Internet and ChatGPT as Learning Tools in University Environments

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The Paris Conference on Education 2025
Official Conference Proceedings

Abstract

Informational literacy is a transversal skill that all graduates need to acquire, as it plays a crucial role in managing online information for learning and knowledge development. This pilot study examines how seven university students interact with online information and Artificial Intelligence (AI) tools, such as ChatGPT, while completing an academic task. Students' interactions were recorded using an eye-tracking device to capture their visual attention patterns. After that, each student watched the video obtained (which contained all the actions made and the eye movements performed during the resolution of the task) while verbalising their thoughts and decision-making processes of each action. A definitive video file (which contained actions, eye movements and verbalizations) was obtained for each participant. Each definitive video file was analysed considering the time spent and the frequency of performing each skill: defining the academic task to be solved, planning search strategies, searching for information, processing it, and presenting and organising information. Findings indicate that students devote a considerable amount of time to reading and formulating responses, but spend significantly less time analysing the task, planning, and searching for information. In particular, they rarely showed prior knowledge activation before searching, which may affect the depth of their responses. In addition, the limited comparison between multiple sources could reduce the complexity of their final answers. These results highlight the need to strengthen information literacy training, enabling students to maximise the potential of online resources and AI tools for academic tasks.

Keywords: informational literacy, artificial intelligence (AI), ChatGPT, higher education

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Introduction

In today's digital society, university students are expected not only to access vast quantities of online information but also to critically evaluate, organise, and use that information effectively. This capacity, referred to as information literacy (IL), is now considered a fundamental transversal skill in higher education, essential for academic success and lifelong learning (ACRL, 2016). The importance of IL goes beyond locating information; it involves strategic thinking, ethical judgement, and reflective use of sources to construct meaningful academic knowledge (James & Filgo, 2023).

However, numerous studies reveal that students often struggle to perform essential IL tasks such as planning search strategies, comparing sources, and integrating information meaningfully in academic tasks (Brand-Gruwel et al., 2009; Garcia & Badia, 2017).

The growing adoption of digital tools and Artificial Intelligence (AI) applications, such as ChatGPT, adds further complexity to the way academic information is processed. Although these technologies create opportunities for personalized learning, quick access to knowledge, and greater engagement — including tasks like summarizing, writing, and idea generation (Chiu et al., 2023) — they also present significant challenges related to source evaluation, critical thinking, misinformation, and the ethical use of information (Kasneci et al., 2023; Sublime & Renna, 2024).

As AI becomes a more common component of academic practice, it becomes essential to understand how students integrate AI tools into their information-seeking behaviour and whether these tools enhance or hinder the development of deep learning strategies. Prior research has emphasized that digital environments can either scaffold or inhibit IL development depending on instructional design and student awareness (Frerejean et al., 2019).

To conceptualize how students engage with information, we rely on the Information Problem Solving (IPS) model developed by Brand-Gruwel et al. (2009), which outlines five cognitive sub-skills: (1) defining the task, (2) planning the search process, (3) searching and locating information, (4) processing and evaluating sources, and (5) presenting the results. This model has been widely applied in educational settings, especially in the context of online learning (Argelagós et al., 2022; Garcia et al., 2021). Moreover, the 4C/ID instructional model offers a robust pedagogical framework to design learning tasks that facilitate the acquisition of complex IL skills through realistic, whole-task practice (Van Merriënboer & Kirschner, 2018; Van Merriënboer et al., 2025).

Despite these advancements, few studies have used observational methods such as eye-tracking and verbal protocols to explore how students actually use online resources and AI tools during academic tasks. These techniques can provide nuanced insights into students' cognitive processes, including their attention distribution, decision-making strategies, and implicit knowledge (Argelagós et al., 2022). Eye-tracking data, in particular, has shown promise in capturing real-time interactions with digital content and visual attention patterns (Holmqvist et al., 2011).

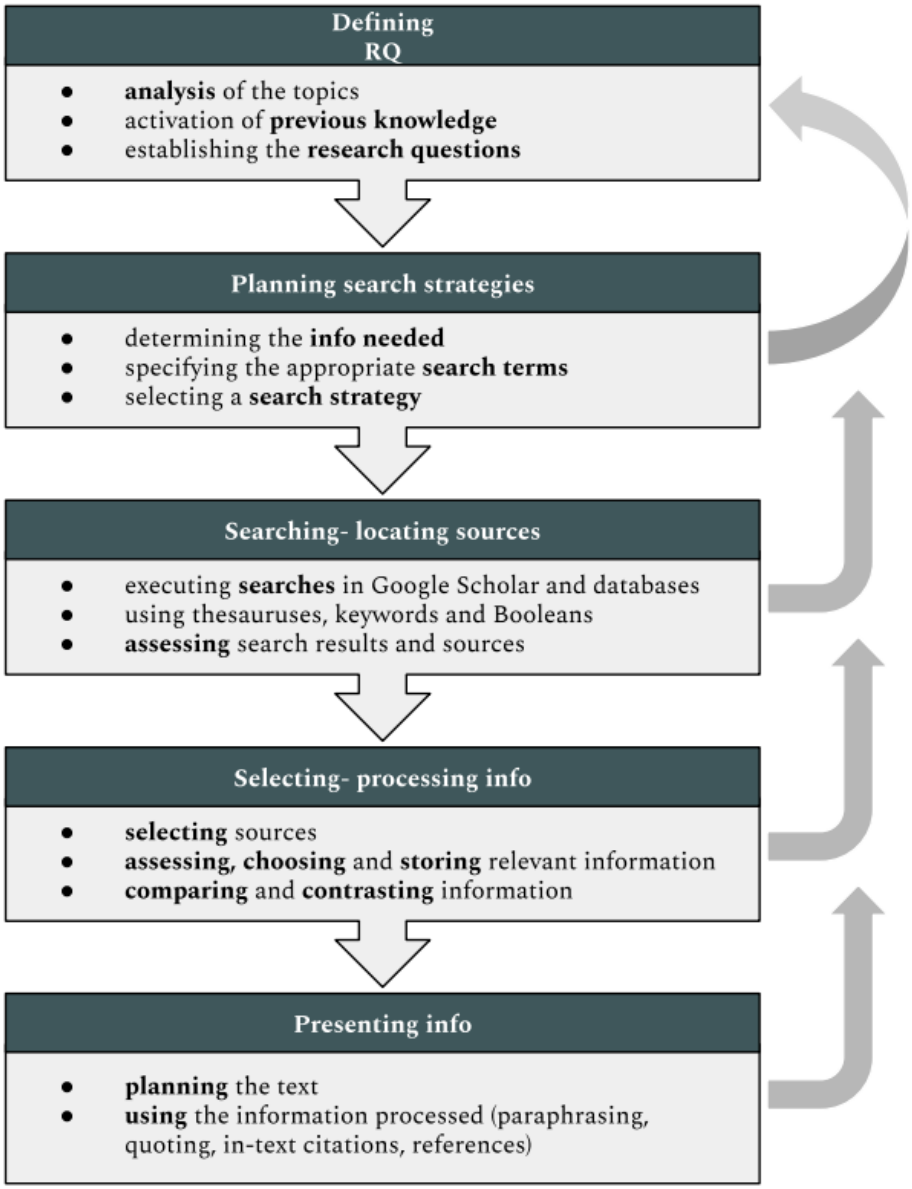
This pilot study responds to that gap by combining eye-tracking technology with retrospective verbal protocols to investigate how university students manage academic information tasks using online tools and ChatGPT. Our analysis focuses on students' actual

behaviour during task completion, rather than self-reported usage or beliefs. By doing so, we aim to uncover both strengths and gaps in students' IL performance and identify patterns that may inform future pedagogical interventions.

This study examines how university students interact with online resources and AI tools (particularly ChatGPT) while completing an academic task. The study focuses on how students navigate the five sub-skills of information literacy as defined by the IPS model: defining the task, planning the search, locating information, processing sources, and presenting results (Brand-Gruwel et al., 2009; Garcia et al., 2021), as can be seen in Figure 1. By using eye-tracking technology and cued retrospective verbal reports, we seek to obtain direct insight into students' visual attention, strategic behaviour, and cognitive processes during task performance.

Figure 1

Information Problem Solving (IPS) Skills and Subskills to Review Scientific Literature (Inspired by Brand-Gruwel et al., 2009; Adapted From Garcia et al. [2021] and Argelagós et al. [2022])



Specifically, we aim to identify which IPS subskills are most and least developed when students use ChatGPT and other online tools, and whether these tools support or hinder the development of deep learning and critical engagement. We hypothesise that while students benefit from the efficiency and fluency offered by ChatGPT, they may neglect early-stage IPS subskills such as task definition and planning, as well as critical source evaluation and comparison. These findings will inform future instructional practices for the integration of AI in higher education.

Method

Participants

A total of seven undergraduate students from different degree programs at the University of Girona took part voluntarily in this pilot study. Although all of them had previous experience using online research tools, they had not received formal training in information literacy frameworks. The participants were between 19 and 23 years old. Their involvement was both anonymous and voluntary, and informed consent was obtained in accordance with the university's ethical standards and has the approval of the Ethics Committee of the Universitat de Girona (CEBRU00048-23).

Procedure

Each participant was asked to complete a short academic task that required searching for information online, organising it, and writing a brief argumentative response. They were allowed to use any digital tools, including ChatGPT. A maximum time limit of 20 minutes was given to complete the task.

While participants worked, an eye-tracking device recorded their gaze behaviour, including eye movements across the screen. Their screen activity was simultaneously recorded.

Once the task was completed, each participant viewed a playback of their session, which included both screen recording and gaze visualization. During this viewing, participants provided a cued retrospective verbal report, commenting on their thoughts, decisions, and reasons behind each action taken. These verbalizations were audio-recorded.

Data Collection

Three layers of data were collected per participant:

- Screen recordings, capturing the sequence of digital actions, websites visited, and tool use.
- Eye-tracking recordings, which showed attention patterns and refixations across the screen.
- Audio recordings of retrospective verbal reports, which provided insights into reasoning, intentions, and confidence levels during the task.

From these, an integrated "definitive video" was created for each participant, combining all three layers for comprehensive analysis.

Each definitive video was coded in a qualitatively way using the five skills from the IPS model (Brand-Gruwel et al., 2009; Garcia et al., 2021): (1) defining the task, (2) planning the

search, (3) searching for information, (4) processing and evaluating information, and (5) organising and presenting the final product (see Figure 1).

Data Analysis

A mixed-methods analysis was conducted. Each protocol was qualitatively analysed to determine which skill and subskill corresponded to each action. Quantitatively, the total time and frequency of behaviours associated with each IPS skill and subskill were manually calculated and compared across participants. The resulting data were visualised using graphs that illustrated the distribution of time across the five skills, as well as the relative contribution of ChatGPT usage within each skill.

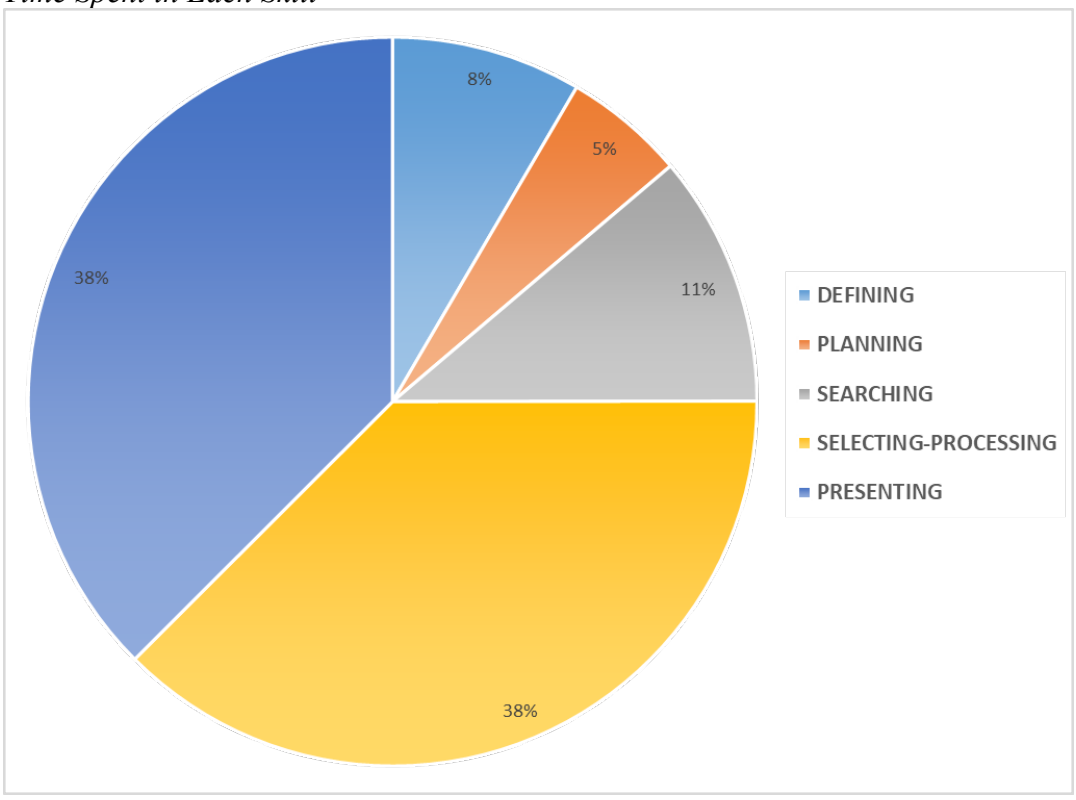
The integration of procedural (screen activity), behavioural (eye-tracking), and reflective (verbal report) data provided a detailed picture of how students engage with digital and AI-based tools during academic tasks.

Results

The analysis of the data gathered from the seven participants (five of whom used ChatGPT during the task) revealed notable differences in the amount of time and number of actions dedicated to each of the five skills outlined in the IPS model: Defining, Planning, Searching, Processing, and Presenting (see Figure 2).

Figure 2

Time Spent in Each Skill



Regarding time allocation, students showed a marked preference for engaging in the later stages of the IPS cycle. On average, Processing was the most time-consuming phase, with participants dedicating approximately an average of 467 seconds, followed by Presenting,

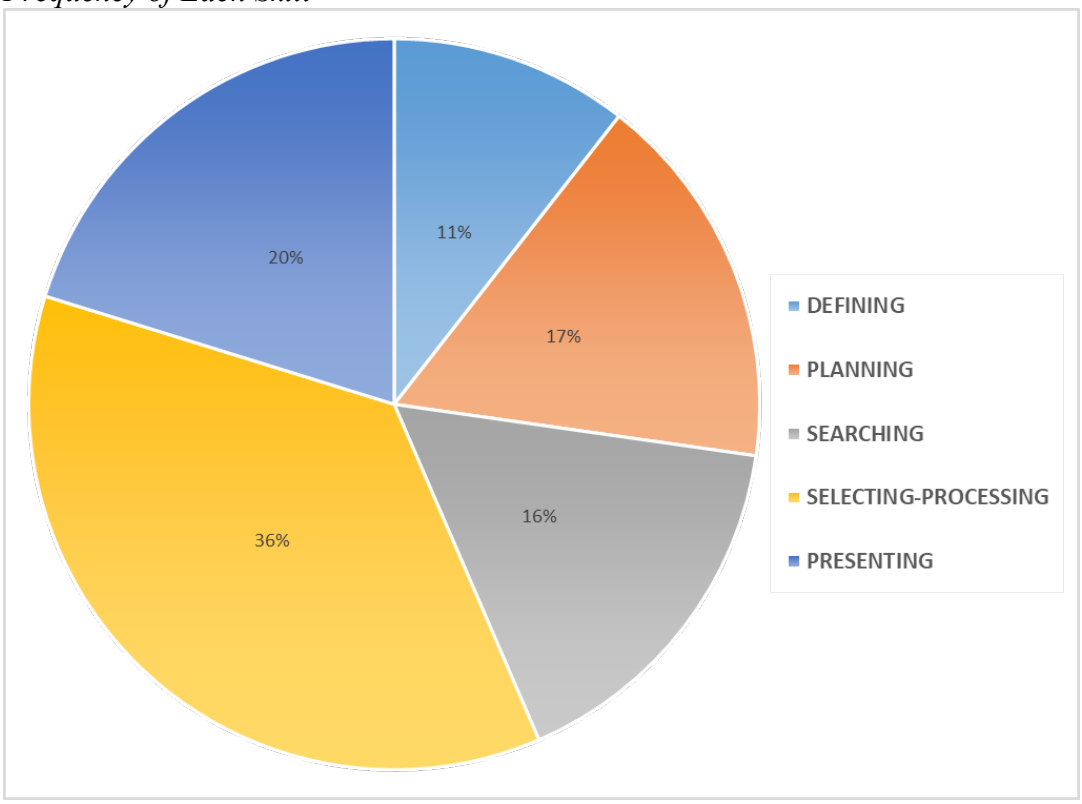
with 466 seconds. In contrast, the earlier stages —Defining and Planning— received significantly less attention, with means of 105 seconds and 67 seconds, respectively. This distribution suggests that students concentrated their efforts on interpreting and reproducing content rather than on understanding the task or organising their approach beforehand.

The Searching phase occupied an intermediate position, with students spending on average 139 seconds locating information sources. However, behavioural indicators suggest that in many cases, this search process was relatively shallow, especially among those who relied heavily on ChatGPT.

In terms of frequency (see Figure 3), students engaged more often in Processing-related actions (e.g., reading, selecting, copying, summarizing) and Presenting behaviours (e.g., writing, editing). For instance, participants reported between 15 and 30 processing actions and up to 19 presentation-related actions per task. Conversely, the number of Defining and Planning actions was low, with some students only performing one or two behaviours linked to these skills. The low frequency and duration of these early-stage activities suggest a limited investment in structuring the task before interacting with content.

Figure 3

Frequency of Each Skill



Beyond temporal and behavioural data, an analysis of the quality of students' final responses offers further insight. On average, participants demonstrated a relatively high rate of correct answers (M = 70.45) and grammatical accuracy (M = 75.00), indicating basic understanding and language competence. However, deeper indicators of critical thinking and academic rigour showed modest results. For example, the average score for paraphrased answers (an indicator of cognitive processing and original synthesis) was 59.09, while the completeness of responses averaged 53.41.

Importantly, the use of in-text citations (M = 45.45) and references (M = 22.73) was particularly limited, suggesting that students did not habitually document sources or follow academic conventions. Moreover, the average frequency of comparing multiple sources was just 4.55, highlighting a superficial use of available information and a tendency to rely on single-source input, often from ChatGPT.

While no formal statistical comparison was conducted due to the small sample size, a descriptive contrast between the five students who used ChatGPT and the two who did not, shows that ChatGPT users tended to spend less time on Searching and Planning, but slightly more on Processing, relying on the tool to quickly generate content which was then edited. However, they also tended to include fewer citations and references, and were less likely to paraphrase critically, pointing to a potential trade-off between speed and depth.

Discussion and Conclusion

The results of this study align with existing literature that identifies significant challenges in students' ability to activate and execute early-stage IL or IPS skills when working with online tools and AI. Despite the recognised importance of IL as a transversal competency in higher education (ACRL, 2016; James & Filgo, 2023), our findings confirm that students tend to prioritize content manipulation and output over initial planning and critical evaluation processes (Sublime & Renna, 2024).

Students' limited engagement with the Defining and Planning phases of the IPS model suggests a procedural gap in their academic strategies. As shown in previous studies, this early-stage disengagement can significantly hinder the quality and relevance of the learning process, particularly when students lack structured guidance or frameworks to guide their inquiry (Argelagós & Pifarré, 2016; Frerejean et al., 2019). Instead of allocating sufficient time to identify objectives or articulate search criteria, most participants jumped directly into content retrieval and adaptation, especially when assisted by generative tools such as ChatGPT.

The preference for the Processing and Presenting phases, both in time spent and frequency, is consistent with the hypothesis that students may use ChatGPT not as a support tool for cognitive development, but as a shortcut for content creation. This raises questions about the depth of learning facilitated by AI applications, and whether students are developing reflective academic habits or merely accelerating task completion. These concerns have been echoed in recent research highlighting how ChatGPT can foster superficial learning if not critically embedded into pedagogical contexts (Sublime & Renna, 2024). These observations suggest a possible trade-off between efficiency and depth, and highlight the need to guide students in how and when to integrate AI tools responsibly.

Moreover, the low average frequency of source comparison (M = 4.55) and minimal use of in-text citations and references reflect a lack of engagement with academic conventions (Suntoro et al., 2023) and suggest that students are not being trained to validate or contextualise the information they retrieve (Kacperski et al., 2025). This is especially relevant in AI-supported environments, where the reliability of generated content may vary and cannot be assumed (Promma et al., 2025).

In conclusion, this study offers a nuanced look at how university students engage with information when given open access to digital resources and AI tools. While generative

technologies like ChatGPT can enhance productivity and access to information, they must be framed within a structured pedagogical model that emphasises critical inquiry, strategic planning, and academic rigour. Educators should consider incorporating targeted instruction on early-phase IL skills (Argelagós et al., 2022), source validation, and ethical use of AI into curriculum design (Sparks et al., 2024), especially as these tools become increasingly integrated into everyday academic practice (Boetje et al., 2024; Suntoro et al., 2023).

These results highlight the need to strengthen information literacy training, enabling students to maximise the potential of online resources and AI tools for academic tasks. Future research with larger and more diverse samples could build on these findings by testing interventions designed to scaffold IL development in AI-supported environments. Additionally, integrating measures of learning outcomes or long-term retention could help clarify whether AI tools merely facilitate task completion or genuinely contribute to meaningful knowledge construction.

Acknowledgements

The authors wish to express their sincere gratitude to the students who took part in this study for their time and valuable collaboration. We also extend our thanks to the PsychoLab at the University of Girona for supplying the technical resources required for data collection, and to the Vice-Rectorate for Research at the University of Girona for their financial support (APLECT_UdG).

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