were found in responses from six (all but one) of the bots. Credibility was found in responses from five of the bots. Purpose and Intuition were found in responses from four of the bots, and Bias was found in responses from three of the bots.

Overall, the themes found overlapped with four of the following elements of the CRAAP test: Currency, Authority, Accuracy, and Purpose in title. However, each of the elements listed in the CRAAP test shares similarities with the themes listed. Notably, none of the suggestions included using the CRAAP test or even utilising a known information literacy method.

5. Discussion

The researcher now discusses the number of suggestions, the readability of suggestions, and the similarities in suggestions to the CRAAP test.

Number and Readability of Suggestions
By examining the number and readability of the suggestions, we may identify whether they are truly accessible. The CRAAP test consists of five major suggestions or indicators of validity when evaluating information. The AI bots presented 7.57 suggestions on average. This shows that more suggestions were presented by the AI bots; however, more suggestions may result in more confusion for information seekers. More research into the effectiveness of suggestions is necessary. Information seekers should be able to use these suggestions and recall them well. Therefore, none of the bots presented too many or too few suggestions.

Although the suggestions presented helpful solutions, their average readability level was high. An average readability level of 13.426 assumes that the information seekers have completed 12th grade. This could result in confusion for the information seekers. As a result, potential future exploration of AI's use in information literacy education could seek to explain why the readability level is so high and how to further mitigate this.

The vocabulary density of 2.82 also shows that these answers are complex: this could also confuse information seekers. Identifying the readability index and vocabulary density shows that although the AI bots provided accessible responses, these responses may be difficult for the average information seeker to understand. This could result in further uncertainty when evaluating potential misinformation, making someone more susceptible to believing it. While this is by no means a disqualification of any of the themes or suggestions, more research into making AI suggestions more accessible is necessary.

Comparison to the CRAAP Test
The researcher now compares the findings with the CRAAP test. Overall, the researcher found four major overlaps with the CRAAP test: Currency, Authority, Accuracy and Purpose. These four shared elements show a shared focus on critical evaluation of the source. Authority specifically focuses on how the author, publisher or reputation of a source is qualified to discuss a topic. The prominence of Authority is important, as it demonstrates a focus on qualifications. It also reminds the users that they must identify the author and publisher as dependable to fully understand whether the information itself is reliable. This is a beneficial tool and shows a multifaceted, effective approach to identifying information. If the author is not an authority on the information, or if the author cannot be trusted, then the information cannot be used.

The presence of Currency, Accuracy and Purpose are also important: these elements are all valuable. Checking for the Currency of an article can safeguard against obsolete information or information that has been disproved. Evaluating the Accuracy of an article validates that the information seeker does not simply trust the article blindly; instead, they must confirm the information elsewhere. Purpose specifically guarantees that the information seeker understands why the

article may have been written. These elements, and their prominence in the answers provided by AI bots, are positive: they show that these tools are valuable and helpful, and are deemed so by a variety of sources.

The absence of Relevance may be due to its similarity to currency. This is not meant to imply that Relevance is an unnecessary tool: indeed, Relevance questions if the information presented is appropriate for its users. This is a valuable element of information. The absence of Relevance may be due to the assumption that an article may be a relevant or acceptable article. The absence of relevance may be because relevance is often overlooked by information seekers. Oftentimes, information seekers may be overwhelmed by the volume of information presented, and therefore, they may forget to check whether or not the information itself is relevant (Martzoukou, 2005; Savolainen, 2015). Similarly, the overlooking of relevance mirrors the difficulty in defining its role in information seeking, as relevance is often a sliding scale depending on the discipline of information (Saracevic, 2022). Because AI often does not discuss implicitness, we may assume that AI's omission of relevance is not because it implicitly assumes that relevance is important (Jacobi, 2024). More research into the absence of relevance and other elements could be beneficial.

The presence of Credibility is like Accuracy; however, in the case of Credibility, the information seeker is challenged to consider the source's reputation or the source's depiction, rather than the data or content itself. This is supported by Vamanu and Zak's 2022 research identifying Source and its credibility as an important factor in determining whether or not to trust information (Vamanu, 2022). Credibility may be cited as more valuable by AI bots simply because the internet is considered a less credible source (Mackay, 2021). The presence of Credibility shows that information seekers are not only interested in accurate, correct choices, but also choices that are sensible and convincing.

The presence of Intuition and Bias is similarly valuable: they demonstrate a scepticism regarding not only the potential untrustworthiness of the author or the publisher of the article, but also provide agency to the information seeker. By suggesting that an information seeker's intuition may allow them to understand whether an article contains information or misinformation, the AI bots show a potential evolution in information literacy. Not only is understanding the potential bias of a source important, but so too is relying on one's own set of skills to determine what to trust. By granting this agency, Intuition and Bias are both important, valuable themes. They build upon the other themes presented and complement them well.

While the themes found in the CRAAP test and AI bot responses are similar, their differences are revealing. The CRAAP test focuses more on the information itself and subtly empowers the information seeker, while the AI bots' interpretation of information literacy identifies the importance of both the source and the information, while explicitly empowering the information seeker. However, these information literacy methods are still incredibly important and helpful for any information seeker. While the CRAAP test is still a useful metric and should be used, the suggestions made by the AI bots are likewise useful and beneficial.

6. Conclusion

AI is a valuable tool in various contexts; however, it remains underexplored in the field of information literacy. To understand AI's scope and use in information literacy education, we must first understand its ability to inform information seekers. After evaluating the responses to a question about determining how to trust an article, AI bots characterised Accuracy, Authority, and Credibility as the most valuable tools. AI responses differed from the suggestions made by the CRAAP test. These suggestions presented a new, unique set of markers used to distinguish between information and misinformation. The researcher also found that while the answers were technically readable, they may have been difficult to understand for most information seekers. While this is a preliminary study, more research into artificial intelligence and its relationship with identifying misinformation is necessary. As misinformation and deceptive tactics evolve, so must our evaluation and ability to discern between information and misinformation.

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