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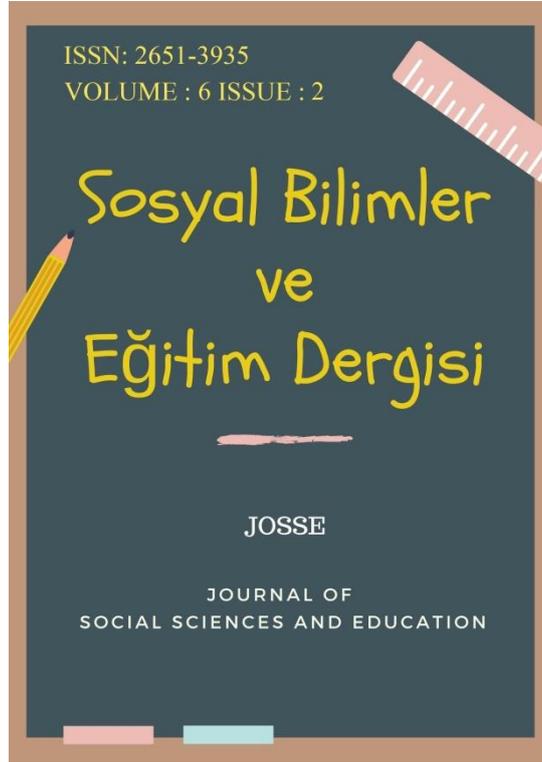
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Problem-Solving Strategies Employed by 8th Grade Students While Solving Multiple Choice Questions in the Republic of Turkey History of Revolution and Kemalism Course

Hasan ASLAN[1]
Kafkas University, Dede Korkut Faculty of Education, Department of Turkish and Social Sciences Education
Asst.Prof. Dr.
hasanaslan_25@hotmail.com
Orcid ID: 0000-0003-2035-1388

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Hasan ASLAN[1]

Kafkas University, Dede Korkut Faculty of Education, Department of Turkish and Social Sciences Education

Abstract	Research Article
The objective of this study is to examine the problem-solving approaches employed by 8th-grade students when tackling multiple-choice questions in the Turkish Republic Revolution History and Kemalism Course. Additionally, the study aims to ascertain the impact of these strategies on students' rates of success and overall academic performance. The present investigation was organized in accordance with a qualitative research methodology. The comprehensive and multi-faceted nature of this approach was deemed preferable. The study group comprises a collective of six students, all of whom are enrolled in the 8th grade at a public school located in the city center of Kars. These students possess varying levels of academic achievement in the course of Turkish Republic Revolution History and Kemalism. The students in the study group were determined by the purposeful sampling method. The participants of the study were instructed to engage in verbalized thinking sessions while solving multiple-choice questions related to the Turkish Republic Revolution History and Kemalism. The data collected from video recordings of the students' question-solving activities were digitized and subjected to content analysis. The findings of the study revealed that students with higher academic performance, who also provided accurate responses to the questions, employed a wider range and greater quantity of cognitive-metacognitive strategies in comparison to students with lower academic performance. Furthermore, in this study, it has been observed that students' use of cognitive-metacognitive strategies is a significant factor in reaching the correct answers to multiple-choice questions.	
Keywords: Metacognitive, cognitive, question-solving strategy, Turkish Republic Revolution History and Kemalism course	

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[1] Corresponding author
Asst.Prof. Dr.
hasanaslan_25@hotmail.com
Orcid ID: 0000-0003-2035-1388

Introduction

Individuals who are expected to grow up as an effective citizen have a number of basic skills. Some of these skills are directly related to thinking skills. One of the most important of these skills, which is indispensable for an effective citizen profile, is problem solving skill (Yılar & Karadağ, 2020). In other words, one of the most important goals of formal education is to equip students with the skills necessary to handle problems successfully throughout their lives. (Baki, Karataş, & Güven, 2002; Yılar, 2022). Different methods are employed to enhance students' problem-solving abilities. These approaches primarily seek to answer the question, "What are the sources of errors that students make in problem-solving processes and what are the necessary conditions for them to answer the question correctly?" (Karaçam, 2009). In order to find answers to such questions, studies are carried out to determine the situations that affect the problem-solving processes of students in different learning areas (Diken, 2014).

Polya (1957) defines problem-solving as going around an obstacle, achieving an impossible goal, or finding a way out of a difficulty. Researchers define the situation in which individuals encounter an unfamiliar question or difficulty as a problem and the process of overcoming this difficulty is problem-solving (Mayer, 1998; Newell & Simon, 1972; Ray, 1955; Dewey, 1910). Van Gog et al. (2005) state that when solving a problem, students use problem-related field knowledge, problem-solving process monitoring components, and problem-solving strategies. The process of problem-solving is a complex activity that must be addressed from a metacognitive as well as a cognitive point of view (Brown & Palincsar, 1982). Therefore, it is inevitable that studies should be conducted to distinguish and identify the strategies students use in their problem-solving processes as cognitive-metacognitive (Diken, 2020).

Individuals with high cognitive-metacognitive skills try to simplify, divide, and solve the complex problems they encounter and continue the problem-solving process in a more controlled way. These behaviors exhibited by individuals in the problem-solving process enable them to perform more successfully (Özsoy, 2007). There are studies (Diken, 2014) that describe individuals with these characteristics in the problem-solving process as experts, label those without these characteristics as novices, and identify differences between individuals categorized as novices and experts in problem-solving. Through the use of metacognition, people can actively engage in their own learning, control and regulate their learning, and be

aware of their own thought and decision-making processes. As a result, it aids in learning by delivering a better qualified performance and encourages more academic success. In addition, it provides the person responsibility and boosts their self-confidence so they can act quickly. (Topkaya, Şentürk ve Yılar, 2021).

The structure of cognitive-metacognitive strategies is intricately connected. Consequently, any strategy can be categorized as metacognitive-cognitive based on its intended purpose. A strategy is deemed cognitive when it is employed to execute mental processes within any aspect of the solution, while it is considered metacognitive when it is utilized to oversee, assess, and regulate the problem-solving process (Livingstone, 1997; Flavell, 1976, 1979). When examining the studies on metacognitive-cognitive strategies in the literature, examples of cognitive, metacognitive, and both cognitive-metacognitive strategies, as generally identified in the studies conducted by Diken (2020), Diken and Yürük (2019), Yurttaş (2016), Diken (2014), Kumlu (2012), and Karaçam (2009) are as shown in Table 1.

Table 1

Cognitive Strategies, Metacognitive Strategies, and the Combined Utilization of Both Cognitive and Metacognitive Strategies are Employed by Students

Cognitive Strategies
Visualization
Reading while tracing the words with a pen
Reading starting from the root of the problem
Comparison
Comparing figures
Comparing descriptions in the text
Comparing the figures and descriptions in the text
Comparing figures in the text of the question with options
Comparing descriptions in the text of the question with options
Comparing options
Examination
Examining the Figures
Examining the Charts
Examining the Tables
Metacognitive Strategies
Re-reading
Repeating highlights
Slowing down reading speed
Increasing reading speed
Underlining clues
Encircling clues
Reading other options for verification
Marking
Marking a shape
Marking options
Marking a table
Marking descriptions in the text
Elimination
Elimination of figures in the text
Option Elimination
Review
Reviewing the Figure
Reviewing the Graph
Reviewing the Table
Reviewing the process
Backtracking
Both Cognitive and Metacognitive Strategies
Reading with underlining words
Asking oneself questions
Note-taking
Expressing in one's own words
Reflecting on the problem in behavior
Trial and error
Drawing
Drawing Shapes

When the literature is analyzed, it becomes clear that there is not much research, particularly at the secondary education level, on the methods for answering multiple-choice questions in social studies and history courses. In this regard, it is considered that this study can make a significant contribution to the field. The objective of this research was to ascertain the strategies employed by 8th-grade students when responding to multiple-choice questions about the Turkish Republic Revolution History and Kemalism (TRRHK) course.

Additionally, the study aimed to examine the influence of these strategies on the students' rates of answering the question correctly and overall academic performance.

Method

Model

The study was conducted with a holistic multi-state design (Yin, 2003) from qualitative research methods. This research design was preferred because it aimed to consider several situations holistically in the study and then compare them with each other (Yıldırım & Şimşek, 2011). In this study, the academic achievement level of 8th-grade students in the TRRHK course and the rate of correctly answering the questions are the situations in the study, and the patterns between these situations were determined and presented holistically.

Study Group

The study group is made up of six 8th graders who are enrolled in the TRRHK course at a public school in the heart of Kars and have varying academic success backgrounds. The students in the study group were determined by the purposeful sampling method. The reason for using the purposeful sampling method is to reach participants who can provide answers that are suitable for the research problems identified by the researcher (Erkuş, 2013). The selection of participants was contingent upon their grade point averages achieved during the fall semester of the 2021-2022 academic year in the course of TRRHK, alongside their expressed willingness to participate. To ensure utmost confidentiality, both the names of the educational institution and the students involved in the study were withheld. Consequently, the participating students were assigned unique codes, namely "S1-S2-S3-S4-S5-S6".

Table 2

The Type of School Where the Students Studied, the Turkish Republic Revolution History Course Grade Point Averages and Levels

School Type	Students	Course GPA	Level of GPA
	S1	97	High
	S2	92	High
Public School	S3	89	High
	S4	55	Low
	S5	43	Low
	S6	35	Low

Table 2 shows that S1, S2, and S3 had grade point averages of 97, 92, and 89 in the course on the Turkish Republic Revolution and Kemalism, respectively, indicating "high" grade point average levels. Of the other students, S4, S5, and S6 had grade point averages of 55, 43, and 35, respectively, in the TRRHK course and their grade point average levels were "low". While determining the grade point average levels of the students in the TRRHK course, the Ministry of National Education Secondary Education Institutions Regulation was taken into consideration (MEB, 2018).

Data Collection Tools

The data for the study were acquired via thinking-aloud sessions conducted with 8th-grade students, about multiple-choice questions concerning the TRRHK course. The thinking-aloud session is a methodology that elucidates the correlation between students' problem-solving proficiency and other influential factors in problem-solving (Van Someren, Barnard & Sandberg, 1994).

The multiple-choice questions to be used in these sessions were selected based on units with a high number of learning outcomes in the 8th-grade curriculum of the TRRHK course (MEB, 2018). The reason for this is that it has been determined that in the Transition to High School Exam (LGS), one of the important central exams in Turkey, there are more questions related to these units with a higher number of learning outcomes compared to other units. Furthermore, while selecting questions attention was paid to the questions in which it was anticipated that students may tend to use a greater number and variety of strategies in the process of solving them. Then, the preparation test books for the High School Transition Exams (LGS) were examined and the appropriate questions were selected for the determined units. During the application, questions that require the activation of various problem-solving strategies such as map analysis, table analysis, and figure analysis were selected to identify students' use of different problem-solving strategies. After the questions were determined, the opinions of a social studies teacher at the school where the study was conducted, a field expert faculty member who studies metacognitive-cognitive strategies, and a faculty member who studies in the field of social studies and history teaching were sought to determine whether there were any information errors or misconceptions in the questions. After receiving expert opinions, the questions were finalized to be used in the study.

Table 3

Distribution of the Questions Used in the Study by Units and the Number of Objectives of the Units MEB (2018)

Questions	Unit	Number of Objectives of Units	Contents
1	A hero is born	4	Table
2	National Awakening: Steps Taken Towards Independence	8	Map
3	A National Epic: Independence or Death!	7	Text
4	Kemalism and Modernizing Turkey	9	Figure

Data Collection and Analysis

During the data collection process, a literature review of cognitive-metacognitive strategy-related studies conducted in Turkey and abroad was conducted, and the list of cognitive-metacognitive strategies was utilized (See Table 1). The questions belonging to the 8th grade TRRHK course to be used in the study were determined by examining the High School Entrance Exam preparation books after taking the opinions of the field experts. Then, in line with the decisions of the Kafkas University Social Sciences and Humanities Scientific Research and Publication Ethics Board dated 07.12.2021 and numbered 25, the necessary ethical permissions were obtained, the necessary correspondence was made with the Kars Provincial Directorate of National Education, and the permissions were obtained from the parents of the students who will participate in the research with the parent consent form. During the spring semester of the school year 2021–2022, the study was conducted.

Before answering multiple-choice questions, students were briefed about the thinking-aloud session. The students were instructed to articulate their thoughts, actions, and problem-solving approaches audibly during the process of answering questions. In order to reduce the excitement of the students due to the use of cameras in the process of solving questions and to ensure that they adapt well to the process, a two-question pilot study was administered to the students before the actual implementation. During and after the pilot study, necessary feedback was given to the students to make the data collection process more efficient. Following the pilot study, the implementation process was begun, and the researcher videotaped the steps taken by the students as they resolved their questions. In the process of solving the questions, it was observed that the students were sometimes silent for a long time. In this case, the students were warned by the researcher to express what they thought aloud.

The participants individually solved the multiple-choice questions during the days designated for history lessons, and the process of data collection was concluded within two weeks.

During the data analysis process, the metacognitive, cognitive, and both metacognitive-cognitive strategies identified by Diken (2020), Diken and Yürük (2019), Yurttaş (2016), Diken (2014), Kumlu (2012), and Karaçam (2009) in their studies were used to determine which strategies students employed while solving the questions. The video recordings of students' question-solving processes were examined, transcribed into written form, and computerized. Thus, the raw data were obtained. The coding of the obtained data was made through content analysis. A discussion was held with a field expert faculty member in the field to verify the accuracy of the data in the encodings. The consistency and reliability of the codes were discussed with this faculty member to determine whether the strategies reached from the obtained data were metacognitive or cognitive. While coding studies were carried out, separate codes were made by the researcher and the field expert faculty member, and the resulting coding was compared. While these encodings were carried out, the reliability formula provided by Miles & Huberman (1994) (Reliability = agreement/agreement + disagreement) (cited in Yanpar-Yelken, 2009) was used. As a result of the comparisons, the coders came to a common decision by discussing the codes that were inconsistent with each other. As a result of the joint decision reached on the encodings, encoder reliability was calculated and the consistency between the encoders was found to be 96%. In qualitative research, when researcher and expert evaluations are conducted, their agreement should reach a reliability level of 70% or higher (Yıldırım & Şimşek, 2011). The fact that the reliability value obtained from the calculation made between the researcher and the field expert in this study is above the specified value is an indication that this study is consistent.

Ethics Committee Approval

In line with the decisions of the Kafkas University Social Sciences and Humanities Scientific Research and Publication Ethics Board dated 07.12.2021 and numbered 25, the necessary ethical permissions were obtained, the necessary correspondence was made with the Kars Provincial Directorate of National Education, and the permissions were obtained from the parents of the students who will participate in the research with the parent consent form.

Findings

In this section of the study, the distribution of metacognitive-cognitive strategies used by 8th-grade students participating in the research while solving questions related to the TRRHK course is presented in tables based on their grade point averages and whether they answered the questions correctly or incorrectly. The metacognitive-cognitive strategies listed in the tables were coded separately, and it is also seen that some strategies can be coded as both metacognitive and cognitive strategies (see Table 1).

Table 4

Cognitive Strategies Employed by Students While Answering the First Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Cognitive Strategies						
Reading while tracking the words with a pen				+	+	
Reading with underlining words	+	+	+			
Reading starting from the root of the question	+	+	+			
Visualization	+	+	+			
Expressing in one's own words	+	+	+			
Comparing Strategies						
Comparing descriptions in the text of the question with options	+	+	+			
Review Strategies						
Examining the Tables	+	+	+	+	+	+

As can be seen in Table 4, it was determined that S1, S2, and S3, who answered the question correctly, used the cognitive strategies of "reading by underlining the words, reading starting from the root of the question, visualization, expressing in one's own words, comparing the explanations in the text of the question with the options, and examining the table" while solving the question.

In the first question, S4, S5, and S6, whose course grade point average level was low, answered incorrectly. It was determined that S4 and S5 of these students used the cognitive strategies of "reading by following the words with a pen and examining the table" while solving the question, while S6 used only the cognitive strategy of "examining the table" when solving the question.

Table 5

Metacognitive Strategies Employed by Students While Answering the First Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Metacognitive Strategies						
Reading with underlining words	+	+	+	+		
Underlining clues	+	+	+			
Encircling clues	+	+	+			
Checking the correctness of the selected option	+	+	+			
Re-reading	+	+	+	+		
Marking Strategies						
Marking a table	+	+	+			
Marking descriptions in the text	+	+	+			
Marking options	+	+	+			
Re-Examination Strategies						
Reviewing the Table	+	+	+	+	+	
Elimination Strategies						
Option Elimination	+	+	+			

Table 5 reveals that participants S1, S2, and S3 employed metacognitive strategies to successfully answer the question. These strategies "underling words, underlining clues, identifying clues, encircling relevant information, verifying the accuracy of their selected option, re-reading the text, marking the table, highlighting explanations in the question text, marking the available options, reviewing the table, and eliminating incorrect options".

Participant S4, who had a low course grade point average, provided an incorrect response to the question. Upon analysis, it was found that this student employed metacognitive strategies such as "underlining the words, re-reading, and re-examining the table while attempting to solve the question". Similarly, participant S5, who also answered the question incorrectly, solely utilized the metacognitive strategy of "re-examining the table" during the problem-solving process. In contrast, participant S6, who also provided an incorrect response, abandoned the task and thus did not employ any metacognitive strategy while attempting to solve the initial question.

Table 6

Cognitive Strategies Employed by Students While Answering the Second Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Cognitive Strategies						
Visualization	+	+	+	+		
Reading while tracking the words with a pen					+	
Reading starting from the root of the question	+	+	+			
Reading with underlining words	+		+			
Expressing in one's own words	+	+	+			
Thinking about the question	+	+	+	+		
Map Interpretation	+	+	+			
Comparing Strategies						
Comparing the map in the text of the question with options	+	+	+			
Comparing the map with descriptions in the text of the question	+	+	+			
Review Strategies						
Map review	+	+	+	+	+	+

According to the data presented in Table 6, individuals denoted as S1, S2, and S3, who exhibited a commendable academic performance in terms of their course grade point average, and also provided accurate responses to the question, employed the cognitive strategies of "visualization, reading starting from the root of the question, expressing in one's own words, thinking about the question, map interpretation, comparing the map in the text of the question with the options, comparing the map with the explanations in the text of the question, and the map review" while solving the question. In addition, it was also determined that S1 and S3, whose used the cognitive strategies of "reading with underlining words" while solving the question.

It was determined that S4, S5, and S6, whose course grade point average level was low and answered the second question incorrectly, used the "map examination" cognitive strategy when solving the question. In addition, it was determined that S4 used the cognitive strategies of "visualization and thinking about the question", while S5 used the cognitive strategy of "reading by following the words with a pen" while solving the question.

Table 7

Metacognitive Strategies Employed by Students While Answering the Second Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Metacognitive Strategies						
Re-reading	+	+	+	+	+	
Reading with underlining words	+	+	+			
Double-checking the options	+	+	+			
Checking the correctness of the selected option	+	+	+			
Repeating clues	+	+	+	+		
Underlining clues	+	+	+			
Encircling clues	+	+	+			
Taking notes on the map	+	+	+			
Re-Examination Strategies						
Re-examining the map	+	+	+	+	+	
Marking Strategies						
Marking the map	+	+	+			
Marking descriptions in the text	+	+	+			
Marking options	+	+	+			
Elimination Strategies						
Option Elimination	+	+	+			

As can be seen in Table 7, S1, S2, and S3, whose course grade point average level was high and answered the question correctly, used the metacognitive strategies of "re-read, reading with underlining words, checking the options again, checking the accuracy of the options marked, repeating the clues, underlining the clues, encircling the clues, taking notes on the map, re-examining the map, marking the map, marking the explanations in the text of the question, marking the options and eliminating the options" while solving the question.

It was determined that S4, who answered the question incorrectly, used the metacognitive strategies of "re-reading, repeating the clues, and re-examining the map" while solving the question. It was determined that S5, who answered the question incorrectly, used the metacognitive strategy of "re-reading and re-examining the map" while solving the question. It was determined that S6, who answered the question incorrectly, gave up solving the question and therefore did not use any metacognitive strategy.

Table 8

Cognitive Strategies Employed by Students While Answering the Third Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Cognitive Strategies						
Reading while tracking the words with a pen				+	+	+
Reading starting from the root of the question	+	+	+			
Reading with underlining words	+		+			
Thinking about the question				+		
Comparing Strategies						
Comparing descriptions in the text of the question with options	+	+	+			
Review Strategies						
Examining the Figures	+	+	+			

As can be seen in Table 8, it was determined that S1, S2, and S3, who answered the question correctly, used the cognitive strategies of "reading starting from the root of the question, comparing the explanations in the text of the question with the options and examining the figures" while solving the question. In addition, S1 and S3 also used the cognitive strategy of "reading by underlining words" when solving the question.

It was determined that S4, used the cognitive strategies of "Reading while tracking the words with a pen and thinking about the question" while solving the question. It was determined that S5 and S6, whose course grade point average level was low and answered the question incorrectly, used only the cognitive strategy of "Reading while tracking the words with a pen" while solving the question.

Table 9

Metacognitive Strategies Employed by Students While Answering the Third Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Metacognitive Strategies						
Re-reading	+	+	+	+		
Reading with underlining words	+		+			
Double-checking the options	+	+	+			
Checking the correctness of the selected option	+	+	+			
Underlining clues	+	+	+			
Encircling clues	+	+	+			
Re-Examination Strategies						
Re-examining the options	+	+	+	+	+	
Marking Strategies						
Marking options	+	+	+			
Elimination Strategies						
Option Elimination	+	+	+			

As can be seen in Table 9, it was determined that S1, S2, and S3, who answered the question correctly, used the metacognitive strategies of "re-reading, re-checking the options, checking the correctness of the option they marked, underlining the clues, encircling the clues, re-examining the options, marking the options, and eliminating the options" while solving the question. In addition, S1 and S3 also used the cognitive strategy of "reading by underlining words" when solving the question.

It was determined that S4 used the metacognitive strategy of "re-reading and re-examining the options" while solving the question. It was determined that S5 only used the metacognitive strategy of "re-examining the options", while S6 gave up solving the third question and therefore did not use any metacognitive strategy.

Table 10

Cognitive Strategies Employed by Students While Answering the Fourth Question

Students Answer Course Grade Point Average	S1 Correct High	S2 Correct High	S3 Correct High	S4 Wrong Low	S5 Wrong Low	S6 Wrong Low
General Cognitive Strategies						
Visualization	+	+	+			
Reading with underlining words	+		+			
Reading while tracking the words with a pen				+	+	
Reading starting from the root of the question	+	+	+			
Comparing Strategies						
Comparing the figures and descriptions in the text of the question	+	+	+			
Comparing the figures in the text of the question with options	+	+	+			
Review Strategies						
Examining the Figures	+	+	+	+	+	+

As can be seen in Table 10, it was determined that S1, S2, and S3 who answered the question correctly, used the cognitive strategies of "visualization, reading starting from the root of the question, comparing the explanations in the text of the question with the figure, comparing the figures in the text of the question with options and examining the figure" while solving the question. In addition, S1 and S3 also used the cognitive strategy of "reading by underlining words" when solving the question.

The cognitive strategies employed by S4 and S5 during the question-solving task were identified as "reading while tracking the words with a pen and examining the figure." Conversely, S6, whose academic performance was characterized by a low course grade point average, solely relied on the cognitive strategy of "examining the figure" while attempting to solve the question.

Table 11

Metacognitive Strategies Employed by Students While Answering the Fourth Question

| Students | S1 | S2 | S3 | S4 | S5 | S6 |
| Answer | Correct | Correct | Correct | Wrong | Wrong | Wrong |
Course Grade Point Average	High	High	High	Low	Low	Low
General Metacognitive Strategies						
Underlining clues	+	+	+			
Encircling clues	+	+	+			
Checking the correctness of the selected option	+	+	+			
Re-reading	+	+	+	+		
Marking Strategies						
Marking a shape	+	+	+			
Marking descriptions in the text	+	+	+			
Marking options	+	+	+			
Re-Examination Strategies						
Reviewing the Figure	+	+	+	+	+	
Elimination Strategies						
Option Elimination	+	+	+			

As can be seen in Table 11, it was determined that S1, S2, and S3, who answered the question correctly, used the metacognitive strategies of "underlining the clues, encircling clues, checking the correctness of the option they marked, re-reading, marking the figure, marking the explanations in the text, marking the options, re-examining the figure and option elimination" while solving the question.

It was determined that S4, who answered the question incorrectly, used the metacognitive strategy of "re-reading and re-examining the figure" while solving the question. It was determined that S5, whose course grade point average level was low and answered the question incorrectly, only used the metacognitive strategy of "re-examining the figure" while solving the question. It was observed that S6, whose course grade point average level was low and answered the question incorrectly, did not use any metacognitive strategy while solving the question.

Discussion and Results

Individuals living in a complex social structure encounter several different problems brought about by complexity. If the problem is not solved by itself, they try to find a solution and develop some strategies within this path. However, for these strategies to be developed, individuals need to have some problem-solving skills. One of the most important stages of the problem-solving skills that will be gained by individuals in this process to solve the problem is included in the education process. For this reason, one of the main objectives of educational institutions is to provide students with problem solving skills. Thus, students will be able to solve the problems they encounter in daily life more easily and become thinking and questioning individuals (Yılar & Tağrikulu, 2019). Because an individual's problem-solving skills regarding the issues they encounter and the subsequent development of these skills are among the significant topics emphasized in social sciences (Çimşir, Baysal, 2019). This study aimed to investigate the strategies employed by 8th-grade students when answering multiple-choice questions in the TRRHK course. Four distinct question types were designed to elicit responses from the participants, and the results obtained were analyzed to determine the impact of different strategies on the students' academic achievement levels and correct answer rates.

In this study, it was found that students with high course grade point average levels who correctly answered questions also used more and different cognitive and metacognitive strategies than students with low course grade point average levels who answered incorrectly. In the study conducted by Serin & Korkmaz (2018), they aimed to determine the level of metacognitive skills used by 4th-grade primary school students during mathematical problem-solving activities through their behaviors and expressions in understanding and predicting the problems. When looking at the results of their study, it is observed that students who are more successful in problem-solving processes tend to employ metacognitive behaviors more than other students. These results are in line with the results of our study. Additionally, when looking at the strategies identified in the studies conducted by Diken & Yürük (2019), Tutar, Demir & Diken (2020) and Diken (2020), they came to the conclusion that students who provided accurate responses to the questions employed a greater variety of cognitive and metacognitive strategies than those who provided inaccurate responses. These results support the results of our study. There are studies in the literature that indicate students with high academic achievement use a greater number and variety of metacognitive-cognitive strategies

while problem-solving, whereas students with low academic achievement use fewer metacognitive-cognitive strategies (Gick, 1986; Clement, 1991). In these studies, researchers have addressed expert-novice differences in problem-solving. In Gick's (1986) study, it is expressed that experts' possession of schemas empowers them to use various strategies successfully, while novices rarely or inadequately use the same strategies. Clement (1991) noted that experts are more flexible in reaching the solution, but novices rarely reach the solution or do not solve the question at all. In our study, it was found that students with higher grade point averages used a greater variety and number of metacognitive-cognitive strategies, while students with lower grade point averages used fewer metacognitive-cognitive strategies, and some of them even abandoned attempting to solve certain questions without using any strategy. These results are consistent with the findings of previous studies mentioned above.

According to these results obtained from the study, it was determined that the student's use of a large number and variety of metacognitive and cognitive strategies is a very important tool in reaching the correct answers to questions. Furthermore, it is also considered that students' subject knowledge related to the course has an impact on their ability to answer questions correctly. In other words, it is a very important finding highlighted in this study that a student with subject knowledge and strategy knowledge can have a higher probability of reaching the correct answer to a multiple-choice question depending on the nature of the question (whether it contains a figure, explanation, map, etc.) by using the appropriate and correct strategy. Tuminaro and Redish (2007) stated that experts have too much subject knowledge regarding the problem, while novices have little or no subject knowledge about the problem. The study results of Tuminaro and Redish (2007) support the results reached from the findings of our study. Some of the metacognitive and cognitive strategies identified in this study can also be found in the existing literature. In addition to the metacognitive-cognitive strategies identified in the literature (see Table 1), this study identified some additional cognitive strategies such as "map interpretation, map examination, comparing the map in the text of the question with the options, and comparing the explanations in the text of the question with the map" and metacognitive strategies such as "taking notes on the map, re-examining the map, and marking the map," which could contribute to the relevant literature.

Recommendations

Social studies and history teachers can be trained in metacognitive-cognitive strategies through vocational training seminars. Furthermore, it may be beneficial to provide students at all levels of education with training on what metacognitive and cognitive strategies are and how using these strategies can be effective in achieving correct answers when solving questions in exams. Textbooks published abroad include reading and writing strategies for students (Turan, 2022). Similarly, question-solving strategies can be included in textbooks to help students acquire cognitive and metacognitive question-solving skills. This study was carried out in a sample of 8th-grade students who will take the High School Transition Exam. In the following period, different studies can be carried out by taking sample groups to solve the questions in all central exams held in Turkey.

Ethics Committee Approval

In line with the decisions of the Kafkas University Social Sciences and Humanities Scientific Research and Publication Ethics Board dated 07.12.2021 and numbered 25, the necessary ethical permissions were obtained, the necessary correspondence was made with the Kars Provincial Directorate of National Education, and the permissions were obtained from the parents of the students who will participate in the research with the parent consent form.

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