Studi e ricerche

Summarizing through the lens of cognitive load theory. Implications for education and teaching methods

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Abstract: Recognizing the complex and specific nature of summarizing, as well as its critical importance in education, necessitates the implementation of appropriate and targeted teaching-learning trajectories to develop summarizing abilities.
This paper draws from an in-depth analysis of research grounded in cognitive load theory – which sheds light on the capacities and constraints of human cognitive architecture – to examine the learning mechanisms and information processing involved in summarizing.
We outline the implications of this theoretical framework for educational and school settings, addressing both the design of a comprehensive teaching-learning path for developing summarizing skills and the identification of the most effective teaching-learning strategies and instructional materials for such a path.

Keywords: summary writing, cognitive load theory, summarizing skills, teaching-leaning trajectories, teaching-learning strategies.

1 Summarizing: cognitive, linguistic, and affective-motivational features

To summarize a text, as the term's Latin root – *re-ad-sumere* – suggests, means to take on board, survey, or reabsorb the key information in a text – whether oral or written – making it one's own in order to reformulate and organize it into a new, more concise text.

The etymology of the word clearly indicates a process that cannot be univocal, despite requiring a certain degree of fidelity and adherence to the original text. Thus, the act of summarizing varies from person to person, as a function of how different individuals appropriate, rework, and reformulate a text to produce an original rendering. It also varies in terms of how accurately the information is expressed and presented to others, an aspect that becomes more critical as the requested degree of conciseness increases (Natoli, 2014). The purpose of the summary and the intended recipient – whether oneself or an interlocutor – further shape the communicative act (Benvenuto, 1987), such it reflects the summarizer's subjective outlook within a specific relational and situational context.

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Indeed, summarizing a text involves engaging in a continuous process of constructing and communicating the meaning of reality, of which the text represents a fragment (Piu *et al*., 2022; Angelini, 2016). This process encompasses linguistic, cognitive, and affective-motivational features (Boscolo, 2006; Balboni, 2006; Bateson, 1977; Levorato, 2000; Piu *et al*., 2022).

Thus, summarizing reveals the summarizer's identity, which is reflected in their interpretation of the text and the aspect of reality it depicts. This identity is applied in service of the self, others, and the summarizer's broader life context, within an ongoing process of communication and meaning making (Piu *et al*., 2022; Angelini, 2016). Written summaries, in particular, can foster both intra- and inter-mental reflection, enabling individuals to form new connections with the real world, as well as with other texts, people, and contexts, in an iterative process of mutual influence.

Summarizers' prior conceptualizations of the world and self, along with affective and emotional factors, inform their expectations about the content of a text, shaping how they read, interpret, and reformulate it. In turn, the textual content influences their conceptualizations. Additionally, summarizers' sense of efficacy – defined as individuals' beliefs about their ability to understand, write, and produce a certain type of text (Hidi *et al*., 2002; Zimmerman & Bandura, 1994) – affects both their motivation to engage in reading and writing and the potential quality of the outcomes (Bruning & Horn, 2000; Pajares, 2003).

Similarly, mental schemas – that is to say, the organization and representation of prior knowledge – are recalled from memory before and during reading or listening, prompting interpretative hypotheses that are projected onto the text. This process enables individuals to integrate incoming information and arrive at a representation of the text's meaning. These interpretations will flow into the summary and, in turn, influence the individual's initial schemas (Boscolo, 2006; Balboni, 2006; Kintsch & van Dijk, 1978).

In their revised version of Bloom's Taxonomy (1956), Andersen and Krathwohl retained the original number of categories, six, but with some important changes (Andersen & Krathwohl, 2001); particularly, Bloom's *Comprehension* category was renamed *Understand* and broken into seven subcategories, the fourth of which was *Summarizing*:

> Summarizing occurs when a student suggests a single statement that represents presented information or abstracts a general theme. Summarizing involves constructing a representation of the information, such as the meaning of a scene in a play, and abstracting a summary from it, such as determining a theme or main points. Alternative terms are generalizing and abstracting (Andersen & Krathwohl, 2001, p. 73).

From a cognitive-linguistic perspective, the process of summarizing operates on multiple levels, starting from a surface-level linguistic representation of the text to a deeper propositional representation that organizes semantic units into micro- and macro-structures. Both types of representation consider the text's de-

tails and overall structure, while relying on inferential processes to fill in gaps and recognize the connections between sentences. This process enables the integration of various pieces of information into a coherent whole, leading to the formation of a global mental representation. This representation is then incorporated into the reader's knowledge system, involving both semantic memory and relevant personal experiences (Van Dijk & Kintsch, 1983).

Summarizing therefore entails the flexible integration of lower-level and higher-level systems, characterized by the interplay of interactive and recursive mental processes (Bazzanella, 2014; De Mauro, 1985). These processes are more complex in reading comprehension and written production compared to listening and speaking. In reading, they enable the integration of low-level information – such as graphic, lexical, syntactic details – with higher-level knowledge, including an understanding of textual structures or of the field referred to by the text (Cardinale, 2015). In writing, these processes guide the planning, organization, and revision of texts, as well as the linguistic and rhetorical choices involved in their composition (Cardinale, 2015), again in an interactive and recursive manner.

Hence, summarizing is a complex process, akin to research, information processing (Bereiter-Scardamalia, 1987) and problem solving (Hayes-Nash, 1996), which involves making mindful decisions.

The outcome of this process is the summary, understood as a mental representation of the source text. The summary conveys the original sense and meaning without distortion, while also reflecting the personal style of the summarizer in identifying, organizing, and hierarchizing information units (Serianni, 2003), as well as in planning and reformulation. The process also requires attention to linguistic and expressive aspects, such as lexicon (use of synonyms and hypernyms), morphosyntactic structures, cohesive mechanisms, and maintaining coherence across the text at both local and global levels (Serianni, 2003).

In line with this perspective, which highlights the complexity of the cognitive, affective, and linguistic processes involved in making a summary, the paper presents and discusses the learning and information-processing mechanisms that underpin summarizing, drawing on cognitive load theory and its focus on human cognitive architecture (Sweller, 2003). The paper also outlines the implications of these mechanisms and processes for education and teaching/learning, offering insights that may be useful for designing teaching-learning trajectories and targeted teaching strategies for developing summarizing skills. The topic will be addressed considering the transversal nature of the didactic practice across all school levels, without delving into the specifics that characterize the different educational stages and various type of texts.

The aim of this article is to offer theoretical and methodological insights into the teaching of summarizing as a distinct form of writing, a topic often overlooked in research, which has traditionally focused more on summarization as a manifestation of the comprehension process (Brown & Day, 1983; Brown *et al*., 1983; Winograd, 1984; Anderson & Hidi, 1988; Lumbelli, 2009) and as an aid to the

comprehension and production of texts. The article also invites reflection and debate on the specifics of summarizing in educational and school settings, where it is often taken for granted, treated as preparatory to the development of other writing skills, oral production, or comprehension, or simply viewed as a marker of language competence and awareness.

❷ Shining a spotlight on cognitive load theory: its evolution and distinctive features

The complex and specific nature of summarizing, as just outlined, together with its critical importance in education, demands teaching-learning trajectories and teaching strategies informed by a comprehensive understanding of the learning and information processing mechanisms involved in making a summary.

Cognitive Load Theory, with its emphasis on human cognitive architecture (Sweller, 2003), provides a valuable conceptual framework for summarizing, as it elucidates how the processing load induced by learning tasks can affect students' ability to process new information and encode knowledge in long-term memory.

This theory was first proposed in the 1980s as a theory of instructional design based on several well-known features of human cognitive architecture (Sweller *et al.*, 1998). Initially, it emphasized knowledge that had been well-established for decades prior to its introduction, such as the characteristics of working memory, long-term memory, and the relationships between them. However, these insights had a limited impact on instructional design, which cognitive load theory was intended to inform and enhance. Over the following twenty years or so, new theoretical developments and empirical studies led to a more complete account of the theory, as well as to the identification of new directions for future research (Sweller *et al.*, 2019).

2.1. *General aspects*

In general terms, cognitive load theory views human learning as the construction and automatization of mental schemas, understood as representations of knowledge (Sweller, 2003). It emphasizes the key role of working memory in either facilitating or hindering this process.

Unlike long-term memory, which serves as the repository for all acquired knowledge and skills stored as schemas, working memory may be seen as a "temporary warehouse". This warehouse is transited both by information from the environment on its way to being encoded in long-term memory, and by information retrieved from long-term memory that must interact with environmental inputs to complete a task or solve a problem.

Working memory plays a crucial role in receiving, processing, and transforming new information into schemas to be stored in long-term memory. It can fa-

cilitate learning if it is permitted to function properly. In other words, its limited capacity – in terms of both the quantity of information it can hold and the length of time for which this information can be retained – must be taken into account.

The organization of working memory is extremely complex. It comprises several coordinated subsystems, which function under the supervision of a central executive, the *attentional control system*. More specifically, working memory is known to include two separate, independent but interconnected, subsystems: one for visual information and one for verbal information (Baddeley, 1990). Before accessing semantic memory, information is processed separately in echoic memory and iconic memory, each with capacity limits that can best be managed by efficiently coordinating their use.

From this perspective, the cognitive load during a given learning task is defined as the amount of work imposed on working memory, in terms of information storage and processing. It is influenced by additional factors such as the interaction between the learner's characteristics, the content, and the instructional format.

Cognitive load can be divided into three types: extraneous cognitive load, intrinsic cognitive load, and germane cognitive load (Sweller *et al.*, 1998).

Extraneous cognitive load comprises all cognitive input to working memory that does not contribute to learning. It arises from content that is superfluous or irrelevant to the learning task and may divert or divide the learner's attention. To foster learning, therefore, it is beneficial to minimize the use of superfluous and extraneous information – whether textual, visual, or auditory – that might distract students from information relevant to the learning task (Sweller *et al.*, 1998).

The second type of cognitive load, intrinsic load, pertains to the workload imposed by the inherent complexity of a given task. This complexity can vary based on the student's prior expertise.

Subjects with a low level of expertise, who lack the necessary knowledge and skills for the task, may struggle to process and rework information. It might be necessary to facilitate their understanding by, for example, breaking down the task or presenting it as a sequence of steps (Sweller *et al.*, 1998).

On the contrary, subjects who possess the necessary knowledge and skills – specifically, the mental schemas required to handle the task – can process information effectively without overloading their working memory (Sweller *et al.*, 1998). The support strategies used for students with low expertise may be ineffective, redundant, or even harmful for students with high expertise, as they could make the task less challenging and lead to demotivation.

The third type of cognitive load, known as germane load, is that associated with actual learning. It also depends on affective and motivational factors, as well as on beliefs and expectations that influence how much mental effort a student is willing to invest in learning activities.

Early work on cognitive load theory has thus provided an account of three basic types of load, prompting recommendations for making educational interventions more effective. These include reducing extraneous cognitive load, adjusting

intrinsic cognitive load to match the student's level of expertise, and fostering the conditions for a high germane cognitive load (Sweller *et al*., 1998).

2.2. *The effects of cognitive load*

To strengthen the theory, studies have focused on the expected learning outcomes associated with teaching methods informed by the theory, thereby offering insights into the effects of cognitive load (Sweller *et al*., 2019). Specifically, research has explored how germane cognitive load may be increased and channeled into the construction, automation and refinement of mental schemas that may then be flexibly adapted to different situations (Sweller *et al.*, 2019).

Such studies have proposed tasks of varying complexity, including problems without clear goals, completion tasks, and tasks with effective practical examples.

Tasks of variable complexity – that is to say, problems that appear different on the surface yet share similar underlying structures – help facilitate the development of flexible mental schemas, based on general principles that may be applied across different settings, provided there are sufficient working memory resources to manage the information and its interactions (Paas & Van Merriënboer, 1994; Sweller *et al*., 2019).

Learning tasks without predefined goals encourage students to focus on finding solutions for each identified problem state, rather than attempting to solve the entire complex problem as with conventional goal-oriented tasks. This approach reduces cognitive load and fosters greater concentration on the solutions required to build knowledge than on addressing the problem as a whole (Sweller & Levine, 1982; Sweller *et al*., 2019).

In completion tasks, on the other hand, students are asked to complete part of a problem and are thus implicitly induced to focus on what they need to learn. This type of task is reportedly more advantageous than the practical examples described below. In this case too, there is a reduction in cognitive load, allowing students to gradually progress towards solving problems (van Merrienboer e Krammer, 1990; Sweller *et al.*, 2019).

For less experienced students, research has explored the benefits of well-designed practical examples that provide a complete solution to the problem which students must study carefully. These examples are structured to minimize cognitive load, avoiding the need for students to mentally integrate different sources of information (the divided attention effect) or redundant information (the redundancy effect) (Renkl, 2014; Sweller *et al*., 2019).

The divided attention and redundancy effects, which align with Mayer's cognitive theory of multimedia learning (2001), confirm the importance of selecting appropriate formats for presenting information to students, as this can significantly influence learning outcomes. The available evidence suggests that irrelevant texts, images, and sounds (which are unrelated to the learning task) hinder learning (Landriscina, 2007). Conversely, in educational communication – whether textual

(oral and written) or visual – using cues that reduce cognitive load and help focus attention is beneficial. This includes using expedients such as titles, highlighted words, dividing texts into paragraphs, and other similar techniques (Calvani, 2009).

Similarly, separating elements that need to be processed together for comprehension creates unnecessary cognitive load, leading to the divided attention effect. In other words, learning is hindered when students must divide their attention between two sources of information, both essential for understanding. A common example is when a written text is spatially separated from its corresponding image. However, when students are presented with two interdependent sources of information, learning improves if one source is presented visually and the other auditorily (Mayer, 2001; Landriscina, 2007).

Further research has built upon these initial findings, enriching the theory with the introduction of additional effects, some of which are defined as compound effects. These compound effects, understood as higher-order phenomena, moderate the impact of the simpler effects previously presented and discussed (Sweller *et al*., 2019).

The cognitive load effects observed in less experienced students have not been found in more experienced students. Similarly, principles that may be relevant at the beginning of a long educational journey can become counterproductive in later stages, once students have gained sufficient expertise. This is based on the well-known expertise reversal effect (Kalyuga *et al*., 2003; 2012) and the instructional guidance fading effect (Renkl e Atkinson, 2003; Sweller *et al*., 2019).

Furthermore, teacher demonstrations of how to approach a problem using worked examples can enhance learning, especially for students with low expertise, as long as the total cognitive load does not exceed their available capacity. Similarly, as students gain expertise, it becomes possible to encourage mental imagery processes related to concepts or procedures, which can support information processing in working memory (Cooper *et al*., 2001).

According to the collective working memory effect, students can leverage the knowledge of group members to complement their own, creating a more effective collective workspace that functions as a single information-processing system (Sweller *et al*., 2019). The efficiency of group learning compared to individual learning depends on the trade-off between the benefits of shared information processing and the transaction costs of communication and coordination (Kirschner *et al*., 2011).

2.3. *The extension of cognitive load theory*

An important extension of cognitive load theory has emerged during its development, focusing on the design of long-term training programs, such as entire courses or curricula. This extension is known as the 4C/ID design model, or the four-component instructional design model (van Merriënboer & Sweller, 2005; van Merriënboer, 2013).

This model focuses on the design of comprehensive, long-term training programs aimed at developing complex skills. It distinguishes between 'recurrent' constituent skills, which can be developed through routine activities, and 'non-recurrent' skills, which involve problem-solving, reasoning, and decision-making. The model's design comprises four key components: learning tasks, supportive information, procedural information, and part-task practice (van Merriënboer & Kirschner, 2018).

The first component involves learning tasks primarily based on real-life situations, through which students acquire and learn to coordinate both recurrent and non-recurrent skills. These tasks increase in complexity as students develop new skills, which helps to manage intrinsic cognitive load, and are designed to offer a high level of variety (van Merriënboer & Sweller, 2005; Sweller *et al*., 2019). At each level of complexity, students receive support and instructional guidance, which gradually decreases before being reintroduced at the beginning of the next level (van Merriënboer & Kirschner, 2018).

This initial component is complemented by supportive information, which helps students perform specific tasks and addresses theoretical aspects in a systematic way. To enable students to form knowledge structures in working memory that can be activated during complex tasks, it is recommended that this information not be presented simultaneously with task execution. This prevents excessive cognitive load, given the highly interactive nature of supportive information (van Merriënboer & Kirschner, 2018).

The last two components, procedural information and part-task practice in selected aspects of recurrent tasks, are designed to enhance automaticity. Procedural information typically involves practical instructions and corrective feedback, while part-task practice focuses on specific aspects of recurring tasks. Key information is presented during part-task execution to consolidate skills and free up cognitive resources for addressing non-recurrent tasks (van Merriënboer & Kirschner, 2018).

In sum, cognitive load theory is a well-established theoretical framework designed to inform practical applications across a range of educational contexts, while remaining open to future developments (Sweller *et al*., 2019).

❸ Educational and didactic implications for the teaching of summarization

Recognizing the resources and constraints of the architecture of the human mind, as well as the learning mechanisms and information processing processes identified by cognitive load theory, can be useful in outlining the task of summarizing and the educational implications that may arise from it.

Summarization, as a complex task, can be classified as a form of problem-solving, as it imposes an intrinsic cognitive load that varies based on an individual's current expertise. It requires the simultaneous activation of mental and

interpretative frameworks at both local and global levels of the text, with inferences playing a central role. This process is accompanied by the transformation and processing of information, demanding the integration of logical-inferential and linguistic skills at various levels, as well as revision skills to recursively rework the text (Bereiter & Scardamalia, 1987; Hayes & Nash,1996; Piu *et al*., 2022).

Having taken stock of the complexity and specificity of summarization, we may conceptualize the development of summarizing abilities as a process of constructing and automating schemas – defined as structured representations of knowledge stored in long-term memory – and recognize that the construction of these schemas requires the active engagement of working memory.

The educational and didactic implications that arise from this understanding can be informed by evidence from cognitive load theory, guiding the formulation of key principles for making educational and instructional choices.

More specifically, cognitive load theory offers targeted guidance regarding both the overall structure of teaching programs for developing summarization skills and the most effective teaching strategies and materials.

For example, organizing a comprehensive teaching-learning trajectory based on the 4C/ID model presented in the last section would entail systematically and progressively developing each of the sub-skills that contributes to summarization ability.

The focus here is specifically on the sub-skills outlined below, which can be categorized into macro-areas corresponding to the cognitive processes involved in summarization and the related linguistic aspects (Balboni, 2006). These areas are organized along a continuum that ranges from comprehension of the source text to production of the summary text, with an intermediate phase referred to as the interface. Each macro-category – comprehension, interface, and production – can be further divided into learning units aimed at developing specific skills (Piu, 2017; Angelini & Piu, 2023).

Thus, the macro-category of text comprehension encompasses the processing of superficial linguistic features, including both surface-level aspects (such as lexical and semantic interpretation) and deeper conceptual decoding (such as inferences and encyclopedic knowledge).

The intermediate macro-category of "interface" includes:

- identification of the units of information contained in the source text, based on high-level interpretative and mental schemas (scripts, frames);
- selection of the primary information units that, based on the instructions assigned, will be incorporated into the summary text, and their ordering based on text type (in the case of narrative texts, typically following the chronological sequence of the original text);
- identification of a hierarchy among the units of information, with accessory information placed at lower levels because it is descriptive, exemplary, redundant, or marginal.

The final macro-category requires the production of a target summary text (oral and written). Producing this oral or written text requires careful planning

and reformulation, with a focus on linguistic and expressive elements, including lexicon (use of synonyms and hypernyms), morphosyntactic features, cohesive mechanisms, and both local and global coherence.

The principle of gradual progression also applies to the complexity of the source and target texts used as teaching materials for students, considering various dimensions (Piu, 2017):

1. focus on the "source text":
   - 1a mode of access to the original text: oral versus written;
   - 1b intra-linguistic characteristics of texts based on readability parameters, including statistical criteria (text length, sentence length, or word length); lexical components (use of basic or advanced vocabulary); and the use and distribution of verb tenses;
   - 1c information density and explicitness, including the need to make inferences, activate completion procedures, reinterpret information distribution, and decode indicators of analepsis and prolepsis;
2. focus on the 'target text' (the summary):
   - 2a method of delivering the summary: oral or written;
   - 2b presence or absence of constraints (e.g., indication of a minimum and/or maximum number of words);
   - 2c presence or absence of prohibitions on the use of certain structures, forms, or templates (e.g., a requirement to rephrase the target information using different words from those in the original text).

The gradual progression in both the learning trajectory and the selection of texts facilitates ongoing assessment of the students' cognitive resources and fosters greater automation of the target processes involved in summarization. This helps ensure that these processes are readily available for summarizing tasks without overloading working memory. Furthermore, as students master each sub-skill, support and guidance for the related learning tasks can be gradually reduced, in line with the principles of expertise reversal and the fading of instructional guidance.

The teaching-learning trajectory can alternate challenging higher-level tasks that draw out the communicative power of summaries and foster reflection on language, with tasks designed to systematically address and periodically review the theoretical underpinnings of each sub-skill and finally with tasks designed to automatize and consolidate the mastery of individual sub-skills.

The first type of task involves the need to represent, write, and revise text to communicate and interact, as well as the enjoyment of doing so within communities of interpreters. In such communities, students can question the meaning of texts, compare interpretations, and share their approaches to engaging with and reflecting on texts. This promotes collective learning and helps students to manage and coordinate both recurrent and non-recurrent aspects of summarizing.

These tasks are primarily based on real-life or simulated tasks, offering students the opportunity to navigate increasingly complex and unfamiliar scenarios and problems, and may be focused on specific target sub-skills (Piu, 2022; Piu *et*

al., 2024). Examples include choosing texts for publication based on how well they present the key points in a story, building a time machine to represent the spatial and temporal information that may be inferred from reading a text, creating an exhibition with a sequence of images to complete a story, miming the inferred internal states of story characters, etc.

The second type of task facilitates the in-depth study of key concepts, requiring a focused and separate exploration of the theoretical aspects of summarization, including the characteristics of the text type under analysis, inferences, key information and sequences, connectives, direct and indirect speech, the morphosyntactic features of the text, and text coherence and cohesion.

Tasks targeting automatization and consolidation aim to increase cognitive load by encouraging the practical application of key schemas and concepts. This is achieved via demonstrations, exercises, exercises in self-explanation, and the completion of part-tasks. The goal is to automate comprehension processes, enhance students' capability to analyze and revise both structured and unstructured texts, and transfer textual production skills via guided learning.

In other words, the goal is not to overwhelm novice writers with complex tasks or problems that generate an excessive cognitive load. Rather, the focus should be on activities that encourage these students to review how they handle information and balance form with content (Angelini & Piu, 2023). This should occur in the course of a gradual teaching-learning trajectory, with each stage specifically targeting the development of individual sub-skills. The approach should prioritize meaning-driven writing that enhances and raises awareness of both interpersonal and intrapersonal communication processes, while systematically addressing the key theoretical underpinnings of summarization skills (Benvenuto, 1987; Piu, 2017; Piu, 2022).

The selection and use of the outlined tasks must respect the principle of flexibility by considering students' individual learning needs and cognitive and affective-motivational characteristics, as assessed at the outset of the learning process and continuously monitored throughout. This ensures alignment between task complexity and individual students' zones of proximal development, which are influenced by their level of expertise. It also fosters active learning that is explicitly focused on the key concepts and principles of summarization, while minimizing extraneous cognitive load from materials and teaching strategies. This approach optimizes germane cognitive load based on the student's expertise and motivational factors.

Tasks must therefore be adapted and adjusted to suit each student's zone of proximal development (Schotz & Kurschner, 2007; Vygotsky, 1962). This refers to the gap between a student's current level of development and their potential level, which can be attained with the assistance of others – whether adults or more competent peers. Additionally, affective-motivational factors, especially perceived self-efficacy, can either facilitate or hinder performance in summarization tasks.

In conclusion, the application of cognitive load theory to the teaching of summarization may be distilled into a set of guidelines, which reflect the following key principles (Piu, 2017):

- *graduality,* to be applied both throughout the overall learning trajectory and within each learning unit, as well as in the selection of source and target texts;
- *focus* the teaching-learning path on the target sub-skills, for which specific learning units may be designed;
- *variety* of teaching strategies and tasks, with a view to ensuring that the students can flexibly apply and coordinate the skills they have acquired, encouraging peer-to-peer cooperation, discussion, and interaction with the mediation of the teacher, fostering explicit awareness of the meaning-making process and its motivational drivers, and inducing processes of reflection and self-explanation;
- *flexibility*, in terms of adapting feedback to the students' current levels of expertise, such that the regulation of learning occurs within students' individual proximal development zones (Vygotsky, 1962), thereby enhancing their perceived self-efficacy and motivation to learn.

4 Conclusions

The complexity and specificity of summarization, which spans cognitive, affective-motivational, linguistic, and communicative dimensions, demands the design of a structured teaching-learning trajectory with the characteristics outlined in the literature on summarization. Conceptualizing the development of summarization skills as the construction and automatization of mental schemas implies that it is also relevant to apply the principles of cognitive load theory to the teaching of summarization.

The application of cognitive load principles, consistently with the research methodology that has identified them, could lead to the formulation of new hypotheses, which may be tested both in relation to individual effects and the overall structure of a teaching approach. This may further contribute to the ongoing development of cognitive load theory.

Finally, the design and testing of a comprehensive approach to summarization can serve as a valuable lens through which to understand the broader organization of school curricula, of which learning to summarize is a key component, considering the development of cognitive awareness (Serianni, 2010), language skills and transversal competences (Benvenuto, 1987; Piu *et al.*, 2022).

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