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ROLES OF METACOGNITIVE STRATEGIES IN READING COMPREHENSION TASKS IN SPECIAL EDUCATION PUPILS

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Abstract

Metacognitive Strategies (MS), and in particular Metacognitive Reading Strategies (MRS) refers to intentional and directed cognitive activities that readers can use to monitor, control and evaluate meaning-in the reading process. There are studies indicating that students with a history of reading or learning deficits have difficulties using MRS. Despite the assumed importance of MRS as an intervention program, there is a lack of studies in this direction. We aimed to investigate the MRS used in Special Education programs for teaching reading comprehension, by examining the current literature. The objective of the study is to identify the aims and objectives related to the different types of programs described in the literature, as well as the outcomes and methods of assessment of MRS strategies. Most of the reviewed studies suggested a significant association between MS/MRS intervention programs and success or improvement in reading or reading comprehension. The results of this systematic review could be valued in designing MS/MRS intervention programs in schools, kindergartens and even higher education, since the investigated literature reveals an ongoing process of implementation of MS/MRS programs and its advantages. Methodological and conceptual issues relating MRS as intervention program were discussed

Keywords: Metacognitive Strategies, Special Education, Reading Comprehension, Intervention Programs.

1. Introduction

It is generally acknowledged that one of the main goals of reading is to extract meaning from a text. Two main components are involved in the reading process: decoding and language comprehension (Gough & Tunmer, 1986). Over the past several decades, researches on reading have focused on improving the reading comprehension of young students, in order to prevent reading and educational difficulties later in school. Some of those researches have targeted improved classroom instruction and the provision of intervention programs for students who struggle with learning to read (Cantrell, Almasi, Carter, Rintamaa & Madden, 2010).

Within the researches on the effect of reading comprehension and learning strategies on academic achievements, studies have reported differences between strategies that were metacognitive or behavior based. For example, students with learning disabilities (LD) preferred using more behavioral based strategies and less metacognitive strategies in comparison to students without LD, which in turn provided a differential explanation of academic achievement for students with and without LD (Proctor, Prevatt, Adams, Reaser, & Petscher, 2006; Ruban, McCoach, McGuire, & Reis, 2003). Metacognitive strategies (MS) regulate students' cognition by activating relevant cognitive approaches. Also, metacognitive strategies include cognitive domains and learning contents, which qualify them as higher order strategies (Donker, De Boer, Kostons, van Ewijk, & Van der Werf, 2014). Three subcategories of metacognitive strategies can be distinguished in the literature: planning, monitoring and evaluating the degree to which new information is being understood, integrated and retained (Flavell, 1979; Schraw & Dennison, 1994). A metacognitive approach to learning has been associated with deeper processing of information, and may be particularly important to academic success for students with reading or learning disabilities (Chevalier, Parilla, Ritchie, & Deacon, 2017; Kirby, Silvestri, Allingham, Parrila, & La Fave, 2008).

Within the concept of MS, the term "Metacognitive Reading Strategies" (MRS) refers to intentional and directed cognitive activities that readers can use to monitor, control, and evaluate meaning making in the reading process (Alexander & Jetton, 2000; in Bergey, Deacon, & Parrila, 2017). According to Olson, Platt & Dieker (2008), MRS are those strategies that involve the application of metacognition—awareness and monitoring of the relationship between cognitive resources and task demands to the process of reading. In the case of reading and learning disabilities, there is an association between the disability and inefficient or inadequate use or awareness of MS (Swanson & Siegel, 2001). Thus, on one hand, students with a history of reading or learning difficulties have been found to utilize fewer metacognitive study and learning strategies than the general students population (Swanson, 1990; Kirby et al., 2008). On the other hand, for students with reading difficulties, theoretically, it has been found that metacognitive reading and study strategies improve academic performance, as they may constitute behavioral and psychological means for coping with difficulties with word reading or reading comprehension (Levinson & Ohler, 1998).

Despite the assumed importance of MRS for children with learning disabilities in particular, or special education in general, an application of MRS as an intervention program has attracted little attention in the field of special education. The present study will systematically review the literature addressing the MRS-based intervention programs for special education students. Specifically, the study will focus on identifying the research aims, the tools that were used to assess MRS, the effect of MRS on academic achievements and the evaluation of those intervention programs. The rationale of the paper focuses on the

need for improving teaching and learning strategies and methods, in order to improve the way pupils with special needs deal with reading and comprehension. It is important to mention that this review will present the concept under the acronym MS/MRS; the studies reviewed in this paper used the concept of MS rather than MRS, although in most of them, the chosen strategies were related to reading.

2. Problem Statement

Since the assumed importance of MRS for children in special education, especially in the aspect of intervention programs, and the lack of systematic reviews in this field, the purpose of this study is to identify the aims and objectives related to the different types of programs described in the literature, as well as the outcomes and methods of assessment of MRS strategies

3. Research Questions

In the search for the main key points concerning metacognitive reading strategies, the following research questions were used as guiding elements:

1. What are the aims of the scientific studies of MS/MRS and reading comprehension in special education students?

2. What types of MS/MRS were used for special education students?

3. Which dimensions of MS/MRS are found to be significant for academic achievements or improving reading comprehension?

4. What dimensions of academic achievements were influenced by MS/MRS?

4. Purpose of the Study

The purpose of this study is to identify the aims and objectives related to the different types of programs described in the literature, as well as the outcomes and methods of assessment of MRS strategies.

5. Research Methods

In order to answer the research questions, the method used in this paper was the systematic literature review, which summarizes empirical studies on a particular topic, offers conclusions on the actual scientific knowledge base and reveals unresolved aspects that need further investigation (Cooper, 1998). The procedural guidelines of Uman (2011) were followed in designing and reporting the stages of the present systematic analysis of the literature.

Literature search included the following databases: Proquest-Educational database, SAGE- Social Sciences and Humanities, ERIC, APA PsycNet and EBSCO. The literature search was based on the following keywords and combinations: Metacognitive Strategies, Intervention Programs, Special Education and Reading Comprehension. Based on a search of each of the keywords separately, hundreds of articles were found. The combination of all the key words together revealed dozens of articles, which were filtered according to the following inclusion criteria:

- Studies had to be published in *English*;
- Studies had to be published between 2007 and 2017 in peer review journals;

- Studies had to allow full text access.

As a result of the keywords search, 36 studies were initially identified in the database. After using the inclusion criteria, 24 studies were excluded. 4 studies were removed due to duplication. 3 studies were excluded since they did not deal with special education or reading comprehension, such as articles addressing math, or articles targeting specific group/category of individuals (e.g. alcohol addicts or acquired brain injury). In the end, 5 studies were included in this review. The selection process is illustrated in Figure 1 in a flow chart.
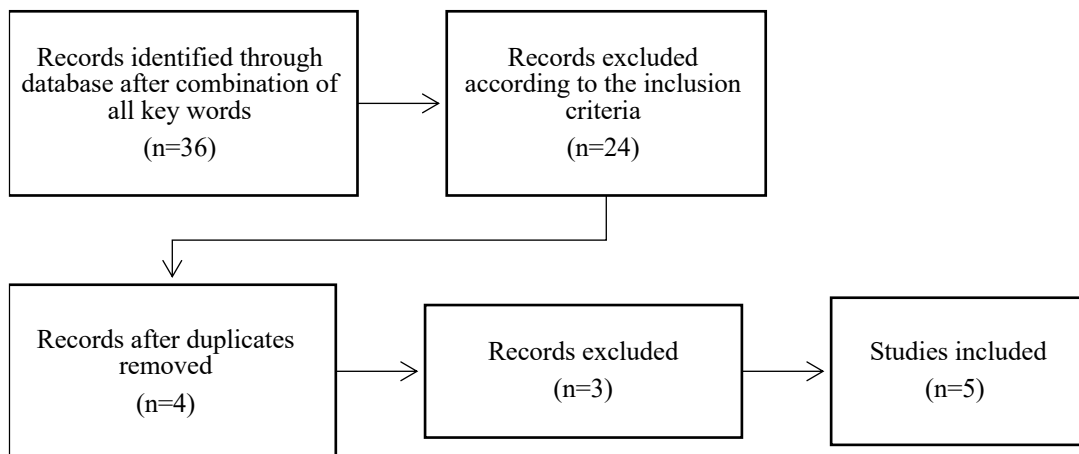

Figure 01. Flowchart for the selection process of the studies referring to MRS intervention programs for special education students.

6. Findings

All the reviewed studies addressed special education pupils or students, but they differed in the specific population chosen for the research, as well as on the ages of the participants. Three studies dealt with children who study in school, i.e., in 4th grade students (Clarke et al, 2010), children aged between 7-11 years (Tannock et al., 2016), and 6th or 9th grade students (Cantrell et al, 2010). One study dealt with young children with a mean age of 5.8 (Schiff, Ben- Shushan & Ben Artzi, 2017) and one study dealt with adult students (Chevalier et al., 2017). This study dealt with students with a history of reading disabilities. Tannock et al (2016) investigated children with ADHD and reading disabilities, Schiff, Ben- Shushan & Ben Artzi (2017) investigated children with SLI (Specific Language Impairment) and Clarke et al. (2010) focused on children with specific reading- comprehension difficulties. One study (Cantrell et al., 2010) did not characterize a specific group and only mentioned that in the intervention conditions a larger proportion of students received special education reading and writing services than in the control group.

Research question 1: What are the aims of the scientific investigations of MS/MRS and reading comprehension in special education students?

Generally, all the studies included in the systematic review aimed to investigate the influence of MS/MRS on academic performance of students. While most of the studies (Cantrell et al, 2010; Clarke et al, 2010; Sciff, Ben- Shushan & Ben Artzi, 2017; Tannock et al, 2016) compared different intervention programs through experimental design studies, including MS/MRS intervention, Chevalier et al (2017) used a self-report study in order to understand the influence of MS/MRS on academic performance. The full list of research aims of the studies included in the literature review is presented in Table 1.

Table 01. Identified aims of scientific investigations of metacognitive strategies and reading comprehension of special education students presented in the reviewed studies (2007-2017)

Aims
- Compare the use of metacognitive reading, learning and study strategies in students with a history of reading disabilities and to understand which strategies are associated with successful academic performance.   - Evaluate improvements in behavioral and reading outcomes for children with ADHD (Attention Deficit Hyperactivity Disorder) and reading disabilities using academic and pharmacological intervention.   - Examine the efficacy of three interventions designed to improve reading comprehension for children with specific reading comprehension difficulties.   - Examine the effect of teaching a comprehensive set of strategies in a Learning Strategies Curriculum on reading comprehension.   - Examine whether incorporation of MS into metalinguistic teaching of spelling would improve spelling and reading performance of children with SLI more than an intervention that did not train children in such strategies.

Research question 2: What types of MS/MRS were used for special education students?

Different tools that were used to measure the metacognitive strategies in the reviewed studies are presented in Table 2. Most of the studies presented and mentioned specific aspects of metacognitive strategies. Hence, Chevalier et al (2017) presented a self- report study which asked students with a history of reading disabilities about their use of metacognitive strategies such as information processing, selecting main ideas, self- testing, study aids, test strategies and time management. Cantrell et al (2010) also used a self- report measure as a part of an intervention program and in their MARSI measure they used items related to global reading, problem solving and support strategies. Clarke et al (2010) mentioned other components in their TC (Text Comprehension) program (reread, look-back, visualize, think aloud and self-explanation). Schiff, Ben- Shushan & Ben Artzi (2017) investigated a group of children with SLI who received metalinguistic instructions that integrates metacognitive strategies, including goal definition, planning, process monitoring during performance and product evaluation after performance. One study did not elaborate on the components of the MS/MRS intervention program, and only mentioned that its purpose was to train children to use and monitor the application of MS/MRS for both academic (mathematics, organizational skills and reasoning) and social settings (Tannock et al., 2016).

Table 02. Metacognitive strategies used for special education pupils in the reviewed literature (2007-2017)

Item	Number	Tools that were used
Self-report study	2	LASSI (Learning and Study Strategies Inventory; Weinstein & Palmer, 2002, in: Proctor et al., 2006), MRSQ (students' use of metacognitive reading comprehension; Taraban et al, 2000, in: Chevalier et al., 2017)
Training program	3	MARSI (Metacognitive Awareness of Reading Strategies Inventory; Mokhtari & Reichard, 2002 in: Cantrell et al, 2010) as a part of a Learning Strategies Curriculum (LSC) GCAST (General Cognitive and Academic Strategy Training, Tannock et al., 2016) TC program (Text Comprehension, Clarke et al., 2010) Metacognitive strategy program for MCML (metalinguistic instruction that integrates metacognitive strategies) group (Sciff, Ben-Shushan, & Ben Artzi, 2017).

Research question 3: Which dimensions of metacognitive strategies are found to be significant for academic achievements/ improving reading comprehension?

The analysis reveals that most of the studies included in the literature review (Clarke et al, 2010; Schiff, Ben- Shushan & Ben Artzi, 2017, Tannock et al, 2016) did not elaborate on the results of specific items or dimensions of MS/MRS, but rather treated the general influence of MS/MRS on academic achievements. One study identified the problem- solving strategy as an MS/MRS dimension influencing academic achievements (Cantrell et al, 2010) and one study identified the selection of a main idea as influencing academic achievements (Chevalier et al, 2017). The dimensions of MS/MRS which were found significant for academic achievements are presented in Table 3.

Table 03. Identified dimensions of MS/MRS significant for academic achievements.

Item	Number
• Metacognitive strategies in general	3
• Selecting main ideas	1
• Improvement in use of problem- solving strategies (visualization, rereading, adjusting speed and guessing the meanings of unknown words)	1

Research question 4: Which dimensions of academic achievements were influenced by MS/MRS?

This research question focuses on the other side of research question 3, and asks about the different academic achievements that were influenced by MS/MRS intervention programs. Also, this question functions as a way to evaluate the influence of MS/MRS intervention programs in relation to the academic achievements of the students. According to Chevalier et al. (2017), who did not use an intervention program, students with a history of reading disabilities had lower overall GPAs (Grade Point Average) and they used fewer metacognitive reading strategies than students with no history of reading difficulties. Tannock et al (2016) and Clarke et al (2010) reported improvement in reading outcomes after the MS/MRS intervention programs, which lasted 10 weeks or 20 weeks, respectively. Cantrell et al (2010) reported

improvement in reading comprehension, and Schiff, Ben- Shushan & Ben Artzi (2017) reported the influence of an MS/MRS intervention program on spelling accuracy as an important step toward reading. Table 4 presents the dimensions of academic achievements for the selected studies and the numbers of studies that have addressed these dimensions.

Besides academic influences, it is also worth mentioning behavioral influences as mentioned in Tannock et al (2016). Parents of children with ADHD and reading disabilities who participated in a metacognitive intervention program reported greater improvement in inattentive symptoms compared to children receiving only reading programs.

Table 04. Identified dimensions of academic achievements which were influenced by MS

Item	Number of studies
Reading outcomes	2
Spelling accuracy	1
Improvement in reading comprehension	1
GPA	1

7. Conclusion

The current paper used a systematic review protocol to analyze the research on metacognitive reading strategies intervention programs and reading comprehension tasks on special education pupils published between the years 2007 and 2017. The results of the review refer to the research aims, to the type of tools that were used to assess MS/MRS and describe the dimensions of MS/MRS related to academic performance, as well as the way it was evaluated. Studies generally aimed to compare several intervention programs and inspect the relations between those programs and academic achievements of the students. Most of the studies suggested a significant association between MS/MRS intervention programs and success or improvement in reading or reading comprehension. However, in two studies, the effect of an MS/MRS intervention program was reported as being lower than a reading intervention program (Clarke et al, 2010; Tannock et al, 2016),or relevant to sixth grade students but not for ninth- grade students (Cantrell et al, 2010).

The results of this systematic review could be valued in designing MS/MRS intervention programs in schools, kindergartens and even higher education, since the investigated literature reveals an ongoing process of implementation of MS/MRS programs and its advantages. Applying metacognitive strategies during learning can serve as an effective platform for developing children's reading comprehension. Furthermore, the relationship between using metacognitive strategies in students with learning disabilities and their academic achievements suggests that a proactive use of early intervention programs which emphasize metacognitive awareness is important. Specifically, having a better understanding of which strategies are associated with academic success can help academic support service providers build specific intervention plans for schools.

The current study also presents some potential methodological and conceptual problems. The fact that only few studies were found after using the inclusion criteria might indicate a relative lack of the evidence-based research in the field of MS/MRS intervention programs, but it also might be explained by the heterogeneity of the concept and its dimensions. Hence, some researches use different concepts with

similar meanings, such as Metacognitive Strategies, Metacognitive Reading Strategies, Metacognitive Awareness, etc. Some articles refer to only one dimension of Metacognition, such as self-regulation. A larger amount of studies might have been revealed if other concepts would have been chosen for this review. Moreover, this review raises a question about the variance of the tools and measurement of MS/MRS. It seems that there is no unitary definition for Metacognition or MS, which might be reflected by the great variety of the items and tools used in the studies included in the review. Another important aspect revealed by this review deals with the marginal role MS/MRS interventions received in some studies in comparison to central intervention programs, such as reading or cognitive strategies. This might lead to the conclusion that more studies focusing mainly on MS/MRS as an intervention program to improve reading comprehension are needed.

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