Comparison of Two Different Presentations of Graphic Organizers in Recalling Information in Expository Texts with Intellectually Disabled Students

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Abstract

The purpose of this study was to compare the effectiveness of two different presentations of graphic organizers on recalling information from compare/contrast text which is a kind of expository text in intellectually disabled students. The first presentation included graphic organizers which were presented before reading whereas in the second presentation students were asked to fill the graphic organizer after reading. Five students with mild intellectual disabilities attending a special education classroom in an elementary school located in Ankara were participated in the study. An alternating treatment design was employed to assess differentiated effectiveness of the presentations of graphic organizers. The results of the study showed that four students reported that filling graphic organizers after reading was more effective on improving their ability to recall the similarities and differences of comparison concepts depicted in the compare/contrast texts. However, one student displayed more improvements on recalling the similarities in compare/contrast texts when provided with graphic organizers before reading. Yet, there were no differences between the presentations in improving the student's ability to recall the differences. Both presentations were equally effective for the student. The results of the study were discussed and suggestions for future research were provided.

Key Words

Graphic Organizer, Recall, Expository Text, Students with Intellectual Disabilities, Elementary School.

Comprehending and recalling information from expository texts is a complex ability for majority of the students. Expository text contains various text structures according to the characteristics of the information provided in the text. The most commonly used structures of expository texts are the sequence, compare/contrast, description, listing, problem solving and cause-effect (Anderson & Armbruster, 1984; Meyer, Brandt, & Bluth, 1980).

Research has shown that students with intellectual disabilities experience problems in information encoding process, organizing verbal information, recalling information from the memory (Kellas, Ashcraft, & Johnson, 1973; Spitz, 1966; Wong,

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1978) and retaining verbal and written information due to their limited memory capacity (Spitz, 1966). Because of such mental characteristics of the students with intellectual disabilities, the retention of information contained in the expository texts becomes more difficult for these students. Evidence has suggested that using various scaffolding and structuring tool are useful in helping students with learning problems overcome such difficulties (Bos & Anders, 1990; Bos, Anders, Filip, & Jaffe, 1989; Darch & Carnine, 1986; Gajria, Jitendra, Sood, & Sacks, 2007). Perhaps the most commonly used instructional tool is graphic organizers in structuring learning by scaffolding student learning.

Graphic organizers are developed based on the Cognitive Theory of Ausubel (1968). Ausubel argued that an individual's existing knowledge or cognitive structure, is a major variable in learning new materials, and in a content area. He hypoth-

esized that new meanings are acquired only when they are related to previous learned information. If the previous learning is gained in a certain structure and is clearly organized, it can be combined with newly acquired knowledge. Ausubel introduces to use advance organizers for the development of this process. Further research was conducted on the effectiveness of Ausubel's theoretical work. On the basis of Ausubel's theory, providing prerequisite information regarding new materials by using graphic organizers which include spatial and visual arrangements depicting the structure of information was examined in the literature (Alvermann, 1981; Darch & Carnine, 1986; Darch, Carnine, & Kameenui, 1986; Hawk, 1986). Graphic organizers are defined as visual or graphic displays that show visual interrelationships of superordinate and subordinate ideas using spatial arrangements, geometric shapes, lines, and arrows to portray the content structure and demonstrate key relationships between concepts (Darch et al., 1986).

For three decades, research has been conducted on the effectiveness of graphic organizers in improving the comprehension and retention skills of typically developing students, students with learning difficulties, and students with mild intellectual disabilities (Alvermann, 1981; 1982; 1988; Alvermann & Boothby, 1983; 1986; Alvermann, Boothby, & Wolfe, 1984; Balajhy & Weisberg, 1988; Barron & Stone, 1974; Berkowitz, 1986; Boothby & Alvermann, 1984; Boyle, 1996; 2000; Boyle & Weishaar, 1997; Darch & Carnine, 1986; Darch & Eaves, 1986; Darch et al., 1986; DiCecco & Gleason, 2002; Griffin, Malone, & Kameenui, 1995; Griffin, Simmons, & Kameenui, 1991; Hall, Hall, & Saling, 1999; Hawk, 1986; Horton, Lovitt, & Bergerud, 1990; Simmons, Griffin, & Kameenui, 1988; Stull & Mayer, 2007; Weisberg & Balajthy, 1989; 1990). In general, there are four theoretical foundations that guide the research in the use of presentations of graphic organizers. These theories are the schema theory, text structure awareness, information encoding theory, cognitive load theory, and activity theory. In the initial examples of the graphic organizers research (Barron, 1969; Berget, 1977; Estes, Mills, & Barron, 1969), the effectiveness of graphic organizers was explained based on the schema theory (Bartlett, 1932). According to this theory, presentation of a graphic organizer before reading activates the prerequisite information of a student while presenting content information and organizing key concepts schematically, and provides a frame for the new knowledge (Anderson, Spiro, & Anderson, 1978; Dunston, 1992). When

a material is completely unfamiliar, it becomes impossible to explain the effectiveness of graphic organizers within the schema theory (Robinson, 1998). The effectiveness of graphic organizers is also explained based on text structure awareness (Alvermann, 1981, 1982; Berkowitz, 1986; Darch & Carnine, 1986; Darch & Eaves, 1986; Darch et al., 1986). Graphic organizers provide more information about the sequence of the information given in the text by presenting visualized content of the text before reading Furthermore, it provides an awareness of the text structure and let the student selectively attend important information units of the text (Anderson & Armbruster, 1984; Meyer et al., 1980).

According to the information processing theory, graphic organizers provide an easiness during both encoding and retrieval processes. With the use of graphic organizers, textual information is dually encoded both verbally and spatially (Paivio, 1983), and when verbal information is not successful in the retrieval of information given in the text, the spatial processing becomes a second stratum cue (Kulhavy, Stock, Peterson, Pridemore, & Klein, 1992). Moreover, with the use of graphic organizers, the verbal information can be visually presented. Indeed, visual presentation of core components of the information makes it possible to spend less effort in processing the information and therefore, it facilitates information processing (Robinson & Schraw, 1994). However, in of the retrieval process, since the information can also be visually stored, it becomes possible to benefit from this visualization to recall the information (Kulhavy, Lee, & Caterino, 1985; Robinson, Katayama, Dubois, & Devaney, 1998; Paivio, 1983).

The importance of the presentation of graphic organizers before reading has also been explained in the cognitive load theory (Stull & Mayer, 2007). According to this theory, it is argued that learning occurs, when learners engage appropriate cognitive processes during learning (Chandler & Sweller, 1991). Appropriate cognitive processes can be attained by essential processing and generative processing. In essential processing, learner is engaged by mental representation of the material which is the determined by inherent complexity of the material. In generative processing, the learner engages in mental activities relating to deeper cognitive processes of the material (Stull & Mayer, 2007). Whereas extraneous processing in which the learner engages in cognitive processing that is not related to the instructional goal (Stull & Mayer,

2007). According to this theory, the presentation of the teacher/researcher-constructed graphic organizers facilitates the students' engagement in generative processing by giving information on how the text was organized (Mayer, 2005; Mayer & Moreno, 2003; Sweller, 2005; Stull & Mayer, 2007).

Stull and Mayer (2007) explains the effectiveness of the student-constructed graphic organizers based on the activity theory. According to this theory, when the students engage in productive learning activities, the deep learning is acquired (Kirschner, Sweller, & Clark, 2006; Mayer, 2004). Construction of the graphic organizers is a productive learning activity. One can state that the activity theory is based on the idea that deep learning occurs when students are encouraged to engage in productive learning activities. During this process, the students select the relative ideas from the text, organize the ideas in the graphic organizer and show the relations of the ideas. However, if the student is lacking the ability to determine the relative ideas and their relationship in the text, then the student focuses on irrelevant ideas in the text. In other words, the student's graphic organizer cannot visualize the relative ideas and their relations in the text (Rewey, Dansereau, Hall ve Skaggs, 1989). When the student focuses mostly on how to construct a graphic organizer, extraneous processing will occur thereby leaving less available capacity for essential and generative processing (Mayer, 2005; Mayer & Moreno, 2003; Sweller, 2005; Stull & Mayer, 2007).

The presentation type of graphic organizer effects students' comprehension and retention of text. Different presentations of graphic organizers were used in graphic organizer studies. The presentations are a) teacher/researcher-constructed graphic organizers which summarize the information depicted in an expository text and their relationships are provided before the text is read (Alvermann, 1981; 1982; Alvermann & Boothby, 1983; 1986; Alvermann et al., 1984; Boothby & Alvermann, 1984; Darch & Carnine, 1986; Darch & Eaves, 1986; Darch et al., 1986; Griffin et al., 1991; Hawk, 1986); b) teacher/researcher-constructed graphic organizers provided students to fill after reading (DiCecco & Gleason, 2002; Griffin et al., 1995; Hall et al., 1999; Horton et al., 1990), and c) graphic organizers generated by the students after or during reading (Boyle, 1996; 2000; Balajhy & Weisberg, 1988; Weisberg & Balajthy, 1989; 1990).

Several meta-analysis studies have been conducted on the effect sizes of different presentations of graphic organizers (Moore & Readence, 1980; 1984). The results of these studies showed that filling and constructing graphic organizers by the students after reading were more effective than presenting teacher/researcher-constructed graphic organizers before reading.

As it can be seen in meta-analysis and other study results, the presentations of the graphic organizers have important roles in improving students' knowledge about the expository texts.

The purpose of this study was to compare the effectiveness of two different presentations of graphic organizers on recalling information from compare/contrast texts which is a kind of expository text in intellectually disabled students.

In this study, one kind of presentation of graphic organizers was selected based on the activity theory and the results of meta-analysis studies. Selected presentation, which was researcher-constructed graphic organizer, had to be filled by the student after reading. There should be no request from the participating students to construct the graphic organizer in order to prevent extraneous information processing since the students do not have the ability to construct the graphic organizers. A request was made to the students to fill the blank researcher-constructed graphic organizer after completing reading the text section by section. When the students finished filling the graphic organizer after reading, than the information units in the text and their relations were shown to the students and the students are asked to read. The second presentation used in this study was a researcher-constructed graphic organizer containing the information units in the text and their relationships that showed the students before reading. In this type of presentation, the aim is to provide information to the students on how the text is organized and when they should read the text to pay attention to information units by using the visual materials provided about the text. Thus, with the use of this type of graphic organizer, encoding the important information depicted in the text is attained and retrieval of such information is facilitated.

Overall, this study will make an important contribution to the existing literature by comparing the effectiveness of two different presentations of graphic organizers with students with intellectual disabilities.

Method

Participants and Setting

Participants of the study were chosen from a special education classroom for student with mild intellectual disabilites students in Ankara, Turkey. Each participant met the following study criteria: a) able to read without syllabicate, b) attending at 6th, 7th and 8th classes, and c) able to recall maximum one similarity and difference after reading a compare/contrast text.

There were five students who met the above study criteria. With the objective of determining the reading performance of the participant students, stories were chosen from a Turkish textbook at the students' class level. The characteristics of the participants are indicated below:

The five participants were all males whose native language was Turkish.

The first participant was 14 years 2 months old, and attended an 8th grade classroom. His full-scale score on the WISC-R was 66. His number of words read correctly per minute (WRCM) was 65, his number of errors in one minute was one.

The second participant was 12 years, 8 months old, and attended a 7th grade classroom. The researcher was not able to obtain the second participant's WISC-R score. The student was attending a half-time inclusion class only during mathematics class. His WRCM score was 57, and he read six words incorrectly in one minute.

The third participant was 14 years, 3 months old, and attended an 8th grade classroom. His full-scale score on the WISC-R was 71 and his WRCM score was 43. He read all words correctly in one minute.

The fourth participant was 11 years, 11 months old, and attended an 6th grade classroom. His full-scale score on the WISC-R was 71 and his WRCM score was 25. He read one word incorrectly in one minute.

The fifth participant was 12 years, 11 months old, and attended a 7th grade classroom. His full-scale score WISC-R was 58 and his WRCM score was 60. He read three words incorrectly in one minute.

Experimental procedures were individually occurred in a room used specifically for tutoring. The room was equipped with a table and two chairs. A video-camera was used to record the sessions for interscorer agreement and treatment integrity.

Experimental Design

The experimental procedure was implemented by using an alternating treatment design (Holcombe, Wolery, & Gast, 1994). The dependent variable of the study was the rate of recalling similarities and differences of the comparison concept depicted in the compare/contrast test. The independent variables of the study were the presentation of a researcher-constructed graphic organizer before reading and filling researcher-constructed graphic organizers after reading.

Materials

Texts: A total of 13 compare/contrast texts was used in the study. Instructional texts were written by the researcher. Three of them were used in the baseline, five of them were used during the presentation of the graphic organizer before reading condition, and five of them were used during the filling graphic organizer after reading condition. All instructional texts were randomly chosen, across all experimental sessions.

The comparison concepts were selected from the concepts taught in fourth and fifth grade science and social studies textbooks which were also used in the students' classrooms. Compare/contrast texts contents that were selected included the following concepts: lung and heart; world and moon; human being and plant; city and village, Mediterranean Region and Black Sea Region, and seas and lakes.

After selecting the concepts, in order to determine the level of knowledge of the students in regard to the selected concepts, 8 to 10 multiple choice questions measuring the students' knowledge on the characteristics of each concept was prepared. The objective was to develop the texts which the students were not able to answer their related questions the test. Therefore, the texts were developed based on the concepts that the students were correctly answered its questions at a maximum rate of 20% to 30%. The texts consisted of three parts. The first part introduced the comparison concepts. The second part included two paragraphs. One paragraph explained the similarities of the two concepts whereas the other one explained the differences of the two concepts. The last part was the conclusion part. There were at least four and a maximum of six differences and similarities depicted in each text. With respect to the number of similarities and differences, there was a maximum of one similarity/difference that can be differentiated in each text.

The average text length was 260 words (range, 233-277 words).

Compare/Contrast Graphic organizer: The compare/contrast graphic organizer was developed on an A4 size paper in color. Graphic organizers included one picture of each comparison concept, one box for writing the similarities of the comparison concepts, and two boxes for writing the differences (Appendix 1).

Experimental Procedures

For each student, experimental procedures were implemented for five school days in each week. The experimental process was completed in four weeks, with two sessions conducted per day. The two different presentations were intermittently administrated by giving a half and an hour break between the presentations. Baseline sessions lasted for 8 to 14 minutes for each student using a graphic organizer before reading with a post-assessment lasted for 15 to 21 minutes, using a graphic organizer after reading with a post-assessment lasted for 31 to 36 minutes.

All experimental conditions were conducted by the researcher. The following conditions were in effect during the experiment:

Baseline: During this condition, the student was asked to read the text silently. After the student completed reading the texts, two questions, "What are the similarities of the concepts?" and "What are the differences of the concepts? were asked to the student. The data were collected three times until the baseline data stabilized in consecutive sessions.

Presentation of the compare/contrast graphic organizer before reading: First a researcher-constructed compare/contrast graphic organizer containing all the similarities and differences of the concept in the form of short sentences or key words was provided to the student. The student was then asked to read the contents. When the student completed reading all the contents in the graphic organizer, he was allowed to examine the graphic organizer for a minute. Afterwards, the student was asked to read the text silently. When the student completed the reading, a post-assessment session was administered following the procedures established during the baseline.

Filling the Compare/Contrast Graphic Organizer after Reading: In this condition, the student was asked to read the introduction part and the second paragraph containing the similarities of the concepts silently. By providing a researcher-constructed, blank compare/contrast graphic organ-izer, the student was asked to state the similarity that he recalled, and later a request was made to the student to fill the graphic organizer using short sentences or key words. If the student was not able to recall the information that was asked to him, the text was shown to the student for a second time and the student was once again asked to review the text to fill all similarities. If the student could not determine the similarities in the paragraph correctly, the researcher asked the student questions like "Is this a similarity?" "Look at the text again?" The paragraph containing the differences of the concepts and the conclusion part were also read by the student and same applications were made. After filling the graphic organizer, filled organizer was presented to the student, and the student was asked to examine it for a minute. After the student completed examining the graphic organizer, a post-assessment session was administered following the procedures established during the baseline.

Data Collection and Scoring Procedures

In order to collect the data, two questions were asked to the participating student. The first one was "What are the similarities of the concepts?" and the second one was "What are the differences of the concepts?" By calculating the percentage of number of similarities and differences responded correctly by the student, study data were recorded on two separate graphics.

Data Analysis

In single subject designs, study data are typically analyzed based on data trend and level of data path (Tawney & Gast, 1984). In this study, trend or level of data path were obtained from the presentation conditions, are compared to analysis of study results.

Interscorer Agreement and Treatment Integrity

Interscorer agreement data were collected during 33.3% of the sessions across the baseline conditions for each the participant, respectively. The mean agreement coefficient was 100% for baseline. Interscorer agreement data were calculated during 23% of the sessions across each presentation for each participant. The mean agreement coefficient was 100% for each participant.

Treatment integrity data were collected during 28% of the sessions across each presentation for each participant as well. Overall, the mean agreement coefficient was 100% for each presentation.

Results

In regard to recalling the similarities depicted in the texts filling the graphic organizer after reading was more effective for the first, third, fourth, and fifth student whereas the presentation of the graphic organizer before reading was more effective for the second student. In regard to recalling the differences depicted in the texts, filling the graphic organizer after reading was more effective once again for the first, third, fourth, and fifth student, but the effects of both presentations were not differentiated for the second student. Both presentations were equally effective for the student.

Discussion

The purpose of this study was to compare the effectiveness of two different presentations of graphic organizers on recalling the information depicted in compare/contrast text, a kind of expository text, with intellectually disabled students. The first presentation included providing graphic organizers before reading whereas in the second presentation the student was asked to fill the graphic organizer after reading.

Previous study results have shown that the presentation of the graphic organizers after reading or construction of the organizers by the student was more effective than the types of presentations before reading (Berkowitz, 1986; Barron & Stone, 1974; Boyle & Weishaar, 1997). Evidence also suggests that the effect sizes were higher in meta-analysis studies (Moore & Readence, 1980; 1984). Similar results were attained in this study as well.

In regard to filling the graphic organizers after reading, it is concluded from this study that the following factors were associated with helping students recall the similarities and differences depicted in the texts. These factors were: a) During the process of filling the graphic organizer, presentation of the blank researcher-constructed graphic organizer was provided to the students and the students were guided to focus on the important information units while reading the text and therefore, this graphic organizer was prevented the extraneous processing (Mayer, 2005; Mayer & Moreno, 2003; Sweller, 2005; Stull & Mayer, 2007) and facilitated the student's active participation (Kirschner et al., 2006; Mayer, 2004); b) instead of presenting the students with the full text, after reading the text section by section, filling the graphic organizers,

helped intellectually disabled students who also have limited memory to recall the information depicted in the texts; c) examination of the graphic organizers filled by the students after reading was effective in having students examine the information units while visualizing these information units as a whole and combining them into each other (Hall et al., 1999).

In conclusion, different from the previous studies, this study compared the effectiveness of two different presentations with intellectually disabled students. Future research should investigate the effectiveness of two presentations with students with different reading performance levels, in different class levels, with different types of expository texts, and longer texts selected from text books with the use of alternating treatment design. Findings from future research will help evidence based practices in selecting effective presentations appropriate to students' individual learning characteristics and needs.

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Appendix/Ek 1.

Karşılaştırma Şeması Örneği

Köy   **Şehir**

Benzerlikleri

- İkisi de yerleşim birimidir.
- Her ikisinin de ismi vardır.
- İkisinde de insanlar yaşar.
- İkisinde de binalar vardır.
- İkisinin de sokak ve caddeleri vardır.

Köy   **Şehir**

Farklılıkları

- Küçük yerleşim birimidir.	- Büyük yerleşim birimidir.
- Az insan yaşar.	- Çok insan yaşar.
- Tarım ve hayvancılık yapılır.	- İnsanlar devlet daireleri fabrikalarda çalışılır.
- Muhtar yönetir.	- Vali yönetir.
- Sokak ve caddeler azdır.	- Sokak ve caddeler fazladır.
- Tek veya iki katlı binalar vardır	- Apartman ve gökdelenler vardır.