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Review articles

Self-regulation of writing in an educational context: a thematic synthesis of recent studies

Autorregulação da escrita em contexto educacional: uma síntese temática de estudos recentes

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Abstract

This article aims to analyze the scientific production on the use of self-regulation strategies for the development of written production. A rapid systematic review was conducted using thirteen studies that met the inclusion criteria, drawn from the Web of Science and Eric databases and published between 2020 and 2024. The empirical material was subjected to thematic synthesis analysis. The studies, conducted in various countries, in the initial levels of schooling, highlighting the Self-Regulated Strategy Development (SRSD) model as the most used approach in interventions. The strategies frequently identified involve planning, goal setting, self-monitoring, and instructional practices of support and gradual autonomy. The main contributions mentioned highlight the significant improvement in text quality (structure, coherence, vocabulary use, length of produced texts), development of skills related to planning, monitoring and self-evaluation, as well as the improvement in motivation and self-efficacy in writing.

Keywords: self-regulation; writing performance; SRSD; rapid systematic review; thematic synthesis.

Resumo

Este artigo tem como objetivo analisar a produção científica sobre o uso de estratégias de autorregulação para o desenvolvimento da produção escrita. Foi realizada uma revisão sistemática rápida, utilizando treze estudos que atenderam aos critérios de inclusão, das bases Web of Science e Eric, publicados no período de 2020 a 2024. O material empírico foi submetido à análise de síntese temática. Os estudos, realizados em diferentes países, concentraram-se nos níveis iniciais de escolarização, destacando o modelo Self-Regulated Strategy Development (SRSD) como a abordagem mais utilizada nas intervenções. As estratégias frequentemente identificadas envolvem o planejamento, a definição de metas, o automonitoramento e as práticas instrucionais de apoio e gradual autonomia. As principais contribuições mencionadas destacam a melhoria significativa na qualidade textual (estrutura, coerência, uso de vocabulário, extensão dos textos produzidos), desenvolvimento de habilidades relacionadas ao planejamento, monitoramento e autoavaliação, bem como a melhoria na motivação e autoeficácia na escrita.

Palavras-chave: autorregulação; desempenho na escrita; SRSD; revisão sistemática rápida; síntese temática.

INTRODUCTION

Writing is a fundamental skill in the 21st century, being crucial for continuous learning, employability, social and civic participation, as well as educational and professional success (Camacho; Alves; Boscolo, 2021; United Nations Educational, Scientific and Cultural Organization, 2011). This skill not only promotes clear and effective communication, but also demonstrates the ability to organize ideas, construct consistent arguments, and transmit knowledge in a structured way. Furthermore, it plays a central role in the learning process by supporting the development of reading comprehension, promoting self-awareness, and strengthening interpersonal communication (Camacho; Alves; Boscolo, 2021).

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Interest in studies dealing with the development of writing skills has grown in diversity and depth, justifying further research on the subject. Due to its cognitively challenging and time-consuming nature (Camacho; Alves; Boscolo, 2021), various researchers agree that writing is a complex and difficult skill to master (Harris et al., 2008; Graham; Harris, 2018; Kim, 2020), requiring continuous effort and years of practice to master it (Kellogg, 2008).

According to Sarikaya and Yilar (2021), writing, which is closely linked to the social and academic life of individuals, involves the integration of cognitive, sensory, and mechanical factors in the process. Acquiring this skill requires extensive experience, necessitating a long-term, lifelong learning perspective. This trajectory varies from one individual to another and, therefore, should be supported by guidance and monitoring from teachers (Bazerman et al., 2017).

Developing writing skills is a challenge for students from different parts of the world. Many of them face significant difficulties in their writing performance (Veiga-Simão et al., 2022). To mitigate these challenges, researchers have highlighted the need to develop theoretically grounded and empirically validated interventions. Such interventions seek to improve students' writing skills, contributing to the creation and consolidation of effective pedagogical strategies aimed at developing these skills (Graham; Harris, 2018; Harris et al., 2008; Harris; Graham, 2009; Veiga-Simão et al., 2022).

In this sense, the literature presents different teaching models to stimulate these skills, especially with the use of self-regulation strategies that include planning, monitoring, revision, and self-evaluation applied to text composition. One of these models is Self-Regulated Strategy Development, developed by Harris and Graham (1992), which stands out as one of the most effective evidence-based methods. International research has shown that explicitly teaching these self-regulation strategies leads to improved writing quality among students, and that skilled writers employ intentional cycles of planning, monitoring, and evaluation, resulting in more cohesive, coherent, and persuasive texts (Graham; Harris, 2018; Harris et al., 2008; Harris; Graham, 2016; Veiga-Simão et al., 2022).

The importance of self-regulation strategies for improving writing quality is highlighted, justifying this research. Therefore, this article investigates the following problem: What is the landscape of research on the use of self-regulated writing strategies in the educational context, based on studies published between 2020 and 2024? The objective, therefore, is to synthesize a set of studies, focusing on descriptive and analytical aspects, in order to investigate the main characteristics related to the levels of education, strategies adopted, main contributions and limitations of the research.

THE WRITING PROCESS AND THE ROLE OF SELF-REGULATION IN LEARNING

The production of a written text involves a vast set of cognitive processes (mental functions related to the acquisition, retention and management of knowledge) and metacognitive processes (awareness of one's own cognitive processes), interacting with affective, motivational, social, and cultural aspects (Bazerman et al., 2017; Harris, 2024). This management process represents a cognitively complex and demanding task, in which students commonly face difficulties, as it requires the integration of different skills, including reading, writing, and other linguistic abilities.

Skilled writing is a process that develops over time. "Competent writing requires meeting multiple demands (e.g., evaluation of the writing task; goal-directed problem-solving; command of skills and strategies; flexible, self-regulated use of the writing process)" (Harris, 2024, p. 2). These demands require effective self-regulation (Harris, 2024).

Bazerman et al. (2017) compare writing to a sophisticated art, whose intricate nature is widely recognized in practices such as sports, music, dance, and visual arts. Mastering any complex art requires a long learning process. This requires mastering resources, developing skills, and consolidating discipline and perseverance, while cultivating specific forms of attention, perception, reasoning, and creativity.

In this scenario, it becomes urgent to implement self-regulated writing programs that encourage students to actively manage their own learning process (González et al., 2017). Such initiatives should promote immersion in the compositional process, enabling them to

plan, monitor, and evaluate their productions consciously and strategically, with the eventual support of technological resources whenever possible. In this direction, the importance of self-regulation strategies to improve the quality of writing is highlighted (Veiga-Simão et al., 2022), understood as a set of actions that allow the student to systematically organize, monitor, and revise their text production process.

As highlighted by Veiga-Simão et al. (2022), the literature emphasizes the importance of developing, from the early years of schooling, the skills necessary for good writing performance. To this end, it is essential to promote the explicit teaching of two complementary dimensions: the writing process, which involves the organization and production of text, especially through learning self-regulation strategies, and the quality of the product, which encompasses mechanical and content aspects, such as structure and vocabulary.

Self-regulation is a cognitive or metacognitive process which contributes to the transformation of knowledge and the development of different skills in students (Graham; Harris, 2018). In the case of this study, we are dealing with writing skills. Effective self-regulation of writing involves the ability to: i) define goals and requirements appropriate to the writing task and take into account the characteristics of the recipient; ii) implement effective planning, formulation, and revision strategies to achieve these goals; and iii) monitor and regulate whether the previously defined goals have been achieved and whether the implemented strategies allow these goals to be achieved (Fernandez; Guilbert, 2024).

Self-regulation in writing can be understood as an active, cyclical, dynamic, and continuous process in which the student takes a leading role in their own development. This allows them to define specific goals to guide text production, develop autonomy and critical awareness of their own learning process, and reflect on the most effective strategies to achieve them. It involves the ability to plan (forecast), monitor (track), and evaluate one's own actions during the writing process, from the formulation of ideas to the final revision, adjusting thoughts, behaviors, and emotions intentionally and strategically (Bazerman et al., 2017; Harris, 2024). This process integrates different dimensions: cognitive (such as the organization of ideas and the use of linguistic strategies), motivational (such as engagement and self-confidence), and affective (such as the control of anxiety and frustration in the face of difficulties).

METHODS

This study was conducted as a rapid review, also known as a rapid systematic review (Grant; Booth, 2009; Tricco et al., 2015). This type of literature review constitutes a form of knowledge synthesis in which certain stages of the traditional systematic review process are adapted or simplified, while maintaining transparency and scientific rigor. It is an emerging methodology within the field of knowledge synthesis, developed to address the growing demand for evidence produced within shorter timeframes (Khangura et al., 2012). Furthermore, they can be conducted by a single researcher (Grant; Booth, 2009; Tricco et al., 2015), making them a viable and strategic methodological alternative, particularly in the educational context.

The investigative process involves a methodological approach focused on input, processing, and output, supported by a set of six interdependent cognitive operations: knowing, understanding, applying, analyzing, synthesizing, and evaluating (Levy; Ellis, 2006). To operationalize these cognitive dimensions, the review was conducted in accordance with the guidelines proposed by Coelho (2024)[1] which includes the following steps: i) problem identification; ii) selection and application of strategies; iii) data extraction and monitoring; iv) exploration, analysis, and synthesis of results; and v) writing the review. Chart 1 presents an integrated view of these stages, highlighting the functional correspondence between the systematic procedures described by Coelho (2024) in a non-linear manner and the cognitive operations outlined by Levy and Ellis (2006).

[1] It is worth noting that this is not intended to be a prescriptive procedure, but rather to recommend steps and clarify some of the key issues to consider for a rapid review that deals primarily with extremely broad domains of literature (data extraction protocols, quality assessment checklists, and synthesis methods). Its applicability will depend on the specific contexts of each research area, as well as the scope and breadth of the research.

Chart 1. Integration of the cognitive phases proposed by Levy and Ellis (2006) and the review stages outlined by Coelho (2024)[2].

Stage (Levy and Ellis, 2006)	Cognitive Phases	Corresponding Phases (Coelho, 2024)	Description
Input	1. Know the literature 2. Comprehend the literature	i) Problem identification ii) Strategy selection and application	Initial exploration of the theoretical framework, keyword searches, accessing, identifying, and understanding information sources, locating and selecting studies based on the adopted strategies, identifying the research problem, identifying key articles and emerging issues, and critically reviewing and analyzing the sources.
Process	3. Apply 4. Analyse 5. Synthesize	iii) Data extraction and monitoring iv) Data exploration, analysis, and synthesis	Application of criteria, screening of titles and abstracts, screening of articles, removal of duplicates, data collection and recording, description of study characteristics (mapping), use of a conceptual framework and analysis codes, critical analysis, and development of interpretive syntheses based on the collected evidence.
Output	6. Evaluate	v) Writing of the review	Knowledge production embodied in the writing of the review; a transparent and responsible summary, with an emphasis on the findings; critical evaluation of the findings; assessment of the reliability and broader applicability; and scientific communication.

Source: Elaborated by the author (2025).

These steps made it possible to develop a reproducible analysis protocol. The first stage of the review began with the identification and formulation of the research question and the selection and application of advanced search strategies. For this purpose, the acronym CROMP - Content, Outcome, Research Object, Modality, and Period (Coelho, 2024), was used in place of the PICO model. This choice was made to align with the specificities of research in the field of education, providing greater precision and clarity in defining the research questions. Based on these elements, the central research question and the secondary questions were formulated, as shown in Chart 2.

Chart 2. Research Questions.

Main Question:	**What is the landscape of research on the use of self-regulated writing strategies in the educational context, based on studies published between 2020 and 2024?**
Secondary Questions:	Which educational levels have been most frequently investigated in studies on self-regulation strategies for the development of written production? Which self-regulation learning strategies were predominantly used in empirical studies on improving students' writing? What theoretical and practical contributions and limitations were identified in studies on the use of self-regulatory strategies to written production?

Source: Elaborated by the author (2025).

[2] The approach presented in this article provides a systematic and generic methodology that can be extended to other areas of application.

Based on the adopted acronym, criteria were also defined for selecting search terms, including keywords directly related to the research questions. In addition, synonyms, terminological variations, and related terms were included to broaden the sensitivity of the search strategy and ensure the retrieval of the largest possible number of studies relevant to the investigated topic (Coelho, 2024), as shown in Chart 3.

Chart 3. Criteria and synonyms.

Components	Question Elements	Description/Focus	Keywords and Synonyms
C- Content	Self-regulation strategies	Refers to the practices, methods, and approaches used to develop writing	self-regulation, self-regulation strategies; SRSD
R - Outcome	Current panorama/skills development	Results and evidence on the effectiveness of strategies for writing development	impact; learning; outcome; performance; development; efect; improvement; quality
O - Object of Investigation	Self-regulated writing/ writing skills	Main focus of the investigation - writing skills and their self-regulated development	writing; writing skills; writing development; written composition.
M - Modality	Empirical studies/ educational contexts	Refers to the type and context of research	empirical; intervention; education; grade; school
P - Period	2020 to 2024	2020 to 2024	2020 to 2024

Source: Elaborated by the author (2025).

The searched terms were combined using the boolean operators "AND" and "OR" to construct the search string: ("self-regulation" OR "self-regulation strategies" OR "SRSD") AND ("impact" OR "learning" OR "outcome" OR "performance" OR "development" OR "improvement" OR "quality" OR "effect") AND ("writing" OR "writing skills" OR "writing development" OR "written composition") AND ("empirical" AND "intervention" OR "education" OR "grade" OR "school").

A systematic search was conducted in two main databases: Web of Science (WOS) and ERIC, chosen for being major indexes of peer-reviewed articles with the broadest coverage of publications. Studies were selected based on the following inclusion criteria: i) the study is relevant to the defined search terms; ii) the study is written in English; iii) it was published between 2020 and 2024; iv) it includes peer-reviewed articles; v) studies aligned with the research theme, addressing practices, strategies, or interventions related to writing in an educational context, empirical research conducted in school or academic settings, with a focus on teaching and learning processes. The exclusion criteria include: i) studies of an exclusively theoretical nature or systematic reviews focused on the development of children's writing or special educational needs; ii) research addressing the teaching of writing in English as a second language, as they do not fall within the scope of this investigation; and iii) duplicate studies.

The criteria for conducting this review were based on an iterative and incremental[3] procedure. Initially, 381 studies were identified (337 in WOS and 44 in ERIC). In an initial screening, following an analytical review of the abstracts, 230 were excluded, in accordance with the exclusion criteria, because they were duplicates or fell outside the scope of the research. The remaining exclusion criteria took into account studies related to children's writing, students with special educational needs, and the teaching of English as a foreign language. After selecting the primary studies, the information relevant to the review was extracted. As a result, 13 studies were selected (Chart 4).

[3] It is considered iterative because the search, data extraction, and visualization of results were carried out comprehensively, first in WOS and then in ERIC, thereby reducing the complexity and scope of each run. It is considered incremental because the final report evolved with each iteration until it became the definitive version, through the integration of the results from each cycle into the final version. This integration was achieved progressively through successive revisions.

Chart 4. Selected studies.

Grenner et al. (2020)	Effects of intervention on self-efficacy and text quality in elementary school students' narrative writing
Rodríguez-Málaga, Rodríguez and Fidalgo (2021)	Exploring the short-term and maintained effects of strategic instruction on the writing of 4th grade students: should strategies be focused on the process?
Sarikaya and Yilar (2021)	Exploring Self-Regulation skills in the context of peer assisted writing: primary school students' sample
Klein et al. (2021)	Self-Regulation in early writing strategy instruction
Salas, Birello and Ribas (2021)	Effectiveness of an SRSD writing intervention for low- and high-SES children
Veiga-Simão et al. (2022)	Assessing the efficacy and social validity of CriaTivo, a curriculum-based intervention to promote Self-Regulation of writing in Portuguese Elementary Education
Wilson et al. (2022)	Integrating goal-setting and automated feedback to improve writing outcomes: a pilot study.
Camacho et al. (2023)	The impact of combining SRSD instruction with a brief growth mindset intervention on sixth graders' writing motivation and performance
Salas et al. (2023)	Embedding explicit linguistic instruction in an SRSD writing intervention
Nunes et al. (2024)	"Breathe, Plan, Write, and Evaluate": the effects of an SRSD intervention and instructional feedback on 4th graders' writing and motivation
Fernandez and Guilbert (2024)	Self-regulated strategy development's effectiveness: underlying cognitive and metacognitive mechanisms
Rocha et al. (2024)	Effects of SRSD writing interventions in grade 3: examining the added value of attention vs. transcription training components
Falardeau et al. (2024)	Effects of teacher-implemented explicit writing instruction on the writing self-efficacy and writing performance of 5th grade students

Source: Elaborated by the author (2025).

For the data extraction phase of the primary studies, a standard form was created in an Excel spreadsheet to collect the following information: Publication details (authors, year, title, abstract, objectives) and results.

The method adopted for the exploration and analysis phase was thematic synthesis, based on Thomas and Harden (2008). This type of method is frequently used to organize, analyze, interpret, gather, and integrate the results of multiple data in primary qualitative research, through an inductive, data-driven approach that focuses on a descriptive synthesis to find relevant explanations for a specific review question. The synthesis was conducted through a three-step cyclical process: i) reading and coding the text; ii) developing descriptive themes; and iii) constructing analytical themes.

The first step involved a thorough reading of the selected studies, with the aim of identifying relevant units of meaning and creating the initial codes. To this end, a line-by-line coding strategy was adopted for the primary studies, a procedure that enabled the identification of conceptual elements and the generation of codes. The aim was to capture the meaning of each textual segment, name and organize the data using labels that simultaneously allowed for the categorization and synthesis of relevant information, forming the basis for the subsequent stages of abstraction and thematic construction. Next, these codes were systematically grouped to construct descriptive themes (closely aligned with the data and evidence presented in the primary studies).

The third stage consisted of developing analytical themes, a process that involved the critical interpretation of the previously identified descriptive themes. In this phase, analytical judgment and theoretical inferences derived from the adopted theoretical framework were employed. The objective of this stage was to move beyond the merely descriptive level of analysis and to

encourage the development of conceptually oriented, analytical themes, in order to generate new interpretive frameworks and contribute to the production of new knowledge that adds scientific value and broadens understanding of the phenomenon under investigation.

Although this technique involves an interpretive component, we sought to ensure analytical rigor by adopting systematic procedures, explicitly outlining the stages of the process, and grounding interpretations in the theoretical framework adopted. In this regard, the stages of code organization, the development, and the final determination of the descriptive themes were described transparently to ensure the traceability of analytical decisions.

As for the data analysis validation procedures, the corpus was reviewed multiple times in order to refine the codes and verify the interpretive consistency of the themes identified. In addition, part of the data was recoded after a period of time as a strategy to verify the stability of the coding, allowing for a comparison of initial and subsequent interpretations and an assessment of the degree of consistency in the analytical process.

RESULTS AND DISCUSSION

The discussion begins with the presentation of the data analysis, emphasizing the studies carried out focusing on the educational level at which the educational interventions were applied and the respective countries (Chart 5).

Chart 5. Educational levels and countries.

Grenner et al. (2020)	fifth grade	Sweden
Rodríguez-Málaga, Rodríguez e Fidalgo (2021)	fourth grade	Spain
Salas, Birello and Ribas (2021)	second and fourth grades	Spain
Sarikaya and Yilar (2021)	fourth grade	Turkey
Klein et al. (2021)	first grade	Canada
Veiga-Simão et al. (2022)	third and fourth grades	Portugal
Wilson et al. (2022)	fifth-eight grades	U.S.
Camacho et al. (2023)	sixth grade	Portugal
Salas et al. (2023)	second and fourth grades	Spain
Nunes et al. (2024)	fourth grade	Portugal
Fernandez and Guilbert (2024)	fourth and fifth grades	France
Rocha et al. (2024)	third grade	Portugal
Falardeau et al. (2024)	fifth grade	France

Source: Elaborated by the author (2025).

Taking into account the countries where the interventions were carried out, the results indicate a concentration of studies at the early stages of schooling, with an emphasis on phases aimed at consolidating literacy and developing fundamental writing skills, generally involving students aged 6 to 11. This age group corresponds, in terms of educational development, to the Fifth Grade in the U.S. educational system (ages 10-11), the final stage of Elementary School (K-5), in which students are expected to have already demonstrated greater mastery of basic reading and writing skills.

However, it is important to note that no evidence of a direct structural correspondence with the U.S. model was identified, particularly with regard to a formal transition stage equivalent to fifth grade. This lack of equivalence stems from the particularities of each country's educational systems, which feature different forms of curricular organization, specific nomenclature for educational levels, and variations in the age groups served at each stage. Thus, the comparisons made should be understood in terms of functional approximations

related to the stage of development of writing skills, rather than as structural equivalences between educational systems[4].

Among the grade levels mentioned in the studies, fifth grade appears frequently, whether in interventions conducted exclusively at this level or in conjunction with fourth grade. This period corresponds to the final stage of elementary education and is characterized as a time when efforts are made to strengthen students' autonomy in the writing process, particularly with regard to the conscious use of strategies for planning, monitoring, and revising texts. This stage is considered strategic for implementing interventions aimed at developing the behavioral, emotional, and cognitive regulation associated with text production.

This distribution suggests that international studies tend to prioritize interventions targeting the 6 - to 11-year-old age group. This period is understood as an important transitional phase, during which students consolidate fundamental writing skills, such as text planning, revision, and the use of self-regulated strategies, preparing themselves to tackle more complex academic demands in later stages. Among these demands, the following stand out: the production of expository and argumentative texts, the comprehension of texts with greater conceptual density, and the completion of tasks that require greater capacity for analysis, interpretation, and problem-solving through writing.

However, there is a gap regarding the continuity of these strategies at levels equivalent to Brazilian high school (ages 15 to 17), a period during which students begin to face significantly more complex demands in terms of text production. At this stage, greater mastery is expected in the comprehension and composition of more sophisticated texts, such as argumentative essays, pieces that require more elaborate reasoning and problem-solving in more demanding academic contexts, which, consequently, demand higher levels of cognitive autonomy and self-regulation.

This scenario reinforces the importance of continuing the development of skills initiated in previous stages of schooling, in order to promote the autonomous management of self-regulation strategies. This implies preventing the progress achieved in the initial phases from weakening throughout the school trajectory. Such skills are fundamental, not only for academic success, but also for preparing students for the challenges of higher and professional education.

This perspective stems from the understanding that writing constitutes a continuous, complex, and progressively maturing process that goes beyond the mastery of mechanical aspects of language and involves, in an integrated manner, the development of skills in planning, monitoring, revising, emotional regulation, and the autonomous management of one's own strategies.

The second question to be addressed concerns the models adopted. The studies focus on explicit instruction models that teach writing and self-regulation strategies. Strategy instruction aims to teach students how to plan, compose, and revise texts, equipping them with writing strategies and prior knowledge about the text genre in an explicit and systematic manner (Camacho et al., 2023).

In general, the studies reviewed use terms such as "model", "method", and "approach" to refer to structured sets of evidence-based instructional practices specifically aimed at developing self-regulated strategies in the context of writing. These proposals focus on the explicit teaching of strategies that can be observed and analyzed based on students' own written work, allowing for the identification of evidence of improvement in writing performance over time.

In this context, interventions typically address different stages of the writing process, including planning (setting goals, organizing ideas, and structuring the text), drafting (initial writing), rewriting (revision guided by linguistic and discursive criteria), and self-assessment (critical analysis of one's own text based on rubrics or previously established criteria).

[4] This analysis is based on: i) educational levels in the Brazilian context, in accordance with the basic education framework defined by the Ministry of Education, and ii) age groups in the U.S.: Early Childhood (Preschool/ages 2-5), Elementary School (K-5/ages 5-10), Middle School (grades 6-8/ages 11-13), High School (9th-12th grade/ages 14-18) (USAHello, 2022).

The most widely used model is the SRSD (development of self-regulated strategies) (Rodríguez-Málaga; Rodríguez; Fidalgo, 2021; Klein et al., 2021; Salas; Birello; Ribas, 2021; Salas et al., 2023; Camacho et al., 2023; Fernandez; Guilbert, 2024; Rocha et al., 2024; Falardeau et al., 2024; Nunes et al., 2024). Veiga-Simão et al. (2022) present an evaluation of CriaTivo, an intervention program for the explicit teaching of strategies that follows a self-regulation approach, and some studies do not mention a specific model (Grenner et al., 2020; Wilson et al., 2022; Sarikaya; Yilar, 2021).

The SRSD is an instructional approach focused on the explicit teaching of self-regulation strategies to support writing. This model is organized into six recursive phases: 1) developing prior knowledge; 2) discussing the strategy; 3) modeling the strategy; 4) memorizing the strategy; 5) supporting the strategy; and 6) developing independent performance (Camacho et al., 2023; Klein et al., 2021; Harris et al., 2008; Harris; Graham, 2009, 2016; Fernandez; Guilbert, 2024; Nunes et al., 2024).

> The assumption underpinning SRSD is that writing is taught in an explicit, stepwise, and interactive manner to help students become more effective and motivated writers. An important tenet of the model is that instruction is scaffolded, which implies that students become progressively responsible for applying the writing and self-regulation strategies, while the teacher support is gradually faded (Camacho et al., 2023, p. 2).

This is an evidence-based approach to writing that integrates prior knowledge, composition strategies, and self-regulation practices with the aim of increasing motivation and improving the quality of written work (Camacho et al., 2023). This approach combines the teaching and learning of knowledge about text genres and self-regulatory writing strategies, such as planning, drafting, and revising, including goal setting, self-monitoring, self-assessment, and self-reinforcement. Based on this approach, "[...] learning as acomplexprocess that relies on changes that occur in learners'skills, abilities, self-regulation,strategic knowledge, domain-specific knowledge and abilities, and motivation" (Harris; Graham, 2009, p. 118).

The next research question addressed in the study concerns writing strategies, with a specific focus on interventions that incorporated self-regulation components. To systematize the findings, Chart 6 presents a detailed categorization of the types of self-regulatory strategies identified in the reviewed studies.

Chart 6. Strategies identified in the reviewed studies.

Descriptive topics	Brief description	Analytical topics
TREE; POW; WWW; HOW; QOQOC; SETA (Silence, Scheme, Text, Evaluate) + 2P2EAcaba!	Mnemonic strategies used to guide planning, organization of ideas, and text structuring.	Text planning and organization strategies
Graphic organizers	Visual tools to help generate and organize ideas before and during writing.	
Goal setting and self-monitoring	Practices that involve establishing objectives and tracking one's own progress in writing.	Self-regulation and metacognition strategies
Knowledge about self-regulated writing	Understanding the cognitive, motivational, and behavioral processes involved in self-regulated writing.	
Self-assessment and self-monitoring	The student's ability to evaluate their own performance and adjust writing strategies as they progress.	Strategies for self-reflection and self-monitoring
Explicit instruction of writing strategies through modeling, support, and self-regulation	Direct teaching of strategies, with teacher modeling and gradual support until the student achieves autonomy.	Instructional practices of support and gradual autonomy
Scaffolding until independence	Providing structured and temporary support, gradually withdrawn as the student becomes more independent.	

Source: Elaborated by the author (2025).

Chart 6. Continued...

Descriptive topics	Brief description	Analytical topics
Regulation of environmental, sensory, motivational, temporal, and social factors	Strategies for managing external and internal aspects that affect writing performance.	Contextual and emotional regulation strategies

Source: Elaborated by the author (2025).

To answer this question, five analytical themes are discussed, addressing the main strategies identified: (1) textual planning and organization; (2) self-regulation and metacognition; (3) self-reflection and self-monitoring; (4) supportive instructional practices and gradual autonomy; and (5) contextual and emotional regulation.

The most frequently reported topic refers to pre-writing planning and the organization of ideas. The use of self-regulation strategies proved to be statistically significant for the planning and monitoring dimensions (Veiga-Simão et al., 2022), resulting in better generation, organization, and structuring of ideas before and during writing. These effects were also observed by Camacho et al. (2023), who identified that such strategies help students to produce, organize, and structure the ideas that make up their texts more efficiently.

Studies highlight the explicit definition of goals and the use of graphic organizers as central tools to reduce cognitive load, structure text, and help students generate and organize ideas during the planning phase (Veiga-Simão et al., 2022; Nunes et al., 2024; Falardeau et al., 2024; Salas; Birello; Ribas, 2021; Salas et al., 2023; Rocha et al., 2024; Wilson et al., 2022). These organizers, often generated in drafts, assist in the generation and sequencing of ideas, allowing for more planned writing.

Fernandez and Guilbert (2024) highlight the principle of explicit instruction, with gradual withdrawal of support (scaffolding), to stimulate efficiency in planning skills. The authors emphasize that many students may lack planning skills, even among adult learners. "In this case, a prompt may not be effective until students fully develop these skills. In some cases, these prompts may even prove to be counterproductive" (Fernandez; Guilbert, 2024, p. 1127). Instruction is explicit, sequential, and interactive, with teacher support, and should be gradually withdrawn as students become more autonomous (Nunes et al., 2024). This adaptive support can have a significant effect during writing tasks. For Fernandez and Guilbert (2024, p. 1127), "[...] a learning environment that not only prompts students to plan, but also provides a video capsule that teaches and models how to use planning strategies effectively, could boost personalized scaffold effectiveness", and thereby improve the quality of students' written work.

Mnemonics complement the planning stage by promoting long-term retention of the steps in the writing process. Although they contribute to the memory of learned strategies, they do not, by themselves, guarantee high-quality text production (Klein et al., 2021; Camacho et al., 2023). Its main role is to reduce cognitive load: both mnemonics and the graphic organizers derived from them (produced in draft form) facilitate access to the steps of the strategy, allowing students to engage more efficiently and consciously in the writing process (Harris, 2024, p. 22).

SRSD interventions frequently use mnemonics to help students memorize the steps of strategies. Examples include TREE for opinion texts (Topic, Reasons, Examples, End) (Camacho et al., 2023; Falardeau et al., 2024), POW, WWW and How[5] (Fernandez; Guilbert, 2024; Falardeau et al., 2024), combined to find and organize the ideas needed to write well-structured stories, QOQOC for planning (Veiga-Simão et al., 2022), and SETA (Silence, Outline, Text, Evaluate) combined with 2P2EAcaba! for argumentative texts (Nunes et al., 2024).

[5] POW (P = Pick my ideas; O = Organize my notes; W = Write and say more); WWW (used to memorize the seven important story parts (W = Who is the main character?; W = When does the story take place?; W = Where does the story take place?; What = What does the main character do or want to do, and what do the other characters do?; What = What happens then and what happens to the other characters?; and How = How does the story end?; How = How does the main character feel and how do the other characters feel? (Fernandez; Guilbert, 2024; Falardeau et al., 2024).

The core of the interventions lies in promoting metacognitive self-regulation, encompassing self-instruction, self-monitoring, and self-evaluation (Camacho et al., 2023; Sarikaya; Yilar, 2021; Nunes et al., 2024). Students are taught to verbalize steps, such as reading aloud, discussion, modeling, and shared writing (Klein et al., 2021), monitor their own performance in real time, reflect on the process, and assess whether the text meets the established criteria. An example of this is evaluating the text to check if all parts have been included (Camacho et al., 2023).

The strategies also include self-reflection, which is closely associated with self-regulation and functions as a mechanism for internalizing and transferring learned skills. Tools such as self-assessment graphic sheets (Camacho et al., 2023) and checklists help students identify gaps and revise their texts autonomously. Fernandez and Guilbert (2024) highlight that developing the ability to monitor difficulties and adjust strategies promotes progressive independence, transforming learning initially mediated by the teacher into self-regulated and sustainable skills over time.

Another strategy is cognitive modeling, as a recurring procedure: the teacher verbalizes aloud their thought processes while planning, writing, and revising, making visible cognitive and metacognitive activities that would otherwise remain hidden (Klein et al., 2021; Nunes et al., 2024; Falardeau et al., 2024). Thus, the classic SRSD cycle will integrate actions such as: discussing, modeling, memorizing, supporting, and practicing independently. According to Veiga-Simão et al. (2022, p. 5), "[...] the teaching of the strategies com prehends their discussion, modeling, the facilitation of their memorization using mnemonics, the supported written production (namely through the feedback provided by the teacher or by peers) and the evaluation and reflection on the use of the strategy".

Although less explored than the other categories, the regulation of motivational, temporal, social, and environmental aspects emerge as an indispensable component (Sarikaya; Yilar, 2021). This includes techniques for managing procrastination, choosing appropriate environments, using motivational self-instructions ("I can do this step by step"), and emotional regulation in the face of frustration. Camacho et al. (2023) records significant gains in self-efficacy, indicating that self-regulated writing is not limited to cognitive processes, but also requires the affective management of effort and persistence, highlighting emotional regulation. Other authors also emphasize the importance of assessing students' self-efficacy and attitudes toward writing as an important component that aids performance (Grenner et al., 2020; Wilson et al., 2022).

This hierarchical organization of categories demonstrates that the development of writing skills depends not only on the acquisition of cognitive strategies, but also on the student's ability to continuously monitor their own performance, adjusting their actions according to the demands of the task and the communicative objectives. In this sense, the integration of planning, monitoring, and evaluation, key elements of writing-as-process models, contributes to the consolidation of a self-regulatory cycle that strengthens both textual quality and student autonomy.

It is worth noting that these dimensions do not operate in isolation but influence one another throughout the process, characterizing it as a cognitive, metacognitive, and socioculturally situated activity. From this perspective, it is important to adopt a three-dimensional model of written production, taking into account: i) textual production, with a focus on the quality of the final text; ii) the self-regulation process, related to the self-regulation strategies to be developed; and iii) the individual, who mobilizes their own beliefs, perceptions, and attitudes toward writing, with appropriate linguistic and discursive choices.

This approach reinforces the importance of didactic interventions that promote the explicit teaching of writing strategies, as well as the use of technological resources, whenever possible, to stimulate students' self-regulated behavior. Such environments can provide different writing situations in which students are challenged to plan, monitor, and revise their work in real time, expanding opportunities for self-regulated practice.

As such, digital platforms and interactive ecosystems can enable students to experiment with various support tools, such as digital rubrics, smart checklists, progress logs, and automated feedback, which promote both the consistent use of strategies and the gradual development of self-regulation. Consequently, the integration of pedagogical practices and digital resources

can contribute to the creation of a more dynamic, responsive environment that fosters the growth of autonomy throughout the writing process.

Chart 7 presents main contributions highlighted by scholars regarding the use of self-regulation strategies, which have proven fundamental in improving students' writing performance.

Chart 7. Contributions highlighted.

Descriptive topics	Analytical topics
Higher quality and greater scope	Improved quality and length of texts
Length (word count)	
Production of more complete texts with better structure	
Understanding of the characteristics of the story	
Gains in organization, structure, vocabulary, and more precise writing	
Number of elements appropriate to the genre and number of connectors	
Use of planning strategies	Strengthening of writing planning and structuring skills
Better generation, organization, and structuring of ideas (before and during writing)	
Monitoring of the textual process	Improved self-assessment
Improvement in students' ability to assess the quality of texts	
Increased motivation	Increased motivation and self-efficacy in writing
Increased self-efficacy for ideation (confidence in the ability to generate ideas)	
Greater autonomy in writing	Promoting autonomy
Better learning outcomes, especially in writing skills	Improving learning

Source: Elaborated by the author (2025).

The main contribution highlighted in the studies was the significant improvement in the quality and length of the texts produced by students who used the strategies (Camacho et al., 2023; Klein et al., 2021; Salas et al., 2023; Fernandez; Guilbert, 2024). The others are related to a greater understanding of the characteristics of history (Klein et al., 2021), improvements to the text, both at the word and sentence levels, including the appropriate use of structural elements and connectors suitable for the genre (Salas et al., 2023).

Improvements were also identified in text structure, coherence, and overall writing quality (Rodríguez-Málaga; Rodríguez; Fidalgo, 2021), as evidenced by the production of more complete, cohesive, and better-organized texts (Nunes et al., 2024). Other studies similarly report advances in the organization of ideas, more appropriate vocabulary use, and increased text length, including a higher number of words and sentences, greater writing accuracy, and fewer spelling errors (Fernandez; Guilbert, 2024; Veiga-Simão et al., 2022). Taken together, these findings indicate improvements in the overall quality of written productions, as well as a greater ability of students to transform knowledge and skills into more coherent, well-articulated, and consistent texts (Falardeau et al., 2024).

Added to this is greater reader awareness and a significant development of creativity in written production (Veiga-Simão et al., 2022), improvement in students' ability to assess the quality of their own texts more accurately (Fernandez; Guilbert, 2024), providing improved accuracy in text monitoring. With this, students can identify perceptions about their own writing skills.

Although the results related to motivation are mixed, some studies have identified important advances, particularly regarding the increase in students' self-efficacy, as they began to

demonstrate greater confidence in their ability to generate and develop ideas (Camacho et al., 2023). Concerning autonomy, significant progress was also observed, as students assumed a more active role in their own learning process, an aspect considered essential for the development of writing skills (Veiga-Simão et al., 2022; Nunes et al., 2024). These findings reinforce the understanding that autonomy is a central element in the development of self-regulated writing performance (Rodríguez-Málaga; Rodríguez; Fidalgo, 2021).

Self-regulation manifests itself throughout the learning process by promoting student autonomy, allowing them to identify and evaluate the actions needed to improve their results. As they internalize these strategies, they become progressively more independent and begin to assume a more active and conscious role in their own learning (Veiga-Simão et al., 2022; Nunes et al., 2024).

Despite the promising results identified in this study, some limitations must be considered. Among them are the limits to the generalization of findings related to the development of skills and competencies, the variability in the fidelity of intervention implementation, and the challenges associated with teacher training. These aspects indicate that the effectiveness of the interventions is directly influenced by factors such as adequate teacher training, consistent implementation of the proposed protocols, institutional conditions, and the availability of pedagogical resources across different educational contexts.

Among the methodological limitations, the predominant use of self-report questionnaires stands out, which can generate biases, especially among younger students, who tend to overestimate or underestimate their own abilities (Nunes et al., 2024). It is also observed that not all students benefit equally from the instruction: those with lower working memory capacity have more difficulty understanding and applying the planning strategies taught (Fernandez; Guilbert, 2024).

Furthermore, some studies indicate that short-term interventions tend to produce limited or insignificant effects on motivational beliefs, such as self-efficacy and students' attitudes towards writing (Camacho et al., 2023). Similarly, McKeown *et al*. (2019 apud Falardeau et al., 2024) highlight that substantial changes in writing quality are generally difficult to observe in short intervention periods. These findings suggest that longer-term and more intensive training interventions may produce better results, especially related to text revision, continuous self-regulation, and the maintenance of gains over time.

LIMITATIONS

Before concluding this discussion, it is worth noting that, as a rapid systematic review, these analyses are derived from a synthesis of the literature, which is subject to some limitations and should be taken into account when evaluating the degree of generalizability of the results and their transfer to other contexts. Among the limitations of this study, the restricted scope of repositories used to search for studies stands out, as well as the non-inclusion of complementary strategies, such as manual searches in reference lists and consultation of grey literature (e.g., dissertations, theses, and conference proceedings). Due to these methodological restrictions, the possibility of publication and selection bias is recognized, since potentially relevant studies may not have been identified or included in the analysis. This review also introduced potential bias by using only one reviewer in the screening/data extraction, which may reduce reproducibility.

To mitigate these limitations, several strategies were adopted to systematize the selection and reduce the possibility of interpretive biases. Among them, the use of the CROMP framework (Coelho, 2024) stands out, to increase the precision in the retrieval of evidence, ensure greater consistency in the study selection process, and guarantee sufficient sensitivity for the identification of relevant studies. And to reduce the possibility of interpretive biases, as recommended by Oxman, Schünemann, and Fretheim (2006), priority was given to evaluating the methodological quality of the studies rather than an excessively extensive literature search. This resulted in a double evaluation of the sample, after a time interval (2 weeks), to correct errors and ensure consistency.

FINAL CONSIDERATIONS

With the aim of broadening and deepening the debate on self-regulation strategies applied to the development of writing, this study highlights the relevance of the topic for both the scientific community and educators. It may prompt reflections that contribute to the improvement of pedagogical practices focused on the teaching and learning of writing, as well as strengthen research on this topic. The analyses presented also aim to inform future research.

The results revealed that the interventions were applied in different countries, with studies predominantly focused on the early and middle stages of schooling (for children aged approximately 6 to 11 years), demonstrating a global interest in the early promotion of autonomy in text production. However, the predominance of interventions at the elementary level highlights a gap in the continuity of these strategies for more advanced stages of basic education, underscoring the need for research and practices, especially in high school, to ensure continuous progression.

It was observed that the SRSD model was the most frequently used in the interventions. Among the strategies mentioned, planning, goal setting, self-monitoring, and instructional practices that promote support and gradual autonomy stood out. Among the main contributions, one can highlight the significant improvement in text quality (structure, coherence, vocabulary use, length of produced texts), development of skills related to planning, monitoring and self-evaluation, as well as the improvement in motivation and self-efficacy in writing.

Although self-regulation strategies make significant contributions to the development of writing, challenges, limitations, and gaps remain that require further investigation. In particular, there is a lack of empirical evidence in specific contexts, such as high school, which underscores the need for future studies that will enable researchers to map actual patterns of self-regulation in student writing and quantify gains in objective criteria of textual quality, such as cohesion, clarity, and argumentative depth.

Other research avenues focus on the development of these skills throughout the academic journey and the long-term impact of using self-regulation strategies. From this perspective, the relevance of research that integrates the use of technological resources capable of optimizing the processes of producing, collecting, and analyzing data derived from students' writing is highlighted, especially in longitudinal studies.

The use of these technologies can enhance the accuracy of analyses, facilitate the monitoring of writing progress, and make the results more applicable to the educational context. This need becomes even more evident when considering the reality of teaching practice, in which teachers often face time constraints that prevent them from providing detailed corrections of texts and individualized feedback. This difficulty is compounded by the limited number of Portuguese language classes dedicated specifically to text production, which does not always allow for the process-oriented monitoring of writing, including stages such as revision, rewriting, and reflection on the produced text.

As noted by Falardeau et al. (2024), there is a growing need to expand research through explanatory designs capable of providing detailed descriptions of how students use the strategies and tools taught, as well as the concrete benefits achieved in terms of learning and motivation. In this regard, it is also important to develop culturally and contextually adapted interventions that take into account the psychological and sociocognitive processes involved in writing, promoting pedagogical practices that are more meaningful and sensitive to learners' realities (Veiga-Simão et al., 2022).

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