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A SHORT REVIEW OF RESEARCH ON METACOGNITION TRAINING WITH ELEMENTARY STUDENTS

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Abstract

Reading is an important skill to be mastered at a very early age. Apart from the awareness of print and phonological sensitivity, other factors like vocabulary knowledge, cognitive, and metacognitive skills gain importance through different levels of reading performance. Supporting comprehension, metacognitive strategies are recommended by many experts. This review, therefore, aimed to understand what experimental research on metacognitive strategy training has revealed about elementary students' reading performance. Covering an analysis of six studies, this paper found out being explicitly trained with metacognitive strategies has a beneficial effect on reading comprehension. Children's reading comprehension and performance improved significantly. Besides, teachers' being knowledgeable about metacognition and how to teach metacognitive strategies, reading texts' being familiar to students, and instructional methods which benefit from the concept of scaffolding can be related to effective metacognitive strategy trainings. Considering the limitations of the studies, some implications for future research were provided.

Key Words: Metacognition, metacognitive training, reading, comprehension, experimental research.

INTRODUCTION

Helping students widen their knowledge, communicate with others, and continue their studies (Royanto, 2012), reading is an important skill to be mastered at the very early ages. Defined by Myers and Paris (1978), reading is "a complex behavior that involves interactions among perceptual processes, cognitive skills and metacognitive knowledge" (p. 680) and skills (Boulware-Gooden et al., 2007). Mayer and Paris's reading definition proposes that an awareness of print and phonological sensitivity are crucial factors (Boulware-Gooden, Carreker, Thornhill, & Joshi, 2007) for comprehension building. However, they are not enough. Other factors like vocabulary knowledge and metacognitive skills gain importance once students progress through different levels of reading comprehension. When either component is inadequate, comprehension can be impeded (Boulware-Gooden et al., 2007). In other words, students who possess decoding skills do not necessarily become fluent and competent readers. It is because, as Gray (as cited in Stauffer, 1969) highlighted for effective reading, the reader needs not only to decode the symbols and recognize important ideas presented in the text, but also s/he needs to monitor his/her understanding, evaluate the ideas presented in the text critically, discover the relationships among them, make decisions, reflect on, and synthesize what s/he reads while clarifying his/ her understanding of the ideas presented by the author (Bilgi & Özmen, 2014; Boulware-Gooden et al., 2007). All these are crucial and interacting components of comprehension, the main reason of reading (Boulware-Gooden et al., 2007).

Reading comprehension is a deliberate action, requiring self- invoked plans, cognitive skills, awareness and deliberate use of before, during and after-reading comprehension monitoring and regulation strategies (Myers & Paris, 1978; Bilgi & Özmen, 2014). For efficient reading, readers need to not only use cognitive strategies but also benefit from metacognitive strategies. While cognitive strategies are necessary to make meaning out of content and to gain contextual information, metacognitive strategies support comprehension monitoring and regulation of cognitive processes and strategies (Gredler, 2001; Bilgi & Özmen, 2014). Stated to be a good predictor of text comprehension in many studies (Artelt, Schiefele & Schneider, 2001), metacognition is defined by Gresten, Fuchs, Williams and Baker (as cited in Bilgi & Özmen, 2014) as one's ability to manage and control his/her cognitive activities and evaluate if s/he performs them well enough or successfully.

Asking what kind of instruction best promotes the development of reading comprehension and vocabulary (Boulware-Gooden et al., 2007), most of the researchers have pointed to explicit strategy trainings. And, it is well-emphasized as an important component of literacy education. Regarding metacognition, Cross and Paris stated that (1998) "children receiving metacognitive training show enhanced awareness and reading skills" (p. 132); thereby, this review, initially, aims to answer if explicit metacognitive trainings can improve students' reading comprehension performance. In relation to this question, this paper also aims to identify characteristics of effective metacognitive strategy trainings leading to enhanced awareness, skills and reading performance. Therefore, by reviewing related literature and research, this paper aims to contribute to reading literature by categorizing common findings of metacognitive strategy trainings and gaps in the studies. So that, concerning the implications, this paper can provide some ideas for future studies.

METHOD

For this analysis of "metacognitive training and reading" work, the author, first of all, set the publication identification and selection criteria. In order to browse and choose studies, following criteria were utilized; participants' age, explicit instruction, experimental research, and native language.

First of all, (a) the participants in all studies were young children older than 8. As Veenman et al. (2006) and Berk (2003) stated, metacognitive skills emerge at the age of 8 to 10, and children younger than 8 are less sensitive to metacognitive variables (Mayers & Paris, 1978). This review, thereby, covers studies whose participants are 3rd graders as the youngest. Also, (b) all studies in this review tested the impacts of explicit metacognitive strategies trainings. This is because, as stated beforehand explicit strategy instruction is an important component of literacy education (Boulware-Gooden et al., 2007). And, when children are instructed for metacognition, they become more aware of their own thinking while they are reading (Paris & Winograd, 1990). Regarding metacognitive trainings, Paris and Winograd (1990) stated that in order to promote such an awareness, children need to be informed about effective strategies and discuss cognitive characteristics of thinking. Similarly, Livingston (2003) emphasized that "providing the learner with both knowledge of cognitive processes and strategies (to be used as metacognitive knowledge), and experience or practice in using both cognitive and metacognitive strategies and evaluating the outcome of their efforts (develops metacognitive regulation)" (p. 5) is the most effective instructional approach. Because explicit metacognitive instruction transfers responsibility for monitoring learning from teachers to students themselves, "promotes positive self-perception, affect, and motivation among students…[and] fosters independent learning" (Paris & Winograd, 1990, p. 15), this review specifically focused on such interventions. Moreover, as one of the aims of this review is to understand the impacts of metacognitive strategy trainings on reading comprehension over any other educational practice, the third criteria is choosing (c) randomized- and quasi- experimental research designs. Randomized experimental research designs are the best available scientific tools for investigating which educational practices work best and for comparing the benefits of different educational practices (Cook & Sinha, 2006). Through random assignment to intervention and control groups, prior to the intervention participants in both are considered equivalent, and this "allows the effects to be attributed to the treatment" (Desimone & Le Floch, 2004). Moreover, like Towne (as cited in Desimone & Le Floch, 2004), Desimone and LeFloch (2004) argued that quasi-experimentation also reserve the characteristics of rigorous and scientific research by incorporating objectivity, systematicity, and peer-review. Finally, the scope of this review targets (d) reading comprehension in one's native language. Apart from the importance of first language reading proficiency as mentioned beforehand, regarding Cummins' (as cited in Muñiz-Swicegood, 1994) Interdependence Hypothesis, studies done in second/foreign language were not taken in the scope of this paper purposefully. Although there are abundant studies investigating the effects of metacognitive training on second/foreign language reading performance, the participants in most of such studies were generally young adults or adults. Therefore, it is anticipated that when a person is proficient in his primary language, cognitive, academic, and literacy skills transfer to the second language (Muñiz-Swicegood, 1994; Thonis, 1983). And, regarding reading experiences, prior knowledge, and cognitive development, second language young adult learners and first language youngsters cannot share similar characteristics, so that they can reflect divergence in acquiring and utilizing metacognitive strategies.

LITERATURE REVIEW

Theoretical Background

Metacognition: The knowledge about and regulation of one's cognitive activities within a learning process was defined as metacognition by Flavell and Brown (as cited in Veenman et al., 2006). While Veenman et al. (2006) defined metacognition as "a higher-order agent overlooking and governing the cognitive system, while simultaneously being part of it" (p.5), Jacobs and Paris (as cited in Michalsky, Mevarech, & Haibi, 2009) stated that metacognition "is the conscious self-awareness of one's own knowledge of task, topic, and thinking, and the conscious self-management (executive control) of the related cognitive process" (p. 364).

Veenman et al. (2006) argued that if metacognition is a set of self-instructions to regulate task-performance, then cognition is the vehicle for these self-instructions (Veenman et al., 2006). In order to understand this two-way mental processing and to conceptualize metacognition better, Nelson's (1996) Metacognitive Model of consciousness and cognition can be referred. Distinguishing "object-level" (cognitions concerning external objects) and "meta-level" (cognitions concerning cognitions of external objects) processes, Nelson's Metacognitive Model highlighted that "any lower-level cognition can itself be the subject of a higher-level cognition" (p. 105). It is because

[t]wo general flows of information between both levels are postulated [simultaneously]. Information about the state of the object-level is conveyed to the meta-level through monitoring processes, while instructions from the meta-level are transmitted to the object-level through control processes [see Figure 1]. Thus, if errors occur on the object-level, monitoring processes will give notice of it to the meta-level and control processes will be activated to resolve the problem" (Veenman et al., 2006, p. 4).

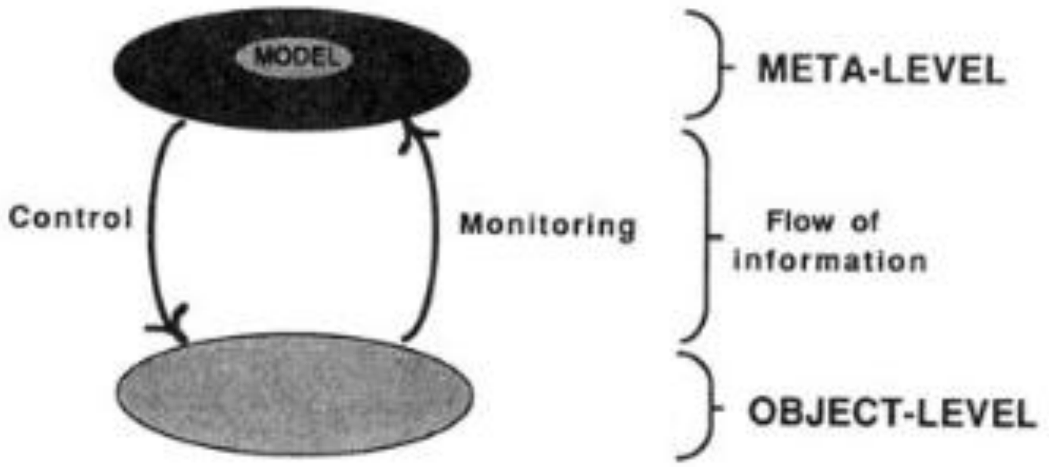

Figure 1: Hierarchical Organization of Meta-Level and Object-Level, and Hypothesized Flow of Information: (Nelson, 1996, p. 105).

Nelson's (1996) model, combining the common distinction of metacognition; metacognitive knowledge and skills (Veenman et al., 2006), illustrates three features schematically. First of all, information from the object-level to meta-level is called *monitoring* which informs the metal-level about the object-level. Second, information from the meta-level to the object-level is called *control* which informs the object-level about what to do next. And finally, meta-level, having goals and ways to support object-level activities, accomplishes pre-determined goals by communicating back and forth with the object-level.

Components of metacognition: Metacognition, the knowledge and control of one's own thinking and learning, includes two categories of mental activities: "self-appraised knowledge about cognition and self-management of one's thinking" (Cross & Paris, 1988, p. 131).

Metacognitive knowledge about cognition includes the variables which influence thinking and the sensitivity to act accordingly (Flavell, 1979). Declarative knowledge, one's understanding of *what* influences reading, refers to the interactive characteristics of person, task, and strategy variables (Veenman et al., 2006). This knowledge ensures (a) the awareness of personal enduring characteristics and temporary conditions influencing one's performance; realistic appraisal of one's potential to engage in appropriate skills, (b) the knowledge of task requirements, purposes and scope to attack the problem/task efficiently, and (c) the awareness of relevant strategies along with the recognition to apply them (Myers & Paris, 1978). Besides, *procedural knowledge* is about regulating problem-solving and learning activities (Veenman et al., 2006), and it is displayed in the form of heuristics and strategies (Schraw, 1998). Reflecting "an appreciation for *how* skills operate or are applied" (Cross & Paris, 1988, p. 131), procedural knowledge can host a large variety of strategies (Pressley, Borkowski, & Schneider, 1987). Also, as metacognitive skills are stated to have a feedback mechanism (Veenman et al., 2006), in time tasks can be performed more easily, efficiently and automatically. Finally, metacognition, serving as "an executive function of coordinating and directing the learner's thinking and behavior" (Myers & Paris, 1978, p. 680), includes *conditional knowledge* referring to one's knowing *when* and *why* to use declarative and procedural knowledge. In order to accommodate various conditions, conditional knowledge helps the individuals apply and adapt their strategies (Bilgi & Özmen, 2014) by allocating their resources.

Metacognition also includes self-management of cognition. It includes the skills which allow "the readers to adjust changing task demands as well as to successes and failures" (Jacobs & Paris, as cited in Michalsky et al., 2009, p. 364). These skills are generally categorized in three components: planning, regulation, and evaluation. In the context of reading, as readers' metacognitive awareness and executive control orchestrates meaning construction, the reader, first of all, needs to plan his/ her reading activity. By selecting particular strategies, activating background knowledge, and generating hypotheses regarding the tasks' and reading material's characteristics, the reading activity is planned for the best potential comprehension. Moreover, the reader needs to regulate her/his reading activity by monitoring and redirecting his/ her activities and strategies to reach the desired goals. And finally, metacognitive evaluation, having a multifaceted nature, refers to a holistic analysis of not only task characteristics and personal abilities, but also the assessment of reading process and goal-fulfillment leading to the generalization of the satisfying behavior (Myers & Paris, 1978; Cross & Paris, 1988) for future performances. Hyde and Bizar (as cited in Muniz-Swcegood, 1994) defined these as "metacognitive processes… in which individual carefully considers thoughts in problem solving situations through the strategies of self-planning, self-monitoring, self-regulating, self-questioning, self-reflecting, and or self-reviewing" (p.83).

Metacognitive instruction: Veenman and his colleagues (2006) stated that children show considerable variations in their metacognitive adequacy. Some children may pick up metacognitive knowledge and skills from a more competent peer, their teachers, or parents while some may not be that much lucky to benefit from the ample opportunities of an environment with a metacognitive tutor. Some children can successfully make use of the scarce opportunities to acquire metacognitive knowledge and skills, whereas some other children cannot acquire a proper metacognitive repertoire. Either they may not have the opportunity to do so, or they may not see the relevance of building such a set of knowledge and strategies (Veenman et al., 2006). However, all students, still, need to monitor and regulate their own reading process (Michalsky et al., 2009) for better comprehension. It is because as Michalksy et al. (2009) emphasized reading is not merely limited to translating printed symbols into meaning. It is an interactive meaning making process between the text and the reader.

Because of the differences in students' metacognitive knowledge and skills, it is always beneficial to know about the characteristics of target group to be trained. Veenman, Kerseboom, and Imthorn (2000) made a distinction between children who suffer from availability and production deficiency of metacognition. For the children with an availability deficiency, the metacognitive instruction should start from the very beginning. It is because such children do not possess sufficient metacognitive knowledge and skills. On the other hand, children with a production deficiency fail to use their certain level of metacognitive knowledge and skills because of reasons such as test anxiety, task difficulty, lack of motivation, or not being able to relate their metacognitive repertoire to the particular task. As DeBoy (1991) stated metacognitive awareness does not necessarily end in metacognitive strategy use. Therefore, in such a case, Veenman, Kok and Blöte (as cited in Veenman et al., 2006) suggested that instruction can be limited to cueing metacognitive activities. So, when deciding how to and what to train children with, it is important to be aware of what they possess and what they need (Veenman et al., 2006).

Regarding metacognitive trainings, Veenman, Elshout, and Busato stated that "[m]etacognitive instruction appears to enhance metacognition and learning in a broad range of students" (as cited in Veenman et al., 2006, p. 9) because students are encouraged to think about how they comprehend a text and what they should do next (Quinn & Wilson, as cited in Michalsky et al., 2009) within the course of metacognitive trainings. For an effective metacognitive instruction, Veenman et al. (2006) stressed the importance of (a) ensuring connectivity by embedding metacognitive instruction in the content matter for connectivity, (b) informing children about the usefulness of metacognitive strategies and activities, and (c) guaranteeing the smooth and maintained application of metacognitive activity through prolonged trainings. These principles are maintained via *WWW&H* rule: What to do, When, Why, and How (Veenman, 1998). Students are basically modelled and guided for particular strategies presented through contextual examples supporting how and when to use them. While being modelled, students are also explained why a particular strategy is being handled in a particular case, and how useful it is for their reading comprehension. Explicit instruction is important for students' rationalization of the effective procedures; therefore, they can recognize appropriate contexts for its use, develop criteria for evaluating their strategy use, and self-regulate themselves and their reading process (Hartman, 2001).

In addition to Veenman et al.'s (2006) suggestions for effective metacognitive strategy trainings, Schon (as cited in Michalsky et al., 2009) made a fundamental distinction between two kinds of metacognitive instruction: metacognition (a) on action and (b) in action. The first one refers to the reflection process taking after reading. It is when the students construct and evaluate the explicit information (or theories) of action to be used for task requirements. Such a process is activated when the reader encounters a problem which contains an element of uncertainty or a conflict, s/he, therefore, needs to consciously confront her/his tacit knowledge to deal with the requirements. On the other hand, metacognition in action is about the interaction with a live problem as it reveals. Seibert (as cited in Michalsky et al., 2009) stated that in-action metacognitive process is active when the task requirements does not include a sense of uncertainty or surprise; thereby, the reader tends to deal with it spontaneously on the basis of his/her tacit knowledge. Contributing metacognition literature by introducing the term premetacognition stage, Raelin (as cited Michalsky et al., 2009) focused on three opportunities for metacognition to be taken care during instructions: "(a) anticipatory metacognition, occurring prior to the experience (often at the planning stage); (b) contemporaneous metacognition, occurring at the moment (metacognition in action per Schon's [1996] terminology); and (c) retrospective metacognition, looking back at the experience (metacognition on action)" (as cited in Michalsky et al. , 2009, p. 364)

ANALYSIS OF LITERATURE

In this part of the review, a synthesis of empirical studies investigating the effects of metacognitive trainings on children's first language reading comprehension is provided. Although there has been a common emphasis on integrating metacognitive strategies in literacy education (Royanto, 2012), it is still important to understand (a) if children can be taught metacognitive strategies, (b) if engaging in metacognitive strategies contributes to reading comprehension/achievement, and (c) some characteristics of effective metacognitive trainings. Because of the rigorous research-selection criteria, the content of this review has been developed in an interconnected method. Each consecutive research calls for the following one to enlighten the phenomenon more and to answer the research questions.

Metacognitive Strategies Can Be Taught and They Benefit Reading Performance

In the first metacognitive training study, carried out by Royanto (2012), the prediction of that "metacognitive strategies can be enhanced in classroom setting with an intervention program using reciprocal teaching, peer tutoring and home reading" (Royanto, 2012, 1603) was tested through a nonrandomized pre-and post-test control group design. The participants, 3rd grade students with an average or above average intellectual ability, assigned to different programs. The experimental group, taught through the principles of reciprocal teaching and peer tutoring for 20 sessions within a 2 month-period, proved that metacognitive strategies can be learned in classroom. The findings also announced that experimental group over-performed the control group in asking explicit questions, verification, making right conclusions and right elaborations while post-test proved that the control group students used wrong conclusion and rereading more. Besides, it was stated that the experimental group gained new strategies; lagging of the problem, defining, and elaboration with expression after the treatment.

Taking the role of scaffolders, teachers or peers can help novice readers to reduce the zone of proximal development (Royanto, 2012) by providing cues, prompts, modeling, asking questions and discussing. As it is stated by Pea (as cited in Royanto, 2012), through discussions and dialogues, distributed cognition occurs in a dynamic and complex environment. Reciprocal teaching, helping students to build their comprehension with the help of interacting learning components, support novice readers to develop their metacognitive strategies and accommodate their needs simultaneously. Expressing themselves freely, students start to facilitate their own learning, develop their own learning tools, and direct their own thinking. The dialogue between the expert and the novice stimulates the transfer of intermental processes to intramental ones (Royanto, 2012).

Royanto's (2012) contribution to metacognition and reading literature is important for highlighting that metacognitive strategies can be taught to young children in classrooms as long as teachers scaffold students and pay attention to their learning pace along with needs. However, in her study, the author fails to depict the intervention program well enough and assess students' comprehension following the training despite of presenting increased use of metacognitive strategies. Grounded on the idea that reading comprehension does not naturally develop without any direct teaching of comprehension, Boulware-Gooden et al. 's (2007) study has a potential to amplify the weak points in Royanto's (2012) study.

Covering a detailed description of metacognitive strategy instruction, Boulware-Goodden et al. 's (2007) experimental study was carried out to determine "the effectiveness of *systematic direct instruction of multiple metacognitive strategies* designed to assist students in comprehending text" (p.72, emphases added). The research took place in 6 third-grade classrooms. The experimental group was trained for metacognitive strategies directly for a period of five weeks following the pre-tests, which announced that control and experimental groups were not statistically different in reading comprehension and vocabulary.

Metacognitive strategies were instructed in a lesson composed of five parts. *Introduction* part was where the teacher hooked students' attention and activated their background knowledge by asking a question, showing a visual, or by simply telling a joke or riddle. In this part, the purpose of the lesson was stated explicitly. In *vocabulary* part, the students were introduced new vocabulary items which were demonstrated by semantic webs. The semantic webs connected parts of speech, synonyms, antonyms and any other related words. The words with multiple meanings were webbed in multiple webs. In *reading the story* part, students read the story; but before reading, they reviewed their answers to the initial questions which the teacher had asked. Then, while reading, students were reminded to think aloud (if their predictions were right, students were expected to say "yes". If they need correction, they said "oops". And, when they learnt something new, they softly exclaimed "wow" or "aha"). To control individual differences in decoding, on the first week, the teacher read the passages. On the second and third weeks, students read the passages chorally, and 4^{th} and 5^{th} weeks were when the students read the materials silently on their own. In *summary* phase, the students were asked to identify the main idea, supporting ideas, and details in the reading materials. By using a card pyramid, the teacher wrote students' responses on the board or on the overhead. On this pyramid, the main idea was the top card and the supporting ideas were juts placed under it. Similarly, the details were placed under each related supporting idea. Ordered and labeled numerically, these cards were to help students to summarize the reading passages orally. Following this activity, students were asked to write a summary containing a quarter of the words in the passage. Just like in the case of reading passages, the teacher initially was the scribe. Lastly, in *questions* part, teacher asked simple and complex questions for which the students had to use their background knowledge and integrate the main idea and supporting details, drawing conclusions from the reading passages. They also had to clarify the details, and define the vocabulary in context (Boulware-Gooden et al. , 2007). The authors compared pre-and post-test scores of experimental and control groups on a criterion-referenced vocabulary test and a standardized reading comprehension test. And, the experimental group was found to outperform the control group, taught via traditional literacy method, both in vocabulary and reading comprehension. They showed a 40% difference in vocabulary gains and a 20% difference in reading gains attributed to the metacognitive intervention (Boulware-Gooden et al., 2007).

Another study, producing some evidence for metacognitive strategy instructions' effectiveness regarding compression outcomes, was carried out by Muniz-Swicegood (1994). Benefiting from the metacognitive strategies training research carried out with monolingual English- speaking children, Muniz-Swicegood (1994) investigated the effects of metacognitive strategy training on bilingual Spanish dominant children's Spanish and English reading performance. Strengthening Cummins' 'Interdependence Hypothesis' (ac cited in Muniz-Swicegood, 1994), which states that "an instructional focus on the development of dominant language literacy will have a positive impact on second language literacy" (p. 84), the results of this particular experimental study was noteworthy due to its evidence for metacognitive strategy's transfer across languages and presenting similar findings as in previous studies. Of 95 third-grade bilingual Spanish students, who experience reading problems, forty-eight were randomly assigned into experimental group. Being trained to use metacognitive reading strategies (self-generated questioning) for 90 minutes each day during a six-week Spanish reading period, the whole class was, first, modelled by the teacher. Then, like in Boulware-Gooden et al.'s (2007) study, the students worked in groups whose size got smaller each week until they could work on their own. Control group students, on the other hand, were instructed with third grade Spanish basal readers. At the end of the intervention, while students in the experimental group could read a story/paragraph, formulate self-generated questions, and discuss these with the teacher and classmates, an analysis of the pre- and post-test scores showed some evidence for "significant improvements in the types and frequency of metacognitive strategies" (Muniz-Swicegood, 1994, p. 92). Moreover, the metacognitive intervention in Spanish was noted to have a direct positive effect on both Spanish and English reading performances in experimental group tested by The Burke Reading Inventory (for metacognitive reading strategies), Iowa Test of Basic Skills (for English reading performance), and the La Prueba Spanish Achievement test (for Spanish reading performance). It was actually an important finding for "the effects of metacognitive instruction on the overall improvement of dual language reading and biliteracy development" (Muniz-Swicegood, 1994, p. 94). Similarly, it was stated that students also transferred self-generated questioning strategy to other social and academic situations.

Some Characteristics of Metacognitive Strategy Trainings

The experimental studies have so far highlighted that (a) young children can be taught metacognitive strategies explicitly, (b) strategy trainings have advantageous contributions to children's reading comprehension, and (c) once children internalize target strategies, they can transfer these to second language reading conditions or even to different academic and social settings. Apart from these studies, in literature there are some more studies depicting the interventions which produced meaningful findings; however, there is still a need for a clear portrayal of the essential groundings of metacognitive strategies training.

Gaultney (1995), developing her experimental study on the basis of the idea that "[e]xperts…are individuals with more elaborated knowledge base, or schemas, which allow them greater reasoning and memorial abilities" (p. 143) contributed to the understanding of essential characteristics of effective metacognitive strategy trainings with her research findings. Utilizing students' domain of expertise for teaching a comprehension strategy, Gaultney's (1995) idea was highly related to Bjorklund's (1988) suggestion of that previous knowledge can facilitate the acquisition of new strategies. To be retained and generalized, the strategies are better to be accompanied with relevant declarative and procedural metacognitive knowledge (Kurtz & Weinert, 1989).

In her study, Gaultney (1995) examined if domain knowledge (prior knowledge of baseball) facilitates poor readers' (N= 45) acquisition of self-questioning (asking why questions in response to the reading material). The choice of this specific strategy was done purposefully because it has been found to promote deeper processing of the material, the accuracy of text recall and self-monitoring, and the connections between prior knowledge and written material. And, the use of familiar content materials was rationalized regarding Kreutzer, Leonard, and Flavell's (as cited in Gaultney, 1995) study with kindergarteners. In Kreutzer, Leonard, and Flavell's study it was assumed that "[f]amiliar material may also facilitate the effectiveness of monitoring" (Gaultney, 1995, p.144), which generally results in improved reading performance (Baker & Zimlin, 1989). So, the participants, 4th and 5th graders, were randomly assigned to one of the four training conditions varying on two dimensions: (a) strategy training and (b) domain of the training material. The study produced groups of training-baseball, training-nonbaseball, control condition-baseball, and control condition-nonbaseball. The participants in training groups were instructed for 2 days with the target strategy. Like in all previous studies, students were modelled and progressively handed over the strategy use. Being compared for their pre-and posttests, the participants in training condition reading baseball texts demonstrated greater acquisition and retention of the strategy than the other three groups. This is because "[t]he use of familiar materials allowed them to read and comprehend with more automaticity, leaving more capability available for strategy acquisition" (Gaultney, 1995, p. 157). Although the other training group reading non-expertise materials were instructed with the same strategy, they showed less strategy acquisition. On the other hand, the control groups seldom used strategy at all.

Contributing to the features of how to instruct children with metacognitive strategies partially, Gaultney's (1995) findings had better to be combined with Michalsky et al. 's (2009) study, highlighting reading phase-dependent metacognitive instruction. As a traditional reading lesson is composed of three phases; pre-, while-, and post-reading, Michalsky et al. (2009) investigated the effects of metacognitive instruction (a) before, (b) during, and (c) immediately after reading scientific texts on students' scientific literacy, domain specific knowledge, and metacognitive awareness. Within a quasi-experimental design, 108 4th-grade students, who studied in heterogeneous classes, randomly selected from four elementary schools. Four teachers were randomly chosen from a group of 10, volunteering to continue further training in teaching reading scientific texts after participating in-service training programs.

Studying a unit on animals and plants three times in a week for 12 weeks, the students in 4 science classrooms read the same scientific texts and completed the same scientific tasks in cooperative learning groups. For this particular study, cooperative learning was the standard instructional method. Each cooperative group had one high achiever, two middle achievers, and one lower achiever. On the other hand, the 4 teachers were randomly assigned to one of the research groups: 3 metacognitive instruction groups and one control group. Three of 4 teachers, who were trained for enhancing students' scientific literacy and comprehension, were introduced to the rationale and techniques of the particular metacognitive guidance method which they would implement in their classrooms.

Examining the effects of metacognitive guidance provided (a) before (beMETA), (b) during (duMETA), and (c) immediately after (afMETA) reading a scientific text, Michalsky et al. (2009) took Mevarech and Kramarski's (as cited in Michalsky et al., 2009) IMPROVE method as the model. Presenting metacognitive strategies through IMPROVE method included four self-assessed metacognitive questions aiming for comprehending the phenomenon in the text, connecting previous and new knowledge, solving problems with an appropriate use of inquiry strategies, and reflecting on the processes and the solution. Related sets of questions were printed and distributed to the students and teachers in 3 experimental groups. Regarding reading phases, the beMETA group utilized self-addressed metacognitive questions prior to reading each text. While the duMETA group were exposed to the same questions during their reading, the afMETA group received these questions immediately after they finished reading the text. In each group, students were reminded that these questions would help them understand and remember the text better. Depending on the metacognitive questions' presentation time, students were allowed to discuss both metacognitive questions and task requirements (a) before, (b) during or (c) after reading the text in small groups. However, noMETA group read the text, discussed it in small groups, and engaged in the tasks after reading the text. They were not explicitly exposed to the metacognitive instruction.

Students were given domain specific test of science knowledge, test of scientific literacy, and metacognitive awareness questionnaire twice, at pre- and posttest intervals. And, the findings indicated no significant intergroup pre-test differences, but significant post-test differences on all variables. Reading scientific texts embedded in metacognitive instruction through IMPROVE was more effective in developing students' scientific literacy than reading without any metacognitive instruction. Within group comparison showed that students in afMETA group significantly outperformed all other groups on all outcomes: domain specific scientific knowledge; scientific literacy and metacognitive awareness. While beMETA group outperformed duMETA, noMETA scored the lowest.

In all studies so far, metacognitive strategies have been taught explicitly. Although this is a technique aligning with what most in-field researchers recommend, there is still a need for solid evidence to carry out such explicit trainings. This is because instructing metacognitive strategies asks for considerable amount of time and effort. It is not only an issue asking teachers to be well-equipped and prepared; students also need to endeavor to succeed the target strategies by practicing well enough (Kraayenoord, & Schneider, 1999). Therefore, it is important to identify both effective and long-lasting educational practices, so that limited sources are not wasted in vain.

Motivated by the question "What can teachers do to improve their students' performance in reading comprehension?" (Houtveen & Van de Grift, 2007,p. 173), Houtveen and Van de Grift designed and carried out a quasi-experiment with 10-years old students in Dutch elementary schools to find out the effects of metacognitive strategy training and optimizing instructional time on reading comprehension. The experimental group composed of 11 schools with 344 students were instructed by the teachers who were trained in metacognitive strategy instruction and in optimizing teaching time for better reading comprehension. Being observed for their metacognitive strategy instruction and instructional time, the teachers were ranked on the instruments, using the event-sampling procedure and time sampling procedure, respectively. On the other hand, students were given a set of instruments including a questionnaire for metacognitive knowledge about reading, a reading attitude and reading materials questionnaire, a test for measuring reading comprehension, an intelligence test, and a questionnaire for SES, age, and gender.

The findings of the study can be divided into two regarding teachers and students. "[T]he teachers in experimental group outperformed the control group on metacognitive strategy instruction and instruction time with effect sizes (Cohen's *d*) of .34 and .87, respectively" (Houtveen & Van de Grift, 2007, p.183). In parallel with the scores of the teachers, in experimental group students also outperformed control group students regarding metacognitive knowledge. "[T]he effect size in favor of the experimental group was .38, which is a medium difference" (Houtveen & Van de Grift, 2007, p. 184).

Moreover, during the first months of the next school year, all students from former control and experimental groups were tested for their reading comprehension. The test results revealed that average score of the former control group was distinctively lower than the average score of former experimental group. Providing some evidence for metacognitive strategies' being learned and taught, this study also highlighted that intensive metacognitive trainings foster students' more automatic reading processes. Effective metacognitive strategy trainings led by teachers, who are knowledgeable about metacognition and well-prepared to teach metacognitive strategies by optimizing instructional time, can help students develop metacognitive skills and benefit from them in future, as well.

DISCUSSION AND IMPLICATIONS

Reading does not merely mean code-breaking and reading comprehension does not solely enhance by reading more texts. It is true that children need phonological and phonemic awareness, but still their understanding of written materials is to be supported with comprehension strategy instruction (Boulware-Gooden et al., 2007).

Veenman et al. (2006) stated that research on metacognitive training has a common conclusion; explicit metacognitive strategy trainings have a statistically significant effect on reading comprehension scores; nevertheless, Boulware-Gooden et al. (2007) raised an important issue to be considered regarding trainings. They stated that even though metacognitive strategies are thought to be valuable for text comprehension, "classroom teachers often fail to teach this process" (Boulware-Gooden et al., 2007, p. 72). In this review, two studies, Houtveen and Van de Grift's (2007) and Michalsky et al. 's (2009), had teachers instructed with metacognitive strategies and guided how to teach them. As partially correlated to students' reading outcomes in Houtveen and Van de Grift's (2007) study, teachers' effect in metacognitive strategy instruction is one of the areas to be investigated. More specifically, some studies investigating how teachers' being well-equipped with and well-knowledgeable about metacognitive knowledge and skills impact the effectiveness of metacognitive strategies training can be carried out. Even to take this idea further, instead of training teachers for research purposes, some studies can investigate pre-service teachers' readiness to teach metacognitive strategies. For that purpose, (a) if teacher education programs integrate metacognition in their curriculum, (b) how teacher-candidates conceptualize metacognition, and (c) what kind of beliefs and attitudes they have towards teaching metacognitive strategies in their future classes can be potential research questions to be investigated.

Moreover, all studies in this review were designed to test the common hypothesis: explicit metacognitive strategy instruction may affect children's reading comprehension positively. Although cumulative findings proved this hypothesis true, each study has its own particular pathway to explain the phenomenon more. While Royanto (2012) specifically investigated teaching metacognitive strategies through reciprocal teaching and emphasized the importance of scaffolding, Michalsky et al. (2009) used cooperative learning as the instructional method. Therefore, another important direction for future research is to investigate how to instruct students with metacognitive strategies best. Such research, aiming to make strategy acquisition more meaningful, relatively easy, motivating and effective for all students, needs to investigate, first of all, (a) how different instructional techniques and/or methods, for example reciprocal teaching, cooperative learning, traditional reading instruction, and concept-oriented reading instruction (Guthrie, Wigfield, Barbosa, Perencevich, Taboada, Davis, & Tonks, 2004), affect metacognitive instructions' effectiveness and (b) if teaching method have a confounding effect on students' reading performance .

Boulware-Goodden et al.'s (2007), Michalsky et al.'s (2009), and Gaultney's (1995) research also highlighted another important factor to be considered for strategy instruction: background knowledge and familiarity, respectively. In addition to testing students' reading comprehension enriched within different instructional environments, it is also important to investigate how text difficulty, familiarity, and prior knowledge affect students' strategy acquisition (Michalsky et al., 2009) and retention. Through an experimental design, students can be trained with the same metacognitive strategies in different instructional groups with reading texts whose familiarity level differs. So, future research can also investigate if text familiarity and instructional method have an interacting effect on metacognitive strategy training's effectiveness in a single study.

In addition, although enhanced reading comprehension results (product measures) were reported following metacognitive strategy interventions almost in each study in this review, these studies failed in reporting process assessment of children's (changing) knowledge about reading and metacognition. In other words, examining the effectiveness of metacognitive trainings should also cover how and why these trainings facilitate "increased reading outcomes" apart from simply reporting comprehension test results. To clarify this, the impacts of metacognitive trainings on children's understanding of reading, strategy acquisition, and reading engagement need to be investigated. For that, future studies can utilize mixed method designs and benefit from think-aloud protocols. "It [think-aloud] is a technique in which students verbalize their thoughts as they read and thus bring into the open the strategies they are using to understand a text" (Oster, 2001, p. 64). Requiring an awareness for meaning-making and a feedback mechanism for effective strategy use, think-aloud is the way to reach students' conscious material and cognition processing.

Lastly, taking Veenman, Kerseboom, and Imthorn's (2000) distinction between children who suffer from availability and production deficiency of metacognition into consideration, carrying out face-to-face interviews with students can be helpful to understand their awareness and use of metacognitive strategies and ,thereby, to adapt the metacognitive intervention. Although each research in this review benefited from metacognitive strategy trainings, there is still a need to understand how these interventions were developed. Aiming to satisfy students' specific learning needs and to benefit from their prior knowledge, future research may utilize some diagnostic tools. For this purpose, inspired by Flavell's (1979) theory, some interview questions may be developed to find out, for example, (a) if students set a goal before reading, (b) if they scan the text to activate background knowledge, or how they activate background knowledge, (c) if they underline some parts of the text for specific goal(s) or how they know they are on the right track. After collecting data for these, nature, purpose, and components of the prospective metacognitive training can be adjusted. Regarding students' needs and their prior knowledge, students reading comprehension can be supported purposefully.

CONCLUSION

This review has covered empirical studies on explicit metacognitive trainings and highlighted their common and important points regarding reading comprehension. Limited to six studies carried out with grade 3 to 5 children, it basically aims to contribute to the understanding and implications of metacognitive trainings in reading classes.

Emerging from the current analysis of experimental research, the common points to be considered for classroom applications and future research cover (a) explicit metacognitive strategy instruction and (b) very possible advantageous features of the interventions. First of all, in all studies, students were explicitly trained with metacognitive strategies and being trained with metacognitive strategies created an obvious and positive impact on children's reading comprehension performances. So, the findings about improved reading outcomes support what most research has recommend so far. Still, training children with metacognitive strategies to enhance their reading comprehension had better be done by teachers who are knowledge enough about metacognition and its training. Also, teachers' modelling and scaffolding can be integrated in collaborative learning and/or reciprocal teaching. This is because in such instructional environments children, progressively handed over the strategy use, can experience whole-class discussions, work in small groups, and finally work at individual levels to build up their metacognitive knowledge and skills repertoire.

Training children with metacognitive strategies requires a well-designed intervention program, as well. This is because, teachers' being well-informed about metacognition and metacognitive strategies may not be enough to reach the ultimate goal. As learning emerges from the interaction of learners, materials and strategies, by paying attention to each component children's metacognitive strategy development can be supported as much as possible. So, training children with familiar texts can be helpful, because they not only activate children's background knowledge, but also lessen the metal load. In addition to using familiar texts, opening a space for meaningful strategy acquisition, teachers can also consider about how to embed metacognitive knowledge and skills and benefit from them in each reading phase. Asking explicit self-generated questions, activating their background knowledge for the verification of their hypothesis, and making right elaborations with the help of "why" questions, students ought to be motivated to monitor and regulate their own reading processes in each phase of reading. To develop metacognitive skills, automatic and durable for future performances, these are important and advantageous acts.

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