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A Pedagogy of Metacognition for Reading Classrooms

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ABSTRACT

Despite metacognition's profound effects in research classrooms, such research might have a very limited influence on mainstream classrooms. This may stem from a lack of comprehensive and practical pedagogy that classroom teachers can adapt for metacognition instruction as researchers do. To address this problem, this study developed a pedagogy of metacognition for reading classrooms (PMR) by the principles of grounded theory. Data were collected via document analysis and a PMR was constructed through a systematic and analytic review of its literature. A PMR consists of 7 dimensions, and these include (a) fostering students' metacognitive knowledge, (b) scaffolding students' strategic reading, (c) encouraging students' independence with strategic reading, (d) assessing metacognition, (e) adopting goal-directedness, (f) integrating the language of thinking, and (g) prolonging instruction. Regarding the nature of a PMR, this paper does not propose a new instructional method or technique; however, it describes a framework to support teachers' professionalism with metacognition instruction. Therefore, reading teachers can transfer beneficial research practices to their mainstream classrooms without making distinctive instructional alterations or expansive changes in their classrooms.

Key words: Metacognition, Reading, Instruction, Thinking, Grounded Theory

INTRODUCTION

Metacognition pertains to thinking about thinking and it involves metacognitive knowledge, metacognitive strategies, and metacognitive experiences (Flavell 1977; 1979). In reading classrooms, metacognition may be exercised through strategic reading experiences where metacognitive readers engage in higher-order thinking about oneself as a reader, text, reading strategies, and meaning-making processes for task demands or goals (Ozturk, 2017b). Reading research demonstrated that metacognition has positive impacts on reading awareness, skills, comprehension, vocabulary, and performance (e.g., Boulware-Gooden et al. 2007; Curwen et al. 2010; Veenman, Van Hout-Wolters, & Afflerbach 2006). Such research also demonstrated that students could learn metacognition successfully (e.g., Pintrich 2002; Schraw 1998; Tanner 2012; Zohar & Ben David 2009).

Despite research providing evidence for metacognition, the degree to which students demonstrate and practice metacognition in research and mainstream classrooms is not similar as Van Keer and Vanderlinde (2010) as well as Baker (2017) highlighted. Such a discrepancy may stem from either of the following reasons: classroom instruction lacks pedagogies of metacognition and there is a need for directives to integrate metacognitive pedagogies in mainstream instruction. Few studies examined mainstream classroom metacognition instruction (e.g., Curwen et al., 2010; Kerndl & Aberšek, 2012; Perry, Hutchinson, & Thauberger, 2008) and they reported that metacognition instruction in classrooms is limited and insufficient. Furthermore, only a few researchers highlighted the need for explicit directives to teach metacognition (i.e., Kerndl & Aberšek 2012; Veenman, Van Hout-Wolters, & Afflerbach 2006). That is, reading teachers might not have any guides or aids for teaching metacognition. In this sense, as Duffy (2002) emphasized "research focus must be on thoughtfully adaptive teaching" (p.36) instead of searching for "foolproof" (Duffy, 2002, p.36) instructional practices. Therefore, training teachers to possess a mindset of being metacognitive and teaching metacognition should be a priority.

Regarding these problems or needs, I aimed to develop a pedagogy of metacognition for reading classrooms (PMR). Therefore, the notions of a PMR can be adapted for the classroom. However, a PMR does not promote or emphasize any teaching methods. Indeed, it aims to develop dispositions of teaching for metacognition.

METHOD

Research Design

This review study was conducted in the qualitative realm and utilized the principles of grounded theory (GT) to develop a conceptual framework for metacognition instruction. While

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the data (literature) were collected via document analysis method, they were analyzed via the grounded theory which aims to produce and/or construct an explanatory framework to uncover a process inherent to the area of inquiry (Chun Tie et al., 2019). In the following, the steps for the development of a PMR will be presented.

Literature Selection Criteria

I systematically searched for the primary literature on metacognition in reading on various academic platforms (i.e., Google Scholar, EBSCOhost, ProQuest, Eric, ScienceDirect, and DOAJ). The literature was selected for the review when they met the following criteria: (a) it was published in peer-reviewed journals, (b) the journals were indexed by Social Science Citation Index (SSCI), Social Science Citation Index Expanded (SCI-Expanded), Arts and Humanities Citation Index (AHCI), or International Education Indexes (i.e., ERIC), and (c) the focus was on reading and metacognition. Following the selection procedures, I categorized the literature into three: (a) theory, (b) practical methodological, and (c) effective classroom instruction papers.

Data Set and Analysis

I studied and analyzed a broad set of literature (N≈110, Appendix) to determine how to develop and/or foster students' metacognition in reading classrooms. In GT, initial coding is the preliminary step to fracture the data. At this stage, important words or groups of words are identified regarding some questions such as 'What does the data assume, 'suggest' or pronounce' (Chun Tie et al., 2019, p.5). Following this, it is necessary to do intermediate coding which builds on the initial coding. During the intermediate coding, categories are reviewed and subsumed under other categories. Dimensions and relationships can also be refined. Theoretical saturation heralds when the new analysis might not provide any additional categories and the extant data are sufficient for conceptual theories. At this stage, selective coding can be employed. Lastly, advanced coding enables researchers to do a theoretical integration and produce a theory or framework (Chun Tie et al., 2019).

In the following, I will present the initial (numbered) and intermediate *(italicized)* codes employed in this study. Appendix also presents the codes. Initially, I reviewed (1) metacognition theory. The manuscripts where Flavell (e.g., Flavell 1977; 1979; 1987) discussed *the definition* and *nature* of metacognition, as well as its *components* were studied. However, such theoretical fundamentals might not necessarily be practical for some teachers. For this reason, I disseminated how (2) metacognition might appear in reading classrooms. As some researchers (e.g., Bransford, Brown, and Cocking 2000; Papleontiou-louca 2003; Schraw 2001; Veenman 2016; Zimmerman 2000) argued that metacognition may not be generic; that is, its manifestations are context-dependent and domain-specific, I identified *the capabilities* and *competencies* of (3) metacognitive readers. Following this, I studied *behavioral indicators* of *metacognitive competencies* on (4) measurement instruments.

Following those steps, I reviewed the literature on (5) metacognition instruction in reading classrooms. However, this set of literature did not identify how to develop students' metacognition but why it is crucial for reading. I, therefore, reviewed *meditations on metacognition* with a *pedagogical* perspective and searched for *instructional approaches* and *techniques for metacognition*. Then, I reviewed (6) research-based instructional approaches, techniques, and methods for metacognition instruction and I realized that instructional approaches aligned with *the gradual release of responsibility* (GRR) model (Pearson and Gallagher 1983). Therefore, I reviewed GRR to shape a PMR.

I also reviewed (7) experimental or quasi-experimental studies. For this purpose, I found many studies whose title, at least, included some of the following: *metacognition training, effects of metacognition training, experimental study of metacognition teaching*, etc. However, the literature in this section was narrowed down because of the inclusion criteria. The experimental or quasi-experimental studies were included in this review when they satisfied the following criteria. Such studies (a) included a detailed description of metacognition instruction, (b) done in the first/native language, (c) implemented a transfer of metacognitive control to students, (d) practiced a prolonged metacognition training, and (e) done in the field of reading.

In this section, I also reviewed studies on (8) supplementary instructional techniques presented in the experimental studies. I reviewed such literature when they (a) portrayed a detailed description of the instructional technique, (b) done in the field of reading, and (c) measured the effects of the instruction. I also studied *reasoning, thinking,* and *thinking aloud* as they were the fundamental terms in research-based literature.

Reviewing the experimental research, I also concluded that (9) social theories of learning played a significant role in metacognition instruction. Students' development of metacognition was supported by *competent models* or *aids*. Therefore, I reviewed *social constructivism, self-regulation*, and *social learning theory*.

Finally, I reviewed (10) assessment studies that measured *teachers' pedagogies of metacognition* to identify what counts for metacognition instruction. Literature was not ample in this realm, and most did not provide assessment criteria; therefore, I coded *behavioral indicators of teaching metacognition*. A possible model of metacognition instruction for reading may be implemented by the following:

- goal setting for reading and use of strategies,
- utilization of the language of thinking,
- teachers' explicit explanation of differences and reciprocity between cognition and metacognition,
- informed and explicit teaching of strategies,
- holding metacognitive discussions about the reader and reading,
- teachers' modeling strategic reading via the WWW&H rule,
- thinking-aloud and reading aloud,
- Socratic questioning,
- using rubrics, action plans, graphic organizers, or analogies,

- guided practices of strategic reading with the teacher, in (small) groups, or with instructional aids,
- students' reasoning via self-questioning and questioning the author,
- students' thinking-aloud and demonstration of strategic reading,
- students' interactions for questioning others' thinking,
- teachers' providing scaffolding and constructive feedback,
- enabling students' independence with metacognitive control,
- teachers' assessment of students' strategic reading,
- students' doing self-assessment, and
- prolonged training.

Such a list of practices might not be comprehensible and practical for teachers. Therefore, I categorized these practices into 7 dimensions regarding the principles of social learning theories and the GRR model. This stage pertains to the advanced coding of the GT and conceptualizes a PMR. In the following, a PMR is described.

A PEDAGOGY OF METACOGNITION

Definition of a Pedagogy of Metacognition

A pedagogy of metacognition is a form of teaching where teachers employ their metacognition, effective instructional practices for teaching metacognition, and metacognition assessment by the principles of social learning theories to initiate and foster students' metacognition (Ozturk, 2017b).

Dimension of a Pedagogy of Metacognition

A pedagogy of metacognition can be implemented via 7 components (Ozturk, 2017b). Four components require instruction to flow through a gradual release of responsibility model incorporating social principles of learning. These are (a) fostering students' metacognitive knowledge, (b) scaffolding students' strategic reading, (c) encouraging students' independence with strategic reading, and (d) assessing metacognition. The other three components support the effectiveness of instruction. These include (e) adopting goal-directedness, (f) integrating the language of thinking, and (g) prolonging metacognition instruction.

In the following, I will present the components in a linear order; however, it should be noted that such instruction does not always have to flow linearly especially when students show some availability and competency with metacognition. For example, some components can be merged into others or teachers might prefer to skip some instructional practices at higher grades when students show some availability of metacognitive competencies. Moreover, the instruction might flow spirally if need be. Such a practice may let students practice and polish their extant competencies while they acquire new skills. For such decisions, teachers should initially assess students' metacognitive competency, determine their needs, and validate instructional goals.

Fostering Students' Metacognitive Knowledge

This component pertains to students' knowledge about reading (i.e., the process, different genres, structures, and topics), self as a reader (i.e., interests, goals, motivations, capabilities, etc.), cognitive and metacognitive strategies, and tasks (Book et al., 1985; Fisher, 1998; Flavell, 1979; Veenman et al., 2006). To improve students' metacognitive knowledge, teachers can implement explicit teaching, model strategic reading, and hold metacognitive discussions (Dole et al., 1991; Duffy, 1993; Duke & Pearson, 2008; Gourgey, 1998; Pintrich, 2002; Veenman et al., 2006).

Initially, teachers can implement explicit teaching where they inform students about the nature of reading, the necessity of thinking about the self, text, and goals or task demands, as well as the usefulness of metacognition (Duffy, 2002; Gourgey, 1998; Palincsar, 1986; Veenman, 2013; Veenman et al., 2006). Moreover, teachers need to explain the difference and reciprocal flow between metacognitive and cognitive processes and strategies. For this task, some instructional tools such as the WWW&H rule, graphic organizers, or analogies can be used. Therefore, students can both visualize and realize that employing some cognitive strategies may not simply activate higher-order thinking.

To stimulate students' appreciation and internalization of metacognition, teachers can also model thinking through reading and demonstrate metacognitive control over reading. Modeling reading helps teachers show that every individual can be in control of his reading (Duffy, 1993; Nelson, 1996) and realize the impacts of thinking on one's performances (Duffy, 1993; Duke & Pearson, 2008; Veenman, 2013; Veenman et al., 2006). To facilitate higher-order thinking and make teachers' reasoning accessible to students, teachers can use different techniques or tools such as think-aloud, Socratic questioning, self-questioning, or graphic organizers (Hartman, 2001; Israel, 2007; Schraw, 2001). For example, teachers can communicate how they plan their reading considering task demands or personal goals, how they monitor comprehension and regulate strategies to fix any failures, and how they evaluate their performances and goal-attainment by using thinking-aloud or filling out an action plan. During this task, teachers can explain the rationale of each step taken towards comprehension, task completion, and goal attainment. They can also discuss these actions and their impacts on their reading process, performance, and products. The purpose of modeling is not to have students replicate teachers' strategic reading but to provide them with good-models, coach students' experiences, and scaffold their internalization of strategic reading.

Moreover, metacognitive discussions can be held to have students describe their minds and reflect on their thinking about the text, performances, task demands, strategies, and self (Fisher, 2007; McDevitt & Ormrod, 2016). During metacognitive discussions, teachers can recognize and help students recognize their strengths and weaknesses as a reader and deal with any misconceptions about strategic reading. By providing sufficient feedback, teachers can help students improve weaknesses, continue benefiting from their strengths, and relate thinking about the text to successful experiences.

Scaffolding Students' Strategic Reading

This domain pertains to teachers' sharing strategic reading responsibility with students (Book et al., 1985; Duke & Pearson, 2008) and scaffolding their practices via instructional tools (Book et al., 1985; Kolencik & Hillwig, 2011) as well as interpersonal exercises (Duffy, 2002; Perry et al., 2002). This is a vital component of metacognition instruction as teachers provide students with feedback for their metacognitive experiences (Borkowski & Muthukrishna, 1992).

To help students develop a strategic reading competency, teachers can create opportunities for co-regulation. Via interactive dialogues (Hartman, 2001), students can contribute to the teacher's goal setting, identifying task demands, determining strategies, monitoring comprehension, suggesting strategies to improve comprehension, and evaluating reading processes and goal-attainment (Perry et al., 2002). During such interactions, while students attend, examine, and react to teachers' thinking and strategic acts, they help teachers keep thinking and reading dynamic (Hartman, 2001).

Following guided practices, some students can assume full responsibility for strategic reading. However, it may not be realistic for all students as students can show variations with metacognition competencies (Veenman et al., 2006). For this reason, teachers need to create opportunities for all students to practice strategic reading until they are competent enough. For this purpose, teachers can benefit from collaborative learning practices as Klingner and Vaughn (1998) and Pressley and colleagues (1992) did. Students can engage in shared-regulation practices where they work with peers or in small groups to exercise strategic reading. Engaging in shared-regulation, students can plan reading, monitor comprehension, regulate strategies for comprehension and task demands, and evaluate performances. During these interactions, students may also hold metacognitive discussions where they question, listen to, build on, and appreciate others' thinking and reasoning in a risk-free environment (Hartman, 2001; Jones, 2007).

During co-regulation and shared-regulation, teachers can provide students with instructional tools such as graphic organizers, thinking maps, action plans, or rubrics (Kolencik & Hillwig, 2011). Such aids can include probing questions, directions, or reminders to help students visualize, organize, and practice strategic reading efficiently. However, it is also important for teachers to remind students that such prompts are not fixed but just aids to help stimulate, control, and get feedback for strategic reading. Each reading experience is different; therefore, each reading experience may require different action plans.

Teachers, moreover, should listen to students' thinking and reasoning actively during these practices to provide necessary scaffolding and feedback. For this purpose, students can be required to think-aloud. During students' thinking aloud, teachers can monitor students' decisions and provide them with guidance to think about the text properties, task demands, and strategies, if necessary, at all. By students' thinking aloud, teachers can also assess students' metacognitive characteristics and capabilities and provide scaffolding for independence with strategic reading.

Encouraging Students' Independence with Strategic Reading

The goal of metacognition instruction is to enable all students to manage strategic reading, independently (Duke & Pearson, 2008; Ewijk, Dickhäuser, & Büttner, 2013; Palincsar, 1986). Until this stage, students already practice strategic reading with teachers and/or peers or with the help of instructional tools. Therefore, they are expected to have built accurate conceptions of metacognition and assume total independence and responsibility for strategic reading. At this stage, it is still important for teachers to continue creating authentic opportunities for strategic reading and scaffolding students' metacognitive experiences, if need be.

Assessing Metacognition

Throughout the entire process of teaching metacognition, assessment holds a prominent place both to improve instruction and to support students' metacognition. Assessing metacognition has two facets in this model as in the following: teachers' assessing students' metacognition and students' doing self-assessment.

Teachers can assess students' metacognitive competencies during discussions, while students think aloud or work in groups, and by examining students' use of instructional tools (Pintrich, 2002; Pressley & Afflerbach, 1995). Also, they can use surveys (e.g., MARSI) or interview procedures (Duffy, 2002; Pintrich, 2002). Indeed, assessment results may help teachers inform instruction and confirm students' metacognitive knowledge and capabilities for strategic reading (Israel, 2007). While teachers' assessment is an indispensable pillar of metacognition instruction, the purpose is to educate independent and self-regulated learners. For this reason, as Gourgey (2001) as well as Afflerbach and Meuwissen (2005) emphasized, students should assume full responsibility for doing self-assessment.

For students' autonomy, students need to practice questioning and evaluating themselves: their strengths and weaknesses, the relevance of goals, approaches to reading, the effectiveness of regulating strategies, comprehension, performances, and task-management. For this purpose, some techniques such as dialogic teaching or instructional aids like rubrics can be used. As Kolencik and Hillwig (2011) proposed, teachers can ask or distribute to students a set of awareness-raising or thought-provoking questions to facilitate self-questioning during each phase of reading. Moreover, students can be guided to use assessment tools (e.g., MARSI) as rubrics to do self-assessment. Following students' self-assessment, teachers can discuss students' strategic acts. Comparing two assessment results (i.e., teachers vs. students), teachers can inform students about their proficiency and guide them for improvement or fidelity, if necessary (Samuels et al., 2005).

These four components may construct a potential instructional model for developing students' metacognition in reading classrooms. I am also aware that such instructional practices might not be always exceptional in mainstream classrooms. Still, metacognition instruction goes beyond these four components and should include the following

facets. That is, it may not be always possible to promote metacognition in mainstream classrooms without adopting goal-directedness, the language of thinking, and prolonging such instructional practices.

Adopting Goal-directedness

This component pertains to goal-directed reading, strategy use, and strategy learning. For this, teachers need to help students develop an awareness of why reading is important and why they (should and want to) read (Duffy, 1993; Israel, 2007; Zimmerman, 2002). The class can discuss potential reasons to read regarding the text properties, task demands, contextual dynamics, and personal ordinations; therefore, students can realize that the purpose and in relation, the nature of each reading experience may change. Also, teachers can help foster students' autonomy and goal-directed reading experiences by having students discuss their motives and responsibilities to read (Brown et al., 1986; Duffy, 2002; Israel, 2007; Palinscar & Brown, 1984). That is, when students set their goals to read, they have something to critically think about and value (Israel, 2007).

Furthermore, goal-directed reading can initiate goal-directed strategy use. When students know their goals, they can manage each reading experience by using different approaches (Palinscar & Brown, 1984; Samuels et al., 2005). For example, students preparing for an exam can hold different goals and employ different strategies than while they read a travel-guide to get to the town center or a recipe to cook.

Moreover, it is important to explain the rationale for learning strategies. Indeed, as Paris and colleagues (1986) emphasized, students need to find instructional activities and learning meaningful; therefore, they can internalize the strategies. They can develop motivation and resilience towards learning those strategies when they achieve task demands or manage goals using strategies (Paris et al., 1986).

Integrating the Language of Thinking

In addition to adopting goal-directedness, teachers need to use a set of vocabulary for talking about thinking because students adopt the dispositions, habits, and tools of thinking in their social groups (Vygotsky, 1978). As many researchers emphasized (e.g., Borkowski, Chan, & Muthukrishna, 2000; Fisher, 2007; Israel, 2007; Schraw, 2001; Tishman & Perkins, 1997), stakeholders can use an advanced set of vocabulary for talking about thinking during metacognitive discussions or when one demonstrates his strategic reading. For example, students can show evidence, justification, and reasons for their thinking processes, assumptions, and hypotheses. Moreover, they can challenge others' theories and conclusions (Tishman & Perkins, 1997). In such classes, students can not only organize their thinking but also develop a sensitivity to thinking and reasoning (Papleontiou-louca, 2003).

Prolonging Metacognition Instruction

Describing a pedagogy of metacognition might seem straightforward; however, thinking habits might not develop easily or quickly. Considering that individuals display differences with metacognition competencies, metacognition's complicated nature, and its' not being assessed at schools (Lai, 2011), metacognition needs to be addressed, practiced, and scaffolded continuously over an extended period by a variety of texts, tasks, and strategies (Duffy, 1993; Duke & Pearson, 2008; Gourgey, 1998; Veenman et al., 2006).

CONCLUSION

This conceptual paper was developed for metacognition literature's practicality in mainstream classrooms. It is an initiative to compile a comprehensive literature-based pedagogy of metacognition for reading classrooms. A pedagogy of metacognition for reading classrooms includes 7 dimensions as in the following:

- Fostering students' metacognitive knowledge,
- Scaffolding students' strategic reading,
- Encouraging students' independence with strategic reading,
- Assessing metacognition,
- Adopting goal-directedness,
- Integrating the language of thinking, and
- Prolonging metacognition instruction.

By the nature of these dimensions, teachers do not have to make distinctive or expansive changes with their instruction or in their classrooms, respectively. They do not have to implement someone else's instructional directives, either. Rather, teachers can help their students develop metacognition via small but effective instructional practices tailored to their students' needs and proficiency with metacognition.

Teachers might prefer to implement these pedagogies after they do a self-assessment of teaching metacognition via its instrument (i.e., Ozturk, 2020). When teachers do a self-check regarding the indicators of teaching metacognition in reading classrooms, they may realize the dimensions that they ignore or need to foster. Moreover, teachers may evaluate their instruction at different intervals and assess its effectiveness concerning students' metacognitive competencies. However, the instrument might reflect socio-cultural variabilities; therefore, future research might conduct validations studies before its implementation in different settings.

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APPENDIX

Appendix: Literature reviewed for a possible model of metacognition instruction: a PMR

Initial Codes	Elements	Literature
Metacognition Theory	• Thinking about thinking • Cognitions controlled by the actions and interactions of metacognitive components • Metacognitive knowledge: knowledge of self, tasks, strategies, task demands, and goals • Metacognitive regulation: planning a cognitive process for task demands and goals, monitoring progress, regulating strategies, and evaluating performance, and goal-attainment • Metacognitive experiences: highly conscious thinking; mechanisms that modify metacognitive knowledge and activate strategies	(Flavell 1977; 1979; 1987; Nelson 1996)
Metacognitive readers	• Practice metacognition in different reading situations; engage in strategic reading; know themselves as readers, reading, reading strategies, resources, text genres, text structures, tasks; plan reading to task demands or reading goals; monitor comprehension or process to task demands or goals; regulate strategies to fix any failures; evaluate reading process, strategies, performances, and goal-attainment	(Afflerbach & Cho 2009; Afflerbach & Meuwissen 2005; Anastasiou & Griva 2009; Baker & Brown 1984b; 1984a; Brown, Armbruster, & Baker 1986; Duffy 1993; Duke & Pearson 2008; Garner 1987; Garner & Kraus 1981; Gourgey 1998; Jacobs & Paris 1987; Kurtz et al. 1990; Palinscar & Brown 1984; Pressley 2002; Pressley & Afflerbach 1995; Michael Pressley & Gaskins 2006; Zimmerman 2002)
Metacognition assessment in reading	• Index of Reading awareness • Metacomprehension Strategy Index • Metacognitive Reading Awareness Inventory • Metacomprehension Scale • Strategic Processing Analysis • Metacognitive Awareness of Reading Strategies Inventory • Metacognitive Process Inventory	(Block cited in Bauserman, 2005; Jacobs & Paris, 1987; Miholic, 1994; Mokhtari & Reichard, 2002; Moore et al., 1997; Schmitt, 2001, 2005)

(Contd...)

Appendix: *(Continued)*

Initial Codes	Elements	Literature
Mediations on metacognition instruction	• Meta-teaching: mediating one's metacognition to help another make explicit their thinking and learning for self-appraisal and self-management • Dialogic talks/teaching; verbal interactions that provide individuals cognitive stimulus, expand their consciousness, and enlarge dialogic space for individuals' thinking and reasoning • Socratic questions; questioning oneself, capabilities, tendencies, incompetence, and thinking • Intelligent behaviors; being curious, collaborative, critical, creative, and caring • Language of thinking; a tool for describing one's own and others' mental states and processes by epistemic stance, intellectual process, and intellectual product vocabulary. • Teachers' modeling thinking, the language of thinking, and strategic reading • Using instructional aids; for example, reading action plans or regulatory checklist of metacognitive strategies • Explicit teaching of metacognition; informing students about the importance and utility of the strategies; for example, by the WWW&H rule (what to do, when, why, and how) • Teaching distinction and reciprocity between cognition and metacognition • Students' practicing and sharing experiences of thinking, the language of thinking, and strategic reading (via, for example, dialogic teaching, cognitive apprenticeship, and PROMISE) • Teachers' coaching; offering students appropriate scaffolding and feedback • Students' doing self-assessment • Cooperative learning environments (for example, PAL)	(Collins et al., 1991; Collins, 1991; Donndelinger, 2005; Duffy, 2002; Fisher, 1998, 2007; McDevitt & Ormrod, 2016; Plato, 1961; Schraw, 2001; Tishman & Perkins, 1997; Veenman et al., 2006; Zimmerman, 2000, 2002)
Research on metacognition instruction	• Scaffolded instruction: promotes the dialogue between the teacher and students to provide students with support that may be beyond students' extant level • Reciprocal Teaching: focuses on predicting, questioning, clarification, and summarizing skills and enables students to alternate roles from the teacher- to-learners by gradually taking over responsibility • Direct instruction: cognitive and metacognitive strategies are the content of the lesson; explicit instruction via the WWW&H rule, the class discusses, practices, and reflects on the strategies • Cognitive Academic Language Learning Approach; preparation, presentation, practice, evaluation, and expansion. • Cognitive coaching: embraces the components of direct and scaffolded instruction, utilizes concrete analogies and metaphors for strategies, and holds group discussions • Informed Strategies for Learning aims to increase students' understanding of reading tasks, goals, and strategies via an explanation of what, how, and why various strategies influence reading • Cooperative learning; the instructional practice of social exchange of shared knowledge by modeling, direct explanation, scaffolded instruction, and group activities; flows through gradual release of responsibility • Transactional Strategies Instruction aims to teach students coordination of a repertoire of strategies, to increase nonstrategic world knowledge, and to encourage them to theorize about reading in a small interpretive community eagerly	Anderson, 1992; Book et al., 1985; Borkowski & Muthukrishna, 1992; Casteel et al., 2000; Çer & Şahin, 2016; Duffy, 2002; Duffy et al., 1986, 1987, 1988; Duke & Pearson, 2008; Gourgey, 1998; Jacobs & Paris, 1987; Klingner et al., 2004; Klingner et al., 1998; Klingner & Vaughn, 1998; Michalsky et al., 2009; Palinscar & Brown, 1984; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Pressley, et al., 1992; Pressley, et al., 1992; Rieser et al., 2016; Rosenshine & Meister, 1994; Van Keer & Vanderlinde, 2010; Varga, 2016; Vaughn et al., 2001; Vaughn & Klingner, 1999; Vygotsky, 1978

(Contd...)

Appendix: *(Continued)*

Initial Codes	Elements	Literature
	• Cooperative Strategic Reading aims to improve students' reading comprehension and increase conceptual learning by previewing the text, monitoring comprehension, using fix-up strategies, identifying the main idea, and summarizing the text by generating questions as they work collaboratively • IMPROVE aims students to adopt metacognitive questions, comprehending the phenomenon in the text, connecting previous and new knowledge, solving problems, and reflecting on the process and solution. • Reading-phase-dependent metacognition instruction • Prolonged training	
Supplementary instructional practices for metacognition	• Self-questioning: pertains to one's awareness of the utility of clarifying and comprehension monitoring concerning task demands • KWL: self-questioning for what is Known about the topic, what one Wants to learn, and what has been Learnt • Questioning the author; aims for students' query of the text and collaborative discussion for a critical disposition toward the text • Think aloud; involves the overt verbal expressions of covert mental processes during strategic reading • PQS; a discourse model of Probing thinking and knowledge about the topic, Questioning the basis of thinking, and Scaffolding students towards a deeper understanding	(Baumann et al., 1992; Beck et al., 1996; Carr & Ogle, 1987; Duke & Pearson, 2008; Garner, 1987; Israel, 2007; Jones, 2007; Joseph et al., 2015; McKeown & Gentilucci, 2007; O'Donnell et al., 2007; Ogle, 1986; Vygotsky, 1978; Williamson, 1996; Wong, 1985)
Theories for metacognition instruction	• Social cognitive theory: Vicarious and Observational learning Direct, vicarious, and self-reinforcement • Self-regulated learning: Co-regulation (with the teacher) Shared regulation (with peers) • Social constructivism: Functions of language (i.e. private and inner speech), Zone of proximal development Scaffolding and Instructional conversations Inter-subjectivity and transfer of responsibility • Gradual release of responsibility; purposeful shift of cognitive load from the teacher to joint responsibility of teacher and students, and the students	(Bandura, 1977, 1986; Fisher, & Frey, 2013; Fox & Riconscente, 2008; Hartman, 2001; Lee & Schmitt, 2014; O'Donnell et al., 2007; Pearson & Gallagher, 1983; Pearson & Gallagher, 1983; Rogoff, 1998; Rosenshine & Meister, 1994; Vygotsky, 2012)
Assessment of metacognition instruction	• Metacognition instruction should be delivered explicitly, analytically, adaptively, directly • Teachers' modeling and thinking aloud • Helping students discover their reader characteristics including interests, strengths, and weaknesses • Listening to students' approaches to reading • Providing students with opportunities to make choices, control challenge, and work in groups to practice metacognition, different task, scaffolding, and feedback, • Having students do reflection, think aloud, metacognitive discussions, and self-assessment • Assessing students' metacognition • Teachers' pedagogical understanding of metacognition	(Bolhuis & Voeten, 2001; Curwen et al., 2010; Duffy, 1993, 2002; Ewijk, Dickhäuser, & Büttner, 2013; Fisher, 2002; Kerndl & Aberšek, 2012; Kurtz et al., 1990; Ozturk, 2017; Paris et al., 1986; Perry et al., 2008; Thomas & Barksdale-ladd, 2000; Wilson & Bai, 2010; Zohar, 1999)