

Rethinking Information Problem Solving for Writing with Generative AI

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An information problem arises when a discrepancy occurs between information needed to answer a question and information that is already known (Brand-Gruwel et al, 2009a). Solving information problems involves a series of activities that collectively form what is known as Information Problem Solving (IPS). IPS is a fundamental skill in education, encompassing several critical stages: defining the information problem, selecting sources of information, searching and retrieving information, processing information, and organising and presenting information (Brand-Gruwel et al, 2005). These stages are underpinned by metacognitive skills, which ensure learners use a strategic and reflective approach to solve problems (Brand-Gruwel et al, 2005). In an era where online learning has become increasingly ubiquitous, IPS plays an important role in constructing meaningful knowledge and fostering digital literacy (Brand-Gruwel et al, 2009b).

IPS has been integral to writing, tools such as search engines have traditionally supported this process, requiring learners to actively select, evaluate, and synthesise information in their writing from multiple sources to produce coherent and meaningful written outputs (Brand-Gruwel et al, 2009b). However, the emergence of generative AI (GenAI), such as ChatGPT, presents a significant transformation in this process. Unlike traditional search methods, GenAI tools do not merely retrieve information but also generate human-like content, synthesise information, select sources of information (i.e., enhanced web search), produce summaries, and provide coherent responses tailored to specific contexts (OpenAI, 2023). This transformation raises critical questions about how traditional IPS skills are being reshaped. For instance, learners may no longer need to engage in source selection as GenAI tools automatically collect the source of information for them. Meanwhile, new skills, such as AI literacy and fact-checking, may become critical, particularly when integrating such outputs into academic or professional writing.

Despite the transformative potential of GenAI, empirical research on its impact on IPS processes and skills remains limited. Existing literature often hypothesises on the implications of these tools but lacks robust empirical evidence. This gap in understanding limits our ability to assess IPS skill accurately and design effective interventions and support systems that leverage GenAI for IPS in writing.

To address this gap, our study aims to explore the intersection of GenAI and IPS by investigating three key research questions:

1. To what extent do learners engage with GenAI tools across the stages of IPS and how do these processes differ from performance?
2. How do learners use regulations to coordinate their IPS process for writing with GenAI tools and how does this coordination differ from their performance?

To address the research questions, we conducted an experiment in 2023 using the FLoRA platform, a Moodle-based system designed to support self-regulated learning (SRL)

(Zimmerman, 2001). Fifty-nine participants from a Chinese public university completed a 200–400-word essay task in English, including 2-hour initial writing and subsequent 1-hour revision sessions. The platform provided reading materials, task instructions, and SRL tools such as annotation, search, and planning features. Depending on their assigned condition in the revision session, participants interacted with either a human tutor or ChatGPT-powered chatbot.

We collected multiple data sources, including trace data including keystroke and mouse clicks and movements from user interactions, essay products, eye-tracking data, chat histories, prior knowledge tests, and demographic surveys. We will use traditional stages of IPS as a base framework. We will use methodologies from writing analytics and quantitative ethnography (Shaffer, 2017), such as trace analysis and observational studies. This approach will capture both the processes and products of human-AI collaborative writing, providing a comprehensive understanding of how GenAI impacts learners' abilities to synthesise, evaluate, and apply information effectively. Through this workshop, we look for feedback and suggestions within the writing analytics and educational research communities to refine the methodologies and frameworks needed to address the challenges and opportunities posed in IPS for writing with GenAI.