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Investigation of Metacognitive Reading Strategy Use for Items Constructed at Different Cognitive Processes

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Abstract

Reading comprehension is very important for students as it is what they need throughout their whole life to meet certain standards socially and academically. In the literature, some research has investigated the relationships between reading comprehension and metacognitive strategies. This study aims to reveal whether students use different metacognitive strategies in their reading comprehension skills at different cognitive levels (focusing on and retrieving explicitly stated information, making straightforward inferences and evaluating and criticizing the content and textual elements). The study group consists of 69 seventh grade students. Reading comprehension test, rubric, and Metacognitive Reading Strategies Scale were used to collect data. Crosstabulations were created in the data analysis, which revealed that the metacognitive reading strategy was the most frequently used strategy, while answering the items at all cognitive levels is the problem-solving based reading strategy. Students' strategy use varied by their inexperience in using strategies, their low performance in reading comprehension success, or their unawareness of metacognitive strategies. The results were discussed in light of the studies using the same measurement tool and investigating metacognitive reading strategies and reading comprehension.

Key Words: Meta cognitive strategies, reading comprehension, reading strategies, achievement test.

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Introduction

While reading was defined by Akyol (2007) as the process of structuring knowledge for a specific purpose with the help of prior knowledge and constructing meaning, Demirel (1999) argued that reading is the process of making meaning out of written symbols with the cooperation of cognitive processes and psychomotor skills. Reading comprehension skill is formed as a result of a process and is one of the first steps for individuals to acquire knowledge. This skill is the most basic skill required for many needs of individuals such as their personal lives and professional education, self-realization, evaluating social events, establishing relationships and conveying their thoughts. Mete (2012) underlines that reading is a measure of civilization both at the individual and social level. Mullis, Martin, Kennedy, and Foy (2007), on the other hand, emphasize that the reading comprehension skill will be beneficial for the individual in increasing the success of the individual in daily life, providing intellectual accumulation and discovering the individual's potential.

Metacognitive reading strategies are defined as strategies that help individuals regulate and monitor their cognitive strategies (Ahmadi, Ismail, & Abdullah, 2013). Readers who are conscious of reading comprehension and who have acquired/discovered the knowledge of how to read in order to understand it in the best way, approach the text more consciously in order to facilitate their ability to evaluate and critique the content and textual elements in the comprehension process. It is known that they prepare some cognitive strategies in advance to cope with the comprehension barriers they think they will encounter in the text (Karatay, 2010). Zhang, Gu, and Wu (2008), metacognitive awareness in reading practices; They expressed it as including the readers' conscious awareness of the strategic reading process, the vocabulary of reading strategies, and the highest level and correct use of strategies in understanding the text. Readers with high metacognitive awareness choose reading strategies related to reading purposes in the reading and comprehension process. They follow the understanding process, effectively evaluate the strategy they have chosen, and change their strategy when they need to. In the process of reading and meaning-making, if the individual knows and applies reading strategies, meaning-making increases.

Today, schools do not only aim to make individuals literate. Schools should ensure that their students understand and perceive the world correctly and demonstrate high-level skills that will help them perceive the world. Knowing a piece of information and using that information effectively are quite different things. The important thing is to use the information effectively. In this respect, it is very important for the individual to know the strategies used in understanding the text he read and to use this knowledge in the process of reading comprehension.

Metacognitive reading strategies are to consciously follow the reading process, intervene when necessary, and evaluate the process in all its aspects in order to create meaning (Başaran, 2013). Beyond cognition, which is briefly expressed as "thinking to think" or "learning to learn", it is essential for the individual to evaluate his/her own learning process. Therefore, in this assessment, the individual's learning tasks and what kind of knowledge and skills this requires should be properly comprehended. At the same time, metacognition is intertwined with the ability of an individual to make correct inferences about how to apply his or her own strategic knowledge in a certain situation and how to use this strategy efficiently (Melanlıoğlu, 2011).

Mokhtari and Reichard (2002) mention three basic processes of metacognitive reading strategies as holistic reading strategies, problem solving strategies and supportive reading strategies. Holistic reading strategies involve readers establishing

reading intent, activating their prior knowledge, making predictions about the text, verifying their predictions, reviewing the text, scanning the text to determine its type, making use of the clues and structure of the text, and using other textual features to enrich reading comprehension. Problem solving strategies include reading slowly and carefully, adjusting reading speed, rereading, visualizing the information read, reading aloud, and inferring the meanings of words. Supportive reading strategies, on the other hand, include the reader taking notes while reading, expressing what he has read with other words, underlining, asking himself questions, discussing and summarizing the subject with others.

Muhid, Amalia, Hilaliyah, and Wajdi (2020) studied the relationship between metacognitive strategies and reading comprehension achievement with high school students. According to the findings of the study, the use of metacognitive strategies positively affects students' reading comprehension success. In other words, students who use metacognitive strategies effectively have higher scores in the reading comprehension achievement test. In their study, Wu, Valcke, and Van Keer (2019) examined student and grade level variables that are effective in student achievement, and revealed that the two features most associated with secondary school students' reading success are students' use of metacognitive strategies and their autonomous reading motivation. Ghaith and El-Sanyoura (2019) revealed that program solving strategy, one of the metacognitive strategies, has a positive and significant relationship with high-level understanding.

Based on the points explained and discussed in the literature, it is deduced that the process of answering the items written at different cognitive levels completely and correctly depends on the reading of the text on which the item is based, in a way that reveals the feature measured by the item. The use of metacognitive processes, which take an active role in reading and comprehension processes, is related to the strategies individuals use while reading the text. Considering all these, the questions sought to be answered by this research are as follows:

- What is the distribution of students' metacognitive reading strategies used for answering the item measuring focusing on and retrieving explicitly stated information?
- What is the distribution of students' metacognitive reading strategies used for answering the item measuring making straightforward inferences?
- What is the distribution of students' metacognitive reading strategies used for answering the item measuring evaluating and criticizing content and textual elements?

Method

Research Design

This study aims to examine how the metacognitive strategies used by students to answer open-ended items in the field of reading comprehension written at different cognitive levels are distributed according to how accurately students answer the item. It is a survey research that aims to describe a situation that has happened in the past or that still exists (Creswell, 2009).

Study Group

The study group consists of 69 seventh grade students studying in Mamak district of Ankara province in the fall semester of 2019-2020 academic year. The convenience sampling was used as the sampling method. In convenience sampling, the researcher creates the sample starting from the most accessible respondents until he or she reaches a large group he/she needs (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz,

& Demirel, 2014). Convenience sampling prevents the loss of time, money and labor, but interpreting the results must be performed very carefully.

Data Collection Tools

Reading comprehension achievement test, rubric, and Reading Strategies Metacognitive Awareness Inventory were used to collect data in the study.

The reading comprehension achievement test consists of a reading text and three open-ended items based on the reading text. The text used is the 'Obesity' text used in the PISA 2012 application, which is an international large-scale assessment. The text was chosen considering its suitability for real life. The items prepared based on the text were prepared at three levels using the PIRLS reading skill classification. These are focusing on and retrieving explicitly stated information, making straight forward inferences, and evaluating criticizing the content and textual elements. When the relevant levels are examined, it is seen that the focus is on the student's ability to recognize the information or idea that is related to the answer of the item when the items measures the focus on and retrieve explicitly stated information. This process requires no interpretation. What is expected from the student is to distinguish the targeted information/idea from the others in the text. In measuring the cognitive process of making straightforward inferences, the focus is on finding information and ideas and combining what they find. Relationships, information, or ideas are not presented directly to the reader, but a skilled reader will relate and sequence them in his own mind as he reads. The process of examining the elements, content and language of the text, which is the most complex reading comprehension level, is based on the student's examination of the relevant text from his own point of view (worldview, belief, knowledge, etc.) and making inferences and interpretations about this text when necessary. In this process, which represents the highest level of reading comprehension skill, the student can evaluate the quality of the text, the event described in the text or the author's point of view by using their own knowledge. (Mullis, Martin, Gonzales and Kennedy, 2003).

A directive was prepared for each form describing the purpose of the research and what is expected from the students. The selected text, prepared items and instructions were sent to two assessment and evaluation experts and two Turkish teachers with secondary school experience. The formed expert group was asked to examine the items in terms of intelligibility, suitability for the grade level, word choice, and the appropriateness of the text to the grade level, as well as measuring the grouped reading comprehension levels of the items. According to the feedback from the expert group, the text, instructions and items were revised and the achievement test was made ready for application. The descriptive statistics of the scores obtained by the students from the achievement test are given in Table 1.

Table 1

Descriptive Statistics for the Total Score of Achievement Test

	focusing on and retrieving explicitly stated information	making straightforward inferences	evaluating and criticizing content and textual elements	Total score
\bar{x}	7.19	4.87	5.77	17.83
Median	7	4	7	18
Mod	10	7	10	21
Ss	2.94	3.27	3.65	7.44
Minimum	0	0	0	0
Maximum	10	10	10	30
Range	10	10	10	30

According to Table 1, students generally performed above the average. The average score they got from the level of focusing on and retrieving explicitly stated information, which is the most basic level of reading comprehension, is considerably higher than the higher levels of making straightforward inferences and evaluating and criticizing the content and textual elements. In other words, the most easily answered item by students is the item at the simplest cognitive level.

A rubric was created to score the open-ended items in the prepared achievement test. The rubric was prepared with the most correct answer, far correct answers, blank answer and wrong and other answers subsections. Identification codes were used for the responses. Each item was evaluated out of 10 points. The prepared rubric was sent to three assessment and evaluation experts, and the rubric was finalized in line with the feedback received from the experts.

The last data collection tool, Reading Strategies Metacognitive Awareness Inventory, was developed by Mokhtari and Reichard (2002) and adapted into Turkish by Öztürk (2012). This inventory has a 5-point Likert-type rating of (1) Never (2) Rarely (3) Often (4) Often, and (5) Always. All items have been preserved during the adaptation phase. As a result of the analysis of the three factors in the original scale, the eigenvalue of the first factor was 9.67 and the variance it explained was 32.26%; The eigenvalue of the second factor was 1.74, the variance explained was 5.8%, the eigenvalue of the third factor was 1.36, and the variance explained was 4.54%. The total eigenvalue of the scale is 12.87 and the total variance explained is 42.6. The three-factor structure in the original scale preserved itself when applied to students in Turkey. Among the three factors in the scale structure in Turkish culture, the "supporting reading strategies" factor is the third factor in the original scale, the first factor in the Turkish form, the "problem solving strategy" factor is the second factor in the original form and the second factor in the Turkish form, and the "general reading strategy" factor is the first factor in the original form, and the third factor in the Turkish form. In addition, it was found as while the 2nd item in the scale was in the factor of supporting reading strategies in the original form, it was in the general reading strategy factor in the Turkish form, and the 26th item in the general reading strategy factor. Except for these differences, all items were found to be compatible with the sub-factors in the original scale, but the order of only two sub-factors was changed. The Cronbach Alpha coefficient was calculated for the total score reliability of the Reading Strategies Metacognitive Awareness Inventory, and it was found to be $\alpha=0.91$. When the reliability of the sub-dimensions of the scale was examined, it was seen that the reliability of the Supporting Reading Strategies sub-dimension was $\alpha=0.71$, the reliability of the Problem-Solving Strategy sub-dimension $\alpha=0.74$, and the reliability of the General Reading Strategy sub-dimension $\alpha=0.82$.

Data Collection

The data were collected by the researchers from seventh grade students studying at a public school in Mamak. After obtaining permission from the school principal and course teachers, the researcher entered the classrooms. A brief summary of the study was made for students on the first day of classes. Parental consent forms were distributed to students. After obtaining permission from the parents of the students, the data collection process was started. Both text and text-based questions and three Reading Strategies Metacognitive Awareness Inventory were distributed to each student in each class. The logic of answering the questions used in PIRLS was explained to the students and the purpose of this study and the starting point of the idea were explained. Accordingly, the complete and correct answer to each question they are about to answer includes reading the text for different purposes; For this reason, it was mentioned that the strategies for reading the text were predicted to change while answering each question. In summary, after each student answered the

first question, they filled the first metacognitive awareness inventory, and they filled the second metacognitive awareness inventory after answering the second question, and the last metacognitive awareness inventory after answering the last question.

Data Analysis

The data were analyzed by using the SPSS 22.0 package program. Response recognition codes of the students were recoded as 2 for the most correct answer (response recognition code 10), 1 for far correct answers (response recognition codes 13, 17 and 20), and 0 for incorrect and unrelated answers (response recognition codes 30 and 40). Scores from each sub-dimension of the inventory were calculated separately for the first, second and third items. Since each sub-dimension has a different number of items, the mean scores of the sub-dimensions were calculated in order to make comparisons between the sub-dimensions possible. For each item, the distribution of metacognitive strategies used by those who answered the item most correctly, those who answered it far right, and those who gave incorrect or unrelated answers were examined with cross tables.

Findings

In this section, the findings related to the first, second and third research questions are given, respectively.

Findings regarding the First Research Question

The distribution of metacognitive reading strategies used for answering the first research question, focusing on and retrieving explicitly stated information item, to student response recognition codes was examined with cross-tables and given in Table 2.

Table 2

Distribution of metacognitive strategies used to answer the items measuring focusing on and retrieving explicitly stated information process

	Supporting Reading Strategies sub-dimension	Problem solving strategy sub-dimension	General reading strategy sub-dimension	Total
The most correct answer	1	24	3	28
Partially correct answers	3	29	6	38
Incorrect/Unrelated answers	0	3	0	3
Total	4	56	9	69

When Table 2 is examined, 41% of the group gave the most correct answer to the item of focusing on and retrieving explicitly stated information; 55% gave partially correct answer and 4% gave an incorrect or unrelated answer. 85% of the students who gave the most correct answers, 76% of the students who gave the partially correct answer, and all of the students who gave incorrect or unrelated answers used the problem-solving strategy the most when answering the item. The second most used strategy was general reading strategies for each response category, while the least used strategy was supporting reading strategies.

Findings regarding the Second Research Question

The distribution of metacognitive reading strategies used to answer the second research question, making straight forward inferences item, to student response recognition codes was examined with cross-tables and given in Table 3.

Table 3

Distribution of metacognitive strategies used to answer the items measuring making straightforward inferences process

	Supporting Reading Strategies sub-dimension	Problem solving strategy sub-dimension	General reading strategy sub-dimension	Total
The most correct answer	1	7	3	11
Partially correct answers	7	33	9	49
Incorrect/Unrelated answers	3	2	4	9
Total	11	42	16	69

When the metacognitive strategies used for answering making straightforward inferences item are examined in Table 3, it is seen that the strategies based on problem solving are the most frequently used strategies. It was determined that 64% of the 11 people who gave the most correct answers and 67% of the 49 people who gave partially correct answers used reading strategies based on problem solving; additionally, about half of 9 people who gave incorrect or unrelated answers used general reading strategies. The second most used strategy is general reading strategies while supporting reading strategies was used the least frequently.

Findings regarding the Third Research Question

The distribution of metacognitive reading strategies used to answer the item, evaluating and criticizing content and textual elements item, was examined with cross-tables and given in Table 4.

Table 4

Distribution of metacognitive strategies used to answer the items measuring evaluating and criticizing content and textual elements process

	Supporting Reading Strategies sub-dimension	Problem solving strategy sub-dimension	General reading strategy sub-dimension	Total
The most correct answer	7	13	2	22
Partially correct answers	11	22	5	38
Incorrect/Unrelated answers	2	6	1	9
Total	20	41	8	69

Table 4. Distribution of metacognitive strategies used to answer the items measuring evaluating and criticizing content and textual elements process

When the metacognitive strategies used in the evaluating and criticizing the content and textual elements are examined in Table 4, it is seen that the problem-solving

strategy is the most frequently used strategy as happened in other cognitive processes. 59% of the group that gave the most correct answer, 58% of the group that gave the partially correct answer, and 67% of the students who gave incorrect or unrelated answers used problem solving strategies. The order of metacognitive strategies used in the question of evaluating and criticizing content and textual elements differs from the strategies in other cognitive processes. While problem solving strategies are used most frequently, it is seen that reading support strategies are used in the second place and general reading strategies are used in the last place for the evaluating and criticizing content and textual elements process.

Results

In this study, the cognitive level distribution of metacognitive strategies used by 7th grade students was examined. The results showed that the distribution of metacognitive strategies used by 7th grade students did not differ greatly according to the cognitive level of the questions they answered based on the text. In all of the items of focusing on and retrieving explicitly stated information, making straightforward inferences and evaluating and criticizing the content and textual elements, the most used metacognitive reading strategy was determined as the strategies based on problem solving. In the cognitive levels of focusing on and retrieving explicitly stated information, it was seen that the most used metacognitive answering strategy in all response categories was problem-solving strategies, and the second most used strategy was general reading strategies. In the item of evaluating and criticizing the content and textual elements, which is the highest cognitive process, the slightly different distribution revealed. While the most frequently used metacognitive reading strategy was a problem-solving strategy, the second most frequently used strategy was to support reading strategies. The results obtained by Ateş (2013) show parallelism with the results of this research. Ateş revealed that students' reading strategies and their use of general reading strategies were at a moderate level, and their use of problem-solving strategies was at a high level. Meniado (2016), in his study examining the relationships between metacognitive reading strategies, motivation and reading comprehension, concluded that the most used metacognitive reading strategy is the problem-solving strategy.

It was thought that the students' frequent use of the problem-solving strategy, one of the metacognitive reading strategies, within the scope of this study may be related to the repetitive and slow readings of the related strategy. It is known that Turkish students rank very low in reading and reading comprehension in national and international large-scale evaluation results. The result of this situation may be that the student who cannot read well and cannot understand what he reads, tries to make sense of the text by reading intensively and at varying speeds as a reading strategy.

Another reason why metacognitive reading strategies do not differ according to cognitive levels may be that students are cognitively ignorant of the strategies they use or that they do not have awareness of metacognitive strategies. Even if the student has no education about the learning process and how he learns, has no knowledge of what the reading strategies are, or even if he has a strategy, the correct answer to the multiple-choice items used in the continuous measurement is so independent of the strategy that the student's knowledge and knowledge of his own cognitive and metacognitive processes may be far from an effort to improve monitoring.

The study has some limitations. The first of these is related to the representativeness of the selected sample from the universe. Generalizability of the results can be increased by repeating this study with a larger group. Another suggestion might be

to measure with more items. Due to time and application limitations, the achievement test, which is one of the data collection tools, was composed of only three items. More data on the relevant cognitive level can be collected by sampling more of each cognitive level. The last suggestion is about students' use of metacognitive reading strategies. The orientation towards the same reading strategy at different cognitive levels raises questions about how effectively students use metacognitive strategies. Introducing metacognitive reading strategies, which are an important pillar for supporting and improving reading comprehension, and encouraging students to use different strategies will positively affect the cognitive duration of reading comprehension in the classroom.

Ethical compliance statement

In all the research processes of the article, the author acted in accordance with the principles of universal research and publication ethics.

Declaration of Conflict of Interest

The author declares no conflict of interest.

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Appendixes

Appendix A: Achievement Test

Değerli Öğrenci,

Aşağıdaki 'Obezite' isimli metni ve metne dayalı yazılmış üç açık uçlu soruyu bulacaksınız. Lütfen metni okumadan önce araştırmacının yapacağı açıklamayı dikkatlice dinleyiniz.

Elde edilen veriler yalnızca araştırma amacı ile kullanılacak olup kimseyle paylaşılmayacaktır. Verdiğiniz destek için size çok teşekkür ederim.

BASINDA OBEZİTE

10.01.2015

12 Yaş Altı Çocuklarda Mobil Cihazların Kullanımının Yasaklanması İçin Bir Sebep: Obezite

Video oyunları ve televizyon, obezitenin artması ile ilişkilidir. Odasında bu tür cihazları kullanmasına izin verilen çocuklarda obezite görülme sıklığı %30 oranında artmaktadır. Obez olan çocukların %30unda diyabet ortaya çıkmakta, kalp ve erken felç riski artmakta ve ortalama yaşam süresi kısalmaktadır.

15.12.2014

Çocukluk Döneminde Risk: Obezite

Anne ve babanın obez olması, çocuğun yemek alışkanlığı bakımından anne ve babasını örnek alması, çocukların televizyon ve bilgisayar başında çok zaman geçirmesi, stres, kaygı gibi unsurlar çocukluk dönemine obezitenin oluşmasına neden olmaktadır.

10.11.2014

Çocukları Obez Olan Ailelere Para Cezası Geliyor!

Porto Riko'da hükümet, obeziteyle mücadele amaçlı, çocukları fazla kilolu olan anne ve babalara 800 dolara kadar para cezası verilmesini planlıyor. Gelecek nesillerin daha sağlıklı olması için bu uygulamanın yararlı olacağını düşünenlerin sayısı ülkede oldukça fazla.

Appendix B: Items and Rubrics

1. Metne göre obezitenin sebepleri nelerdir? Maddeler halinde yazınız.

Tanıma Kodu	En Doğru Yanıt	
10	Öğrenci, obezitenin en az dört sebebini yazar.	10
	Uzak Doğru Yanıtlar	
13	Öğrenci, obezitenin en az üç sebebini yazar.	7
17	Öğrenci, obezitenin en az iki sebebini yazar.	4
20	Öğrenci, obezitenin en az bir sebebini yazar.	2
	Yanlış Yanıtlar	
30		0
	İlişkisiz Yanıtlar	
40		0

2. Gazetelerde obeziteyle ilgili haberlere sıklıkla yer verilmesinin nedeni nedir? Cümleler halinde yazınız.

Tanıma Kodu	En Doğru Yanıt	
10	Öğrenci, gazetelerde obeziteyle ilgili haberlere sıklıkla yer verilmesinin üç nedenini yazar.	10
	Uzak Doğru Yanıtlar	
13	Öğrenci, gazetelerde obeziteyle ilgili haberlere sıklıkla yer verilmesinin iki nedenini yazar.	7
17	Öğrenci, gazetelerde obeziteyle ilgili haberlere sıklıkla yer verilmesinin bir nedenini yazar.	4
20	Öğrenci, genel bir yanıt yazar.	2
	Yanlış Yanıtlar	
30		0
	İlişkisiz Yanıtlar	
40		0

3. Metinde obezitenin önüne geçmek için farklı öneriler yer almaktadır.

Siz bu önerileri haklı buluyor musunuz? Düşüncenizi gerekçeleriyle birlikte cümleler halinde yazınız.

Tanıma Kodu	En Doğru Yanıt	
10	Öğrenci, metinde verilen önerinin mantıklı ya da mantıksız olduğunu kendi bakış açısıyla eleştirel olarak tartışır.	10
	Uzak Doğru Yanıtlar	
13	Öğrenci, metinde verilen önerinin mantıklı ya da mantıksız olduğunu belirtir. Kendi bakış açısına yer vermez.	7
17	Öğrenci, kendi önerisini söyler ancak metinde verilenleri eleştirmez.	4
	Yanlış Yanıtlar	
30		0
	İlişkisiz Yanıtlar	
40		0