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Critical Thinking in Information Literacy Pedagogical Strategies: new dynamics for Higher Education throughout librarians' vision

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Abstract

This work explores the articulation of Information Literacy and Critical Thinking, throughout a preliminary study on the pedagogical strategies used by academic librarians in lecturing information literacy courses. A theoretical reflection is presented about students' skills in Information Literacy, enhanced by Critical Thinking, to acquire the ability to move autonomously in printed and digital information environments, based on their reflective thinking, to transform information into new knowledge. The study aims to compare information literacy pedagogical practices in different subject areas. As such, psychology, education, and health sciences were the ecosystems in which the strategies were explored and applied to analyze common approaches, and ultimately detect and share good practices for pedagogical improvements. The present work results from a qualitative study, based on the interviews regarding the vision of three academic librarians, framed by seven major parameters: metacognition, reflection, analysis, evaluation, inference, and use, as well as dispositions, applied to information management. The objective was to evaluate what kind of strategies were adopted by each librarian and if the pedagogical practices are effective in fulfilling the learning objectives. Overall, all three librarians agreed that libraries have an important role in promoting critical thinking in higher education students.

Keywords: *Information Literacy; Critical Thinking; Higher Education, Academic Skills.*

1. Introduction

Currently, academic students mobilize numerous information resources on which to base their academic work. However, the excess of information has become an obstacle to its good use, since it causes noise in the tasks of searching, using, and communicating information in academic goals fulfillment. Therefore, knowing how to collect, assess and select information is increasingly significant for studying, and for obtaining a master's or doctoral degree. In these academic years, the best choices in information resources provide a more solid basis for theoretical and methodological support. The investigation required is no more than iterative research and will depend only on a process of trial and error, as well on increasingly complex questions that arise from this process, and whose answers develop new questions or lines of knowledge in any subject (ACRL, 2016). This is the context of an intersection that converges and frames the concepts of information literacy [IL] and critical thinking [CT]. How can students benefit from librarians' support? These professionals are already helping in the acquisition of IL, through specific training in this area. Therefore, it is important to ask what pedagogical strategies are used, aligned with CT principles, for this purpose.

2. Information Literacy and Critical Thinking

The mission of higher education has been associated with the transmission and production of knowledge, requiring skills that go beyond knowing curricular contents, focusing on a set of transversal processes essential to academic success and effective integration and performance in several disciplinary areas. It is crucial to have the ability to adapt to new contexts, to know academic institutions, and the services they offer, to have the capacity for personal organization, the ability to communicate, the skills to work in a team and solve problems, as well as to adopt ethically appropriate conduct (Garrido and Prada, 2016), in synthesis, to develop transversal academic skills. Byrnes and Bernacki (2013) explain the importance of adequate informational behavior in the lives of citizens to understand how to research, interpret and use information. The exercise of full citizenship, achieved through the empowerment of the learner and through the mobilization of theoretical and practical knowledge learned, is also an underlying intention of these training (Tett, Hamilton, & Crowther, 2012). Understanding cognitive aspects, particularly information-related, can help librarians prepare their actions in the field of IL (Reece, 2005). These aspects explain how the mind acquires, modifies, or manipulates knowledge in different contexts. There are three aspects that condition, restrict, or direct the performance of mental processes and behaviors: knowledge, processing capacity, and affective orientation. Research in information behavior helps theorize IL in explaining and interacting with cognitive processes, behaviors, and feelings, and together they enable the individual in information skills (Hepworth & Walton, 2013). IL can be seen as a professional construct to provide skills and competencies that

model informational behavior. In this sense, supporting intellectual development is a priority, so that the student has the skills and competencies to deal with both academic and professional contexts successfully. The learning process includes facets, dispositions, and the development of complementary attitudes (Hepworth & Walton, 2013). They are organized around sequential, and logical steps, supported by a reflective predisposition about learning, that starts from simple to complex, and "partial tasks support complex learning and the increasing complexity of tasks corresponds to a gradual decrease in teacher guidance and support so that at the end of the process students are autonomous and proficient" in the skills worked (Cruz et al., 2016, p. 237). Thus, it is possible to associate in detail, the various stages of CT to the conceptual frameworks proposed by ACRL (2016) that structure IL teaching (Table 1).

Table 1. Problem Solving Steps / Conceptual Frames for Information Literacy

Critical Thinking Phases	Information Literacy Conceptual Frames
Understanding the problem – It is necessary to understand the operationalization and design problems to be solved (what is known, what hypotheses already exist, is it possible to test?).	**1. Authority is constructed and contextual** – The need to keep an open mind, be aware of critically evaluating the content, and recognize that there are necessarily problems with the traditional notion of information authority. **2. Information creation as a process** – Critical analysis and evidence search.
Developing a plan – Finding a link between the empirical hypothesis and current knowledge gaps (are there any ideas, projects, or similar?; Is it possible to arrive at a hypothesis that is easy to test?; Can a solution be designed?)	**3. Information has value** – Information can be approved by economic and political research and can be bought and sold. May appear free, but not be. Willingness for personal resources to keep up to date. **5. Scholarship as Conversation** – Academic activity occurs at several levels, the appreciation of the content that emanates from the user, and the understanding that the responsibility for academic creating depends on the contribution of various mechanisms and other types of participation in science.
Assessing and using the results – Examine the design obtained (can we simulate the result? Can we use the data to test other hypotheses? Can we validate the initial hypothesis?)	**4. Research as Inquiry** – Persistence, adaptability and flexibility, the practice of CT, and the recognition that learning and discovery are error-based processes. **6. Searching as Strategic Exploration** – Persistence, adaptability, and flexibility, recognizing the value of navigation and information retrieval methods, understanding that the first research attempts do not always work.

Source: Adaptation from ACRL (2016) and L. Garcia-Marques e T. Garcia-Marques (2016).

It becomes clear that both IL and CT constructs influence also both learning and research strategies. Byrnes and Bernacki (2013) argue that individuals seek information because it helps them to fulfill a goal. Aspects like knowledge, processing ability, and values, change

with age, and these changes lead to differences in the type of information searched, and in the way information is interpreted and used. To know the cognitive characteristics that mold library users' can help information professionals be more effective in the training offered. Using it in a meaningful way, whether in a library context or for personal purposes, is always contextual and disciplinary. The dispositions and attitudes that go along the teaching-learning process must focus on students' preferences regarding how they learn. In the current debate, IL is already recognized as crucial to empower individuals through CT skills development, providing them with the conceptual tools necessary to face the challenges of a more complex and rapidly changing information world (Vezzosi, 2004; Willingham, 2019).

3. Methods

We selected a convenience sample of respondents representing different disciplinary areas. Selected participants are academic librarians from Education, Psychology, and Health Sciences areas. The set of three interviewees corresponds to one male and two female higher education professionals, aged between 46 and 59 years old, with more than ten years of teaching experience. As a qualitative approach, an exploratory interview-based methodology was selected for this study, to open up the possibilities of expression, which are consistent with the object of study, and also because of interviewees' experiences (Brinkmann, & Kvale, 2014). Herein, a structured written interview was used, focusing on teaching experience in higher education. Similar to previous studies, which have already addressed the overlaps between CT and informational competence (Carvalho & Morais, 2017; Cruz et al., 2016; Kong, 2014; Vezzosi, 2004), we sought to list the converging aspects of these two constructs (Table 2), to present the theoretical framework for the study.

Framing various factors - metacognition, reflection, analysis, evaluation, inference or use, as well as dispositions, applied to information management -, the questions were the following, applied to the IL teaching experience:

[Metacognition]	1. What strategies do you include to verify the student's awareness of his/ her cognitive process, namely for problem-solving?
[Reflective Discovery]	2. What exercises do you use to promote judgment and reasoning in the informational context?
[Analysis]	3. How do you recapitulate knowledge and skills trained in increasingly sophisticated exercises to refine research questions or use more advanced research methods?
[Assessment]	4. How are tasks performed to assess credibility, relevance, logic, and bias in the information?
[Inference/Use]	5. How do you verify the students' learning about the importance, relevance, and pertinence of the information to interpret facts and organize ideas?

[Provisions] 6. What criteria do you consider to evidence preferences, attitudes, intentions, and learned abilities to deal with information?

The interview guide was sent individually by e-mail, to the convenience sample selected from participants of a Project in Information Literacy, all of whom are practitioners. In January 2022 the responses were collected. Respondents were informed of the purpose of the interview and had access to the questions beforehand.

Table 2: Converging concepts

Main concepts	Critical Thinking	Information Literacy
Metacognition	Knowledge and awareness of your consciousness, as well as an application of these diseases for learning or solution of placements.	Awareness and understanding of each person's thought processes (the way a person apprehends and processes information, considering consciousness and way of learning).
Reflective discovery/ judgment	Understand the nature, limits, and certainty of knowledge, and how this can affect the way to defend their judgments and reasoning out of context; the opposite of what you know.	The integrated skill set encompasses the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and ethically participating in learning communities.
Analysis	The ability to extract an argument and identify the role each projection plays in no argument (e.g. central claim, support, objection, or rebuttal), the source of each projection, and the balance of the overall argument.	The research spectrum ranges from simple questions that rely on basic knowledge recaps to increasingly sophisticated skills to refine research questions, use more advanced research methods, and explore more diverse disciplinary perspectives.
Assessment	The ability to assess the strength of an argument based on the credibility, relevance, logic strength, and bias of its propositions.	The appropriate response of formats to read, see, hear or experience; the structure presented and the adequacy of sources in terms of expertise, reliability, timeliness, perspective, and quality, concerning the information need.
Inference/ usage	Ability to gather analyzed and evaluated preventive evidence to reach a reasonable conclusion or develop an alternative and equal logical force, conclusion, or argument based on available evidence.	Determining importance, relevance, and relevance, deciding on sufficiency, interpreting facts and organizing ideas, and sharing with a community.
Provisions	Tendency or range towards, or about which, I precious or inclined to develop a certain critical thinking skill.	Tendency to act or think in a particular way, a disposition is a set of preferences, attitudes, and intentions, as well as a set of capabilities that allow preferences to materialize).

Source: Adaptation based on ACRL (2016), Dwyer (2020), and Kuhlthau et al. (2007).

4. Results and Discussion

Qualitative content observation is the method to analyze the interviews answers, from Education [R1], Psychology [R2], and Health Sciences [R3]. Regarding metacognition, all interviewees agreed that this is enhanced by searching in databases, with feedback from the trainer, and the repetition of the procedure autonomously. Concerning reflection, all the interviewees mention the comparison. Comparing sources results, search engines, and after that select, and evaluate important results, as well as guiding the search with a script – problem, keywords, planning, selection, evaluation of results, are important to reflection [R3]. Regarding analysis, it is understood that students exercise this ability using filters, different sources, different search strings to compare results [R1], connect ideas, contrast different opinions, examine new experiences, observe other processes feedback in teamwork, and give feedback [R2]. They also observe the results and rephrase the questions, setting steps for a new survey, repeating the exercises with the new knowledge achieved. Assessment requires the use of filters, different sources and search strings to compare results [R1] and understand their importance [R3]. It also implies a focus on credibility, relevance, logic, and information bias. Present and defend opinions, make value judgments about information, observe the validity of ideas or the quality of work based on some criteria, leads to autonomy [R2] and supports the assessment quality. As for inference, it is important to mention the importance of interpretation, understanding, and contextual use, as well as fluency in speech, to refer to and support one's ideas [R3]. Finally, when asked about provisions, the interviews choose resilience and persistence in facing frustration, curiosity, interest, purpose, deliberate practice, as well as CT, evaluation, rigor, and zeal.

In line with the literature (Weiner, 2011; Wertz, et al., 2013; Grafstein, 2017; Zou'bi, 2021), the combination of IL and CT teaching strategies proves to be effective, particularly when associated with curriculum, because it adds profound understanding, assuring significative learning. Students can benefit from converging strategies and growth in autonomy and self-regulation, through more comprehensive and complete training, carried out on several fronts, particularly when dealing with digital information (Goodsett, 2020; Kong, 2014; Reece, 2005). The learning process to acquire information skills must be supported by the recognition of the need for information, and planned based on locating good research sources. This leads to an appreciation of the significant information retrieved in the research. Interpretation is a crucial step in the process of organization of information, and the way it should be communicated. This strategic exploration that characterizes information research must be scrutinized and evaluated towards the questions and research objectives initially made explicit through the information needs. The ethical framework in the good use of information culminates the process, and promotes the replicability of the used strategies. All the main concepts of CT were addressed by these librarians in their IL teaching experience.

5. Conclusions

The dialogue between CT and IL reinforces a chain of events that empowers students to develop skills that can potentially be used in any context. It can be concluded that this is a fruitful and fundamental relationship for the academic students' training, whose purpose must be embraced by librarians and teachers in a collaborative and shared way. The specificity of curriculum content is a feature that consolidates reasoning, anchoring CT, and serves as a basis for IL teaching. Developing skills over the years, in a gradual, iterative, and the increasingly complex way seems to be the key to the successful articulation of these two concepts. Learning based on IL is essential to guarantee the personal and professional growth of individuals and, therefore, of society, since, as people have access to better sources of information and can use them critically, objective, consensual, responsible, and reasonable, puts them in a position to make better decisions than those who do not have this access or who have not developed information skills.

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