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The Impact of Modified Multi-component Cognitive Strategy Instruction in the Acquisition of Metacognitive Strategy Knowledge in the Text Comprehension Process of Students with Mental Retardation

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Abstract

The purpose of this study was to determine the impact of Modified Multi-component Cognitive Strategy Instruction on the metacognitive strategy knowledge used for the comprehension process of descriptive texts for students with mild mental retardation (MMR). Three students with MMR from inclusive classes participated in the study. The study was designed using a qualitative method. In order to collect data, students were interviewed via the metacognitive interview format before and after the application of the intervention, and content analysis was used to analyze the data. Results of the study indicated that there was a positive change in text comprehension related to the metacognitive knowledge of the students between pre and post instruction. Results were discussed and recommendations relating to the implementation, as well as additional studies, were presented.

Key Words

Multi-component Cognitive Strategy Instruction, Metacognitive Knowledge, Reading Comprehension, Students with Mental Retardation, Text Comprehension.

Text comprehension is a complex process in which different levels of cognitive and metacognitive skills like predicting, identifying main ideas, questioning, correlating information units, summarizing, organizing and evaluating performance during the comprehension process are used (Alexander & Jetton, 2000; Baker & Brown, 2002; Gersten, Fuchs, Williams, & Baker, 2001; Westby, 2004). Text comprehension depends on the reader's usage of *before, during and after reading cognitive strategies* and the metacognitive strategies that guide the self-monitoring of his/her comprehension to regulate the reading strategies according to his/her reading goals during this period (Alexander & Jetton, 2000; Baker & Brown, 2002).

During the reading process, competent readers use cognitive strategies to comprehend the text (Duke, 2003; Pressley & Hilden, 2002). Studies of the competent readers' comprehension strategies via interviews show that these readers use a variety of

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cognitive strategies *before, during and after reading* (Pressley, 2002; Pressley & Afflerbach, 1995), as well as metacognitive strategies (Pressley & Gaskins, 2006). Some of these strategies can be listed as (*a*) setting a goal *before reading* (Pressley & Gaskins, 2006), (*b*) underlining important information units, note-taking and identifying the meaning of unknown words for *during reading* (Otero, 2002; Pressley & Gaskins, 2006; Westby, 2004), (*c*) reviewing, re-reading or re-examining the important parts of the text for comprehension, and self-questioning for *after reading* (Pressley, Symons, McGoldrick, & Snyder, 1995). On the other hand, it is stated that the readers with poor cognitive and metacognitive strategies (*a*) start to read without considering the content, (*b*) have problems with setting a reading goal, (*c*) cannot follow a systematic way about how to read, and (*d*) do not know what should be done when they don't comprehend the text (Çakıroğlu, 2007; Gelen, 2003).

Metacognitive ability refers to the ability to manage and control one's cognitive activities and evaluate whether or not they are performing them successfully (Gersten et al., 2001). Metacognition in reading comprehension is an individual's control and awareness on self-monitoring and self-regulating the cognitive skills for interpreting a text (Caron, 1997). There are three types of metacognitive knowledge (Paris, Lipson, & Wixson, 1983; Schunk, 2001). These are declarative knowledge, procedural knowledge and conditional knowledge. Declarative knowledge addresses the stable knowledge of a person about his/her task structure and goals. Procedural knowledge is about how the strategies are performed. On the other hand, conditional knowledge includes the application and adaptation of strategies to accommodate various conditions (Jacops & Paris, 1987; Paris et al., 1983). During the reading process, readers who don't have any metacognitive knowledge about strategies cannot use appropriate comprehension strategies (Bakes & Brown, 1984) or manage the comprehension process (DeBoy, 1991; Dermitzaki, Andreou, & Paraskeva, 2008; Short, 1992). Therefore, students' metacognitive knowledge about strategies is supported by teaching when, how and where each strategy is used and what its effects are (Pardo, 2004; Winograd & Hare, 1988). However, metacognitive awareness is not enough to use these strategies (DeBoy, 1991). This process starts with the metacognitive knowledge of the reader and ends with usage of strategic reading behavior (Babbs & Moe, 1983). Readers should use this knowledge in the reading comprehension process.

Some readers with poor cognitive and metacognitive strategies are students with reading difficulties. It is known that students with reading difficulties have problems wıth the usage of cognitive and metacognitive strategies during the text comprehension (Baydık, 2011; DeBoy, 1991; Gersten et al., 2001; Lenhart, 1994; Short, 1992). There are studies on defining the cognitive and metacognitive strategies used by students with learning disabilities for reading comprehension and comparing them with those of competent readers (DeBoy, 1991; Dermitzaki et al., 2008; Lenhart, 1994; Short, 1992). In these studies, it is observed that students with learning disabilities cannot use cognitive strategies sufficiently to comprehend the text like competent readers do (Gersten et al., 2001), and they cannot control and regulate their comprehension processes using metacognitive strategies (DeBoy, 1991; Dermitzaki et al., 2008; Lenhart, 1994; Short, 1992). Besides these studies, the researcher investigated the metacognitive knowledge of reading comprehension strategy on students with learning disabilities. The research results showed that they have a lack of metacognitive knowledge about which condition and when a strategy should be used (Lau, 2006; Matlock, 1998; Miranda, Villaescusa, & Vidal-Abarca, 1997; Paris & Jacobs, 1984; Swanson & Trahan, 1996). No study result which indicates whether or not students with mental retardation suffer from the same deficiencies as students with learning disabilities was found.

Since students with mental retardation have cognitive deficiencies (Arabsolghar & Elkins, 2000), they have problems in combining background information with the new one, coding and organizing the information, and relating the ideas (Arabsolghar & Elkins, 2000; Banikowski & Mehring, 1999; Turner, Dofny, & Dutka, 1994). Moreover, these students face problems with organizing and linking the information by themselves and identifying the important information (Belmont & Butterfield, 1971; Borkowski & Wanschura, 1974; Camplone & Brown, 1977; Ellis, 1970; Kellas, Ashcraft, & Johnson, 1973). When reading comprehension is defined as the interpretation of written text based on the coordination of various interrelated information (Anderson, Hiebert, Scott, & Wilkinson, 1985; Mastropieri & Scruggs, 1997), all of the difficulties experienced by the students with mental retardation become important factors impeding comprehension (Gersten et al., 2001; Sencibaugh, 2007).

Table 1.
Characteristics of the Students

	Age	Sex	IQ Level	Grade Level	Word Read Correctly in First Minute	Percent of Accuracy	Correct Answer Ratio to Literal Questions
Subject 1	12 yrs. 3 months	Girl	73	5th	63	95	4/13
Subject 2	13 yrs. 4 months	Boy	69	7th	73	95	4/13
Subject 3	13 yrs. 1 month	Boy	58	7th	65	90	5/13

In the literature, many text comprehension strategy instructions were developed for students with learning disabilities and these strategy instructions were tested for effectiveness (Ellis & Graves, 1990; Englert & Mariage, 1991; Klingner & Vaughn, 2004; Klingner, Vaughn, & Schumm, 1998; Mothus & Lapadat, 2006; Palincsar & Brown, 1984; Therrien, Wickstrom, & Jones, 2006). The results of the study showed that strategy instruction was effective in reading comprehension. In Turkey, the effect of metacognitive strategy instruction on the reading comprehension of 5th grade poor readers was investigated in a study (Çakıroğlu, 2007). Results showed that the metacognitive strategy instruction was effective in (*a*) increasing the reading comprehension level of poor readers, (*b*) developing their metacognitive reading comprehension skills and (*c*) using the strategies by internalizing them. There is also a study investigating the effects of Multi-component Cognitive Strategy Instruction which was developed based on POSSE (Englert & Mariage, 1991) and modified by considering a Self-regulated Strategy Development approach (Harris & Graham, 1996) on descriptive text comprehension skills for students with mild mental retardation (MMR) (Doğanay-Bilgi, 2009). In this study, it was demonstrated that the Modified Multi-component Cognitive Strategy Instruction is effective in the comprehension of descriptive texts, the maintenance of these skills, and the generalization of the same type of texts with a different structure and content for students with MMR.

Purpose

The purpose of this study was to determine the impact of the Modified Multi-component Cognitive Strategy Instruction on the declarative and procedural metacognitive knowledge used for the comprehension process of descriptive texts for students with MMR.

Participants

One female and two male students with MMR participated in the experiment. Students were attending the fifth and seventh grades. In order to use the Multi-component Cognitive Strategy Instruction with reading comprehension instruction, some specific criteria were defined for students. These were: (*a*) reading the texts without spelling, (*b*) reading the text with at least 90% accuracy (*c*) correctly answering a minimum of two and a maximum of six out of 13 literal questions in a 350 (+/-20) word descriptive text and d) attending the 5th,6th, 7th or 8th grades. Characteristics of the students are presented in Table 1.

Method

Study Design

The study was designed using a qualitative method. Semi-structured interviews were conducted for data collection by using the metacognitive interview technique. Metacognitive interviews in comprehension were administered to examine the processes used by readers while reading (Westby, 2004). During the metacognitive interviews, hypothetical cases were composed to evaluate declarative, procedural and conditional knowledge related to the corresponding skill (Englert, Raphael, Fear, & Anderson, 1988), and open ended questions about the information to be measured were asked (Chamot & O'Malley, 1994).

Preparation of Intervention Questions

Interview questions were prepared according to the text structure instruction and comprehension strategies used before, during and after the reading (Graves, Juel, & Graves, 2001), and by considering the studies developed to evaluate students' declarative and procedural knowledge in the comprehension process (Lau, 2006; Matlock, 1998; Miranda et al., 1997; Paris & Jacobs, 1984; Swanson & Trahan, 1996).

During the interviews, 8 open-ended questions were asked to the students. First, in order to evaluate the declarative knowledge of the students about the text structure, the following question was asked: "*What is the benefit of knowing the structure of a text that would be read? Tell me.*" Next 4 questions were prepared to

evaluate declarative and procedural knowledge of the students about the strategies used before reading. These questions were asked in the following order: (*1*) "*The teacher provided an expository text to Ali about a wild animal. For a better comprehension of the text, what would you suggest to Ali before reading the text?*" (*2*) "*According to you, why is it important to set the goal of reading before starting to read a text? Tell me*," (*3*) "*Ali wants to set the goal of reading before starting to read passage. What do you suggest him to do to set the goal of reading? Tell me*," (*4*) "*According to you, what is the benefit of predicting the text content before reading it? Tell me*." Of these questions, the 1st and 3rd ones were prepared to evaluate procedural knowledge and the 2nd and 4th ones were prepared to evaluate declarative knowledge of the students *before reading*. The 6th question was prepared to evaluate the procedural knowledge about the strategies used *during reading*. This question was "*If your teacher asks you to read an expository text, what would you need to comprehend the text better while reading it? Tell me*." The last two questions of the interview were prepared to evaluate the students' declarative and procedural knowledge about the strategies used *after reading*. The first of these questions was prepared to evaluate the procedural knowledge of the students and it was "*The teacher provided to Ali a text about a wild animal. In order to comprehend better, what do you suggest Ali to do after he read the text? Tell me*." The other question was "*In your opinion, what is the benefit of writing the summary of a text after reading and comprehending it? Tell me*." This one was prepared to evaluate the declarative knowledge of the students.

Data Collection Procedures

A metacognitive interview was conducted by the first researcher before and after conducting the Modified Multi- component Cognitive Strategy Instruction. The interviews were administered individually to each student. During each interview, 8 questions were asked to the students in the given order. The researcher wrote the answers of each student while the interview was recorded on a video camera. Each of the interviews took 15 minutes before instruction and of 20 minutes after instruction.

Modified Multi-component Cognitive Strategy Instruction

The students were instructed individually in a classroom. During the instruction, descriptive texts about animals were used. Instruction was implemented in four phases: Text structure instruction, modeling for strategy usage, guided practices and independent practices. During instructions, a "think aloud" technique was used and interactive dialogues were allowed. Worksheets and graphic organizers were used as scaffolding to visualize the comprehension strategies during the instructions. Transition criteria between each consecutive phase were set.

Text structure instruction was implemented in three phases, the introduction of text structure, comparison of the structure and sample texts, and evaluation of the texts. After completion of text structure instruction, Modified Multi-component Cognitive Strategy Instruction was implemented**.** During the instruction, *before, during and after reading strategies* were taught. These strategies are (*a*) setting a goal for reading and motivating the students for reading, (*b*) activating the background knowledge about the topic and predicting the text content, (*c*) placing the predicted ideas on a graphic organizer for *before reading*; (*d*) strategy of defining important information units in the text and placing them on the graphic organizer for *during reading*; and (*e*) comparing the predicted ideas with ideas in text and (*f*) summarizing the text in writing for *after reading*.

At the beginning and end of each instruction session, *before, during* and *after reading* strategies used for comprehension were repeated in the given order and students were also asked to repeat. Also, cumulative repetitions of the strategies used during the instruction process were made.

Each session was implemented in one working day and continued until the instruction was completed. Session durations were 45 minutes with 15 minutes breaks between each session. 11 working days were spent with each student and the study was completed in 6 months.

Treatment Integrity

In the study, treatment integrity of the instruction and metacognitive interviews was determined. It was computed by dividing the number of steps the researcher implemented by the total number of steps planned, which was then multiplied by 100 (Billingsley, White, & Munson, 1980). For each subject, at least 33.33% of the records were evaluated by a special education teacher by providing checklists prepared for the instruction process. A minimum of one example is randomly taken from each participant in each of the instruction

phases. Treatment integrity scores for text structure instruction, modeling, guided practices and independent practices sessions were found in a range between 98.18 to 100% for each student. Treatment integrity was calculated for each interview and it was found to be 100% for each student.

Data Analysis

Table 2.
The Categories Composed for Analysis and the Samples of Student Responses

Category	Sample Response
I. Text Structure	
Awareness of text structure	"Knowing the text structure helps me to comprehend the text better."
II. Before Reading Strategies	
Defining reading goal	"Before reading, answer the questions of 'Why am I reading?'" "What are the benefits of reading them to me?", "How should I read to comprehend better?"
Predicting the text	"It benefits to develop our predictions about the text."
Grouping the predicted ideas according to text structure	"Let him predict the things in the text."
Placing the predicted ideas on a graphic organizer	"Let him group his predicted ideas on the prediction graphic organizer."
III. During Reading Strategies	
Defining the important information units by reading the text	"I read carefully and slowly. I take notes. I underline important parts. I draw schema."
Grouping the important information units according to text structure	"Let him draw a graphic organizer to comprehend the text."
Placing the important information units on a graphic organizer	"He had drawn graphic organizer to comprehend the text better."
IV. After Reading Strategies	
Comparing the predicted ideas with text ideas	"I make comparison to see whether I predicted idea true or not."
Writing summary of the text	"Writing a summary of the text helps us to comprehend the text better. It also helps us to tell our teachers, our friends and our family what we had learned."

In the study, the students' responses to interview questions addressing the strategies which were used for the *before, during and after reading* comprehension process were collected before and after Modified Multi-component Cognitive Strategy Instruction. These responses were analyzed descriptively to define whether there was a difference in declarative and procedural knowledge of the students. For this purpose, categories enveloping the strategies which exist for the comprehension process were initially composed. During the formation of these categories, the studies (*a*) assessing students' metacognitive knowledge of the comprehension process (Lau, 2006; Matlock, 1998; Miranda et al., 1997; Paris & Jacobs, 1984; Swanson & Trahan, 1996) and (*b*) using *before, during and after reading* strategies (Englert & Mariage, 1991) were utilized. Next, students' responses recorded by the video camera were watched and transcribed. Finally, a four page print-out (Times New Roman font with 12 pt. and 1.5 line spacing) was produced. Camera recordings and transcription print-outs were checked for correctness of transcriptions by a 3rd grade Special Education Department student. In order to confirm the appropriateness of the categories, the transcriptions and categories were examined by an instructor from the Turkish Language Department and a consensus was reached. The categories composed for analysis and samples of student responses are given in Table 2. Student responses were evaluated according to the composed categories.

Interobserver Integrity

In order to define inter-observer integrity, all of the interviews performed before and after instruction with each subject were watched by an independent observer. Inter-observer integrity was calculated by dividing the number of agreements between researcher and observer to number of agreements plus disagreements (between researcher and observer) and multiplying by 100 (House, House, & Campbell, 1981). Inter-observer integrity was found to be at 100%.

Results

The study results revealed that, before Modified Multi-component Cognitive Strategy Instruction, students' text comprehension strategies were as follows: related with the text structure knowledge, students mentioned that awareness of the text structure would help comprehension and retelling the text. They expressed that, reading the title of the text, answering the related questions, reading stories or novels related with animals, investigating the subject from the internet, encyclopedias and books, going to the zoo, and predicting about the subject by investigating pictures should be done *before reading*. In order to comprehend the text *during reading*, students suggested that they should read the text silently and aloud, underline the parts

that they cannot comprehend, and that reading should be done in a silent place, they should read again when the text is not comprehended and reading should be done slowly and carefully. Finally, to comprehend the text *after reading*, students expressed that one should go to the zoo and observe the movements of animals, reading should be done slowly and carefully, and a summary should be written for retelling to friends.

After the instruction, students expressed that they should use *before, during and after reading* strategies during the comprehension process.

Discussion

Results of the study show that students had inadequate meta-cognitive knowledge about text comprehension strategies before the instruction. The study demonstrates that the student with mental retardation directly begins to read without setting the goals of reading in advance. They do not know why they read nor do they adopt a systematic approach on how to read. Instead, they begin to read without predicting or thinking about the content. They do not know what to do when they cannot comprehend what they are reading. They cannot determine which strategies to use in order to comprehend the text. Also, they cannot establish links between background information and new information. These results are typical examples of the reading behavior of readers who lack sufficient cognitive and metacognitive skills (Çakıroğlu, 2007; Gelen, 2003).

After being instructed, participating students acquired the strategy knowledge *before, during, after reading* that is used by competent readers. Examples of this knowledge are predicting the text, setting a goal for reading, monitoring comprehension processes, underlining important ideas while reading, and writing a summary of the text after reading. The results from the current study are consistent with previous studies' findings (Matlock, 1998; Miranda et al., 1997; Swanson & Trahan, 1996).

Based on the results of this study, the following should be taken into consideration when teaching text comprehension skills to students with mental retardation. These are (*a*) implementing strategy instruction, (*b*) following a holistic approach during strategy instruction, (*c*) modeling by thinking aloud for the processes of the strategies, (*d*) using interactive dialogues, (*e*) using graphic organizers and (*f*) teaching the text structure. When the strategies are used in cognitive strategy instruction, the students should be taught why, how and when such strategies are used by using the 'think aloud' technique. Instructing such components will be effective for (*a*) students' development of the text comprehension, and (*b*) acquiring strategy knowledge to be used for comprehension processes.

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