Educator Perspectives on a Generative AI Tool to Support Information Problem Solving for Epistemic Decision Making

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Abstract

Online information-seeking is central to learning and decision-making, yet the internet, particularly in the age of misinformation and Generative AI (GenAI), presents significant challenges in discerning credible sources. The difficulty is compounded when high-quality sources provide conflicting information, necessitating a nuanced evaluation approach beyond simple accuracy judgments. To make choices grounded in sound reasoning for epistemic decision making, information seekers should evaluate the credibility of sources, weighing arguments and evidence, and recognize differences in opinions and uncertainty. INFO-NAVIGATE is a GenAI-based educational tool, designed and developed to support students in identifying high-quality information in the context of conflicting information, activating and enhancing Information problem Solving (IPS) skills along with higher order thinking, including critical thinking. Educators' perspectives are vital when designing and developing AI support tools like these, as they are the decision-makers for adopting these tools in classrooms and facilitating their use. This paper presents educators' perspectives on INFO-NAVIGATE and how it could support both educators and students. Findings suggest that educators view INFO-NAVIGATE as a valuable tool for helping students gain the information seeking and higher order thinking skills needed to navigate conflicting information on the web. They also highlight its potential to be integrated into higher educational curricula supporting the teaching of these critical skills and the limitations to be considered to ensure such tools promote rather than undermine responsible epistemic decision making.

Keywords

generative AI, educator, Information Problem Solving, critical thinking, higher order thinking, epistemic decision making

1. Introduction

In recent years, artificial intelligence (AI) has become pervasive in education, influencing both teaching and learning experiences [1]. The emergence of GenAI technology has further transformed educational practices, positioning GenAI tools as mechanisms for pedagogical enhancement, writing assistance and productivity, and training and development of skills [2]. Collectively, these AI technologies are classified as epistemic technologies, as they function as epistemic enhancers — shaping knowledge acquisition by engaging with content and practices related to knowing and justification within specific learning contexts [3]. Given the pedagogical and epistemic potential of GenAI tools, educators are encouraged to leverage these technologies to foster students' higher-order thinking, strengthening essential cognitive abilities such as critical thinking, creative thinking, and analytical skills [4], while navigating complexities of how they can be meaningfully integrated in curricula to augment learning and promote critical engagement [5].

One such complex cognitive challenge involves information-seeking for learning and epistemic decision-making in environments where conflicting information is present. In these scenarios, individuals must employ higher-order thinking, particularly critical thinking to identify high quality information and make informed decisions. This becomes essential in this era of misinformation and GenAI [6]

The 26th International Conference on Artificial Intelligence in Education (AIED 2025), July 22–26, 2025, Palermo, Italy
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where the internet is rapidly evolving, presenting information of varying quality and perspectives. The evolution is driven by the unrestricted expression of opinions online and the advent of GenAI, which facilitates the effortless generation of misinformation [7]. The coexistence of both reliable information and misinformation from sources of differing credibility often leads to conflicting narratives [8], making it increasingly difficult for information seekers to discern reliable content.

Conflicting information arises not only from sources of varying reliability but also from high-quality sources that present divergent viewpoints due to expert disagreements or a lack of consensus [9], further complicating the evaluation of the veracity of claims. The information seeking in such contexts is often influenced by cognitive biases, prior knowledge, and information literacy [6]. Moreover, reliance on GenAI responses in such contexts can exacerbate the cognitive biases, as these responses can contribute to opinion polarization due to their limited depth and potentially biased representation of knowledge [10]. Navigating this complexity in digital environments, minimising cognitive biases, requires individuals to develop Information Problem Solving (IPS) skills, which incorporate higher-order thinking, including critical thinking [11, 6]. As such, epistemic decision making becomes crucial, requiring individuals to critically evaluate sources, weigh evidence, and justify their beliefs in the face of uncertainty and competing claims.

Given the potential of GenAI tools in education, particularly for developing higher-order thinking skills in complex contexts such as those outlined above, our work involves developing a GenAI tool INFO-NAVIGATE and a pedagogical intervention to support university students in enhancing the key IPS skills of processing conflicting information and higher order thinking, such as critical thinking. The design rationale, pilot evaluation, and implementation of INFO-NAVIGATE are presented in past work in detail [12]. The current study focuses on understanding educator perspectives on INFO-NAVIGATE, since the effective integration of technology in education is influenced by more than just technological factors [13]. Educators play a pivotal role as the primary decision-makers in adopting these interventions and ensuring their continued use in classrooms [13]. Empirical studies on the development of such tools often lack educators' input, limiting their impact in authentic classrooms [14]. Qualitative studies reveal that while some educators believe that technology adoption enhances the teaching and learning experience, others see no significant benefit as long as traditional methods remain effective [13]. This uncertainty is even more pronounced with the introduction of GenAI in education, where opinions on its use vary widely. Some educators are resistant to GenAI as they anticipate cognitive offloading, metacognitive laziness, and the decline of higher order thinking ability among students due to the use of GenAI tools [15, 16]. Conversely, others are eager to explore its potential in teaching and learning as it offers the benefits of providing personalised support to learners at scale, reducing their workload, and saving time [15], particularly when designed carefully with learner autonomy in mind using techniques such as learning analytics [17]. Recognising the importance of educator voices when developing GenAI educational tools, this paper presents their perspectives on INFO-NAVIGATE built for IPS support.

It addresses the following Research Question (RQ): 'What are educators' perspectives on INFO-NAVIGATE, and how it can support the integration of information seeking and critical thinking in higher education curricula?'

2. Study Context and Methodology

We investigate INFO-NAVIGATE, a GenAI powered IPS support tool designed to empower learners in identifying high quality information in the context of conflicting information [12]. The Information Problem Solving using Internet (IPS-I) model [18] serves as the theoretical foundation for INFO-NAVIGATE. IPS-I specifically represents the process of seeking information via the Internet. It integrates five core IPS skills 1. Defining problem, 2. Search information, 3. Scan information, 4. Process information and 5. Synthesise and present information. In addition, the model incorporates a set of process regulation activities and conditional skills related to computer usage [18]. IPS-I model has been the basis for several existing IPS pedagogical interventions [19]. INFO-NAVIGATE is specifically designed to scaffold conflicting information processing activities, as an educator co-designed pedagogical intervention in

higher education. This accepts search queries as user input and presents relevant information in a manner that minimises cognitive biases during the processing of conflicting information [20]. It consists of five main features: 1. Horizontal view of multiple sources to minimise bias towards highly ranked items in a search results page, 2. Synthesized response to provide an overview with multiple viewpoints included, 3. Quality features panel to assess source credibility, 4. Perspective Panel to view a diverse spectrum of perspectives on the topic and 5. Source Content Panel to summarize the content of each source, categorized into five main subtopics, representative of the coverage of the topic. Figure 1 shows INFO-NAVIGATE's user interface with the main features. This is intended to provide context for the current study, although details of the tool itself are not the focus here and have been presented in prior work [12].

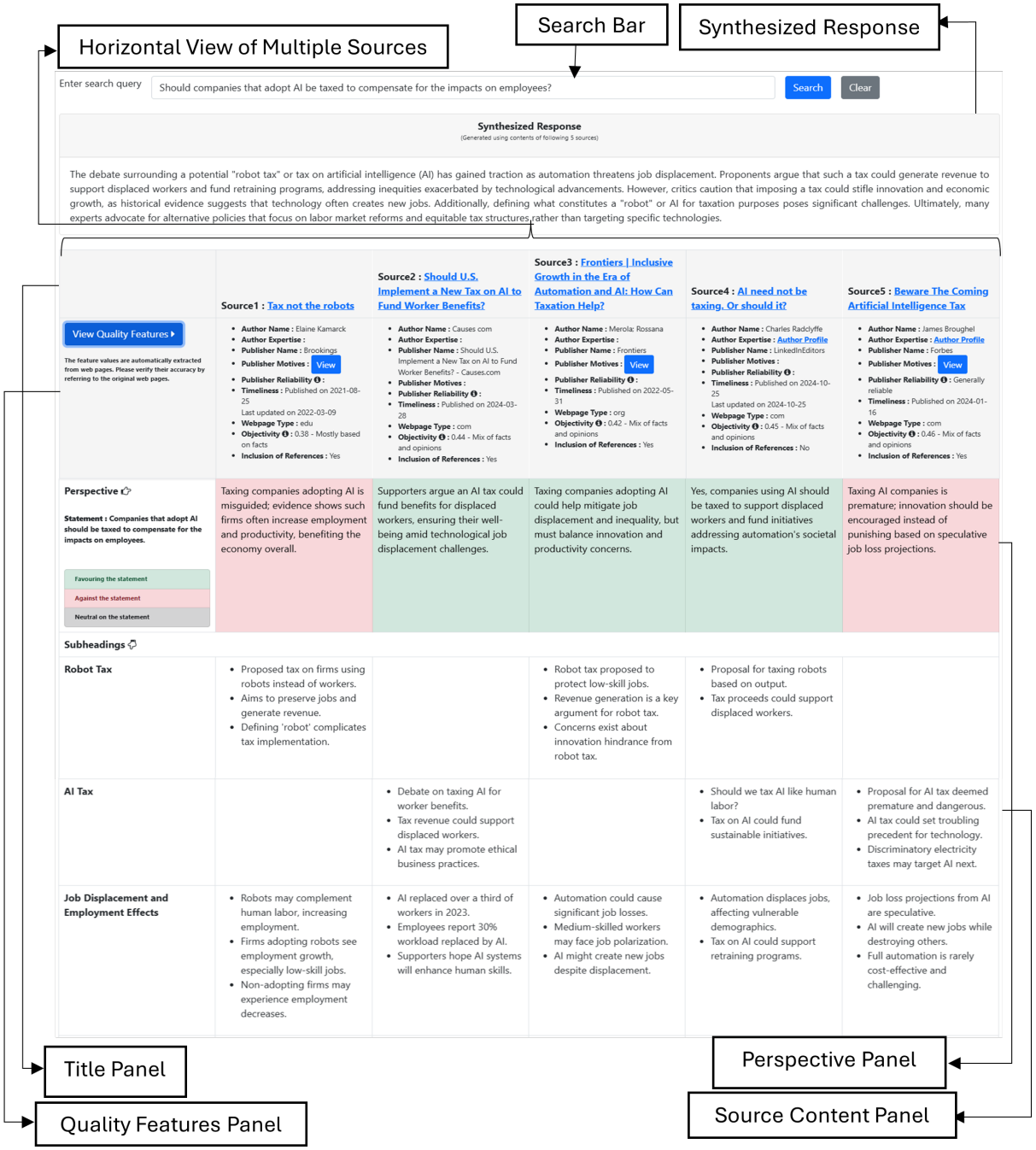

Figure 1: User interface of "INFO-NAVIGATE" with its key features on a sample search query

The tool's content is generated through accessing Google Search Results Page using SERP API[1] to fetch top results from Google Search, and large language model (LLM) through OpenAI API leveraging its capabilities to perform text summarization, information extraction, and stance detection. Piloted with a target group of students demonstrating its usefulness in processing conflicting information [12], the tool is currently being embedded in authentic teaching contexts.

The current study employs qualitative research methods [21] to investigate educator perspectives on INFO-NAVIGATE. Qualitative methods are chosen as they are widely used in similar studies that target the adoption of educational technology innovations in authentic classrooms and can provide rich interpretive insights [13, 14].

2.1. Data collection

The data for this study came from one-on-one semi-structured online interviews conducted with six educators from an Australian university. The interviews were conducted online, with each lasting approximately one hour. Educators were selected through snowball sampling, as they were previously known to incorporate critical thinking and information seeking into their teaching, either as part of or throughout their disciplinary curricula. During the recruitment process, we considered educators from different teaching contexts to maintain the diversity of perspectives, enhancing the rigour and transferability of the results [22]. Table 1 depicts the teaching contexts of participants.

Table 1
The teaching contexts of participants

Participant	Course Context	Designation
P1	Media Literacy	University tutor. Retired School Teacher
P2	Engineering	University Tutor
P3	Public Health Care	Senior Lecturer
P4	Sustainability	Lecturer
P5	Innovation	Lecturer
P6	Health Science	University Tutor

The interviews were designed to gather their perspectives on the INFO-NAVIGATE tool as an aid in the teaching and learning of IPS skills, along with higher order thinking, with the understanding that they had not previously engaged with the tool. To contextualize the applicability of INFO-NAVIGATE within participants' teaching environments and to gain insights into their pedagogical practices, the initial interview questions were designed to elicit detailed descriptions of their teaching contexts. These questions also encouraged participants to reflect on their current approaches to teaching students how to critically navigate through conflicting information and identify high-quality sources. This focus was intentional, as understanding educators' existing pedagogical strategies provides valuable context for interpreting their experiences with the tool. It also helps uncover potential gaps, complementarities, or tensions between current practices and the tool's affordances. To facilitate this reflection, the interview began with a vignette describing a classroom teaching scenario in which the educator designs an activity to support students in developing critical information searching skills on the internet to make informed decisions. The use of a vignette is a promising elicitation technique in interviews, to make it easy for the interviewees to imagine the situation and respond to the questions effectively in a contextually grounded manner [23].

Following the context setting through the vignette, we demonstrated the tool using a sample query on a controversial issue with no clear consensus - for example, Should companies that adopt AI be taxed to compensate for the impacts on employees? This served as an introduction to the tool's key features. Educators were then invited to actively engage with the tool by experimenting with their own controversial queries of personal or professional interest, and subsequently shared their perspectives

[1] https://serpapi.com/

and reflections based on their hands-on experience with the tool. The interview questions were adopted from a previous educator evaluation study on a writing analytics tool [14]. The complete vignette and list of interview questions are in the Appendix A. For this study, only the responses to questions specifically related to participants' experience with the INFO-NAVIGATE tool were considered.

2.2. Data Analysis

Interview transcripts were de-identified for participant confidentiality. A deductive-inductive approach was used, drawing on the theoretical aims of the tool (as probed via the interview questions), alongside inductive reading of responses to create new themes to address the RQ. Coding was done in NVivo by the first author, further validated by the other authors to identify agreement on relevant themes.

3. Findings

Across the interview data, educators recognized the tool's potential to support both learners and themselves in many aspects of IPS and higher order thinking, including critical thinking. Specific capabilities afforded by the tool, as identified by educators, are discussed below.

INFO-NAVIGATE can help students explore diverse perspectives from a variety of sources: Consuming a spectrum of perspectives is key to making informed decisions in the context of conflicting information without falling into cognitive biases [6]. Four out of six educators perceived that INFO-NAVIGATE can help students understand the existence of diverse perspectives on an issue through its horizontal view of multiple sources. This encourages students to interrogate an issue through different lenses, rather than simply picking the top result in a traditional search engine, which may not present diverse viewpoints. *"It has an inherent educative capacity in that it's saying, some questions that you hear have different opinions, and you can see that there are different ways of seeing that. So I think it's a fun way of using the tool"* [P3]. This highlights the tool's potential in guiding inquiry-based learning for epistemic decision making [24]. Moreover, P3 and P4 emphasized the importance of seeing these perspectives from a variety of sources, especially engaging with socio-scientific issues (SSI) that are often controversial and debatable topics that require evidence-based reasoning and ethical evaluation to resolve [25]. They highlighted the importance of students engaging with non-academic sources in addition to peer-reviewed literature, indicating their experiential value and timeliness in SSI contexts. However, educators also noted that students were not confident in finding and using non-academic sources, and tools such as INFO-NAVIGATE can allow students to easily find perspectives from a variety of sources including grey literature. *"It's like a one stop shop for them to easily find a variety of sources"* [P3]. In contrast, P6 viewed the inclusion of non-academic sources as a limitation, emphasizing the need for more peer-reviewed papers. This is likely due to P6's teaching context, in conventional science, where an open web search is not recommended. This theme highlights the scaffolding provided by INFO-NAVIGATE to visualize diverse perspectives from a variety of sources, supporting *information corroboration*, which is a key information processing activity [18].

INFO-NAVIGATE can help students learn sources' meta-information: Both *source* and *content* quality evaluation are vital for understanding and analysing different perspectives and information from a variety of sources to select the most plausible information among them [18]. Five out of six educators perceived "Quality Features Panel" [12] as a useful tool feature to evaluate source and content quality of web pages for credibility and reliability since it clearly presents information about sources (E.g. publisher details, objectivity) in a comparable manner. They noticed that this allows students to understand the reasons behind different perspectives to inquire and compare diverse perspectives deeply and epistemologically: *"It would support that kind of work to say, what are some prominent views in education? What are some prominent views in the industry? Maybe you could even do it regionally"* [P4], and to identify more authoritative sources: *"Instead of going with the first available source, which can be credible or not. So, based on using this tool, maybe they can get more credible sources for their*

argument" [P2].

INFO-NAVIGATE can foster students' higher order thinking: As indicated in the introduction, when engaging with conflicting information, students need to perform information processing activities critically, rather than merely completing the search activity [6]. Educators perceived INFO-NAVIGATE as a distinct educational GenAI tool that enables students' critical thinking and trains their brains to think carefully. P3 viewed INFO-NAVIGATE as a step before information synthesis, guiding students to think and make sense of the provided content. Furthermore, P1 commented, *"that's quite good because it [generation of INFO-NAVIGATE content from sources] didn't really involve me, but it does make me think"*. Additionally, P4 provided a comparative comment highlighting the uniqueness of INFO-NAVIGATE in terms of fostering critical thinking using GenAI, *"this is seeing the human as the forum. So the knowledge system is us, and this is a tool to train and help our brain. Whereas a lot of the other kind of engagements with AI is the opposite. It's the brain is in the AI and you outsource it"*. However, one out of six educators believe the tool does a considerable amount of information processing for students, hindering their learning of information processing in the context of conflicting information.

INFO-NAVIGATE can encourage students to engage deeply with the original sources: When engaging with GenAI tools, the cross verification of GenAI content is important, rather than blindly using the presented information to ensure accuracy [7]. P3 perceived that the tool encourages students to read the original article and learn more about the information before using it, since the tool presents the information along with the links to the original sources. This approach can promote deeper engagement with the content, an important need for critical interaction with AI [26], and helps students develop a more comprehensive understanding of the material. This theme also highlights the tool's potential in guiding inquiry-based learning [24].

INFO-NAVIGATE can support educators in designing teaching materials: Time saving is a main objective of GenAI tools as it improves productivity [7]. P4 found INFO-NAVIGATE to be a useful tool for educators to easily identify sources and arguments related to different perspectives of an issue, allowing them to efficiently incorporate these into their teaching materials: *"Help me identify here's a really strong for. Here's a really strong against and then creating that as the kind of reading material or content for the course"* [P4].

INFO-NAVIGATE can support educators in teaching IPS skills in their classrooms: Four out of six educators perceived that they can use the tool to illustrate and explain different perspectives on an issue. They also identified that INFO-NAVIGATE is useful to teach the differences in quality among a variety of sources. This highlights the tool's support in teaching crucial aspects students need to pay attention to when engaging with conflicting information on the web and guides them in a deep inquiry into an information problem from different dimensions. Moreover, P5 recognized INFO-NAVIGATE as an interactive teaching aid for the context of conflicting information and plans to use the tool with students to derive a spectrum of perspectives on an issue by feeding different relevant queries to the tool and making students think about how they respond to each of the different perspectives.

4. Discussion

The findings of this study highlight several perceived potentials of INFO-NAVIGATE, such as its ability to support students in critically navigating diverse perspectives by engaging deeply with the original sources and their content, while also recognising the differences in quality in these sources - a typical feature of internet sources.They showcase the tool's potential in guiding students' inquiry-based learning and fostering higher order thinking for epistemic decision-making. They also highlight how the tool can support educators to interactively train students with IPS skills, using examples relevant to their teaching materials and incorporate it as a learning aid for students. Since this study was conducted

with a small sample of participants, it does not seek to generalize findings on INFO-NAVIGATE for all educators; rather, it examines the perceived potentials and limitations of the tool within specific teaching contexts of those interviewed. Future studies will explore how such tools can be embedded in authentic classroom settings to enhance students' IPS skills and higher order thinking for epistemic decision making, tailored to specific contexts and aligned with relevant pedagogical needs and learning design [27].

Despite its promises, findings also highlighted educators' perceived limitations of the tool with regard to specific features in their teaching contexts. This includes limited inclusion of peer-reviewed sources in the tool for use in conventional science subjects and hindering of students' capabilities through the semi-automation of processing conflicting information. This aligns with a common risk of students use of AI tools - deferring epistemic responsibility to AI and over-reliance on GenAI tools for information seeking when used uncritically [4, 16]. Findings highlight INFO-NAVIGATE as a distinct GenAI tool that provides epistemic responsibility to the student and guides them in making decisions using evidence from multiple perspectives rather than making those decisions for them. To make use of such tools effectively in learning contexts, they should be designed to extend student cognition for hybrid intelligence without threatening human agency [28]. Careful integration in pedagogical contexts, guided by educators can help towards this aim, and inform how INFO-NAVIGATE fulfills these perceived potentials in actual use and how GenAI tools like this can be used in the classroom to support higher order thinking, mitigating the risk of uncritical over-reliance on them.

5. Conclusion

In this study, we presented educator perspectives on INFO-NAVIGATE, a GenAI based pedagogical tool that can support students in developing key information problem-solving skills, particularly in evaluating and inquiring conflicting information and making informed, epistemically sound decisions. Findings highlight the potential of such AI tools in fostering higher-order thinking and guiding inquiry-based learning in the context of conflicting information and misinformation, a problem amplified by AI itself. Past studies support this, finding that instructional settings with AI technologies [29] and GenAI to support critical learning processes and meta-cognition [30] have the potential to enhance students' higher order thinking. Collectively, these exhibit AI's potential in playing a significant role in the educational context to support epistemic decision making and augment teaching and learning experiences, provided there is careful integration and pedagogic guidance from educators.

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A. Appendix - Vignette and Interview Questions

Vignette – In the following vignette, we're going to ask you to imagine a particular teaching context. This context may more or less represent a typical situation for you, and you are welcome to draw on your own experience in reflecting and responding. You are an educator designing classroom activities to teach university students how to find relevant, high-quality information for their learning or other decision making purposes. During a session or class, you are planning to teach students how to critically solve information problems related to controversial topics, in which different parties may hold different perspectives with no clear consensus. Conflicting information is possible due to different perspectives on such topics. For example, on the topic "Should companies that adopt AI be taxed to compensate for the impacts on employees?", there may be sources that support taxation of companies stating their reasons, and others that are against it. A student comes across this abundance of conflicting information from sources with competing interests and is unable to form their own position by identifying evidence-based claims. Your role as an educator is to design resources and tasks, and plan strategies you will use in the session to support your students in navigating such conflicting information.

Questions –

1. Can you describe your teaching context and how the topics in your subject (or parts of it) align with the scenario discussed in the vignette?
    - What are the key skills or capabilities students would need to develop to successfully navigate such contexts?
    - Are there key challenges or issues students might encounter in this kind of task?
2. What approaches or strategies might you use as a teacher in this context to help students develop those skills?
    - Are there key challenges or limitations in these strategies?
3. Based on your experience with the tool INFO-NAVIGATE, do you think the tool can support you in teaching critical information seeking more effectively? Why?
    - Do you think the tool can support students in learning critical information searching more effectively? Why?

    - Do you think using the tool (with a supporting intervention) can help you and your students overcome some of the previously identified challenges? If so, how?

4. What did you find most helpful in the tool?
5. Did you find anything unhelpful or too complex in the tool? How can it be improved?
6. Will you consider using this tool to teach critical information seeking in the future? Why/ why not?
7. I would love to hear any further thoughts you have.