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# The Mediating Role of Problem-Solving Skills in the Relationship Between Metacognitive Awareness and Critical Reading Skills Among Fourth-Grade Primary School Students*

*Ümmühan YAROL ÖZGÜR***
*Mustafa Onur KAN****

**Abstract**
The aim of this study was to examine the mediating role of problem-solving skills in the relationship between metacognitive awareness and critical reading skills among primary school 4th-grade students. The correlational research design was used in this study in order to uncover the link between variables. The study group consisted of 332 fourth-grade students enrolled in public schools in Hatay province in the 2024-2025 academic year. The Metacognitive Awareness Scale for Children, the Problem Solving Inventory for Children, and the Critical Reading Scale were used to gather data from the students. Pearson product-moment correlation coefficient was used to determine the relationship between the variables. The proposed mediation model was tested using path analysis with observed variables, and indirect associations were evaluated using the bootstrapping procedure. The findings indicated significant positive associations between metacognitive awareness, problem-solving skills, and critical reading skills. The direct association between metacognitive awareness and critical reading skills remained statistically significant after problem-solving skills were included in the model (β = .51), while the indirect association through problem-solving skills was also significant (β = .12), indicating partial mediation. As such, it was seen that problem solving had a partial mediator role in the associations of metacognitive awareness with critical reading; in addition, it was also discovered that metacognitive awareness and problem solving together accounted for 44% of the variance in critical reading. These findings show that problem-solving skills partially mediate the relationship between metacognitive awareness and critical reading skills among fourth grade students.
**Keywords:** Critical reading, metacognitive awareness, problem solving

## İlkokul 4. Sınıf Öğrencilerinde Üst Bilişsel Farkındalık ve Eleştirel Okuma Becerileri Arasındaki İlişkide Problem Çözme Becerilerinin Aracılık Rolü

**Öz**
Bu çalışmanın amacı, ilkokul dördüncü sınıf öğrencilerinde üstbilişsel farkındalık ile eleştirel okuma becerileri arasındaki ilişkide problem çözme becerilerinin aracı rolünü incelemektir. Korelasyonel tarama modeli kullanılmıştır. Çalışma grubu, 2024-2025 akademik yılında Hatay'daki devlet okullarına kayıtlı 332 dördüncü sınıf öğrencisinden oluşmuştur. Veriler, Çocuklar için Üstbilişsel Farkındalık Ölçeği, Çocuklar için Problem Çözme Envanteri ve Eleştirel Okuma Ölçeği kullanılarak toplanmıştır. Çalışma değişkenleri arasındaki ilişkileri incelemek için Pearson Momentler Çarpımı

*This study is based on the master's thesis titled "The Mediation Role of Problem Solving Skills in the Effect of 4th Grade Primary School Students' Metacognitive Awareness on Their Critical Reading Skills," prepared by Ümmühan YAROL ÖZGÜR under the supervision of Prof. Dr. Mustafa Onur KAN.

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Korelasyon Katsayısı hesaplanmıştır. Önerilen aracı model, gözlemlenen değişkenlerle yol analizi kullanılarak test edilmiş ve dolaylı ilişkiler bootstrap yöntemi kullanılarak değerlendirilmiştir. Bulgular, üstbilişsel farkındalık, problem çözme becerileri ve eleştirel okuma becerileri arasında anlamlı pozitif ilişkiler olduğunu göstermiştir. Problem çözme becerileri modele dâhil edildikten sonra bile, üstbilişsel farkındalık ile eleştirel okuma becerileri arasındaki doğrudan ilişki istatistiksel olarak anlamlı kalmıştır (β = .51), problem çözme becerileri aracılığıyla dolaylı ilişki de anlamlı bulunmuştur (β = .12), bu da kısmi arabuluculuğu göstermektedir. Ek olarak, üstbilişsel farkındalık ve problem çözme becerileri birlikte eleştirel okuma becerilerindeki varyansın %44'ünü açıklamıştır. Bu bulgular, problem çözme becerilerinin dördüncü sınıf öğrencileri arasında üstbilişsel farkındalık ile eleştirel okuma becerileri arasındaki ilişkiye kısmen aracılık ettiğini göstermektedir.

**Anahtar Kelimeler:** Eleştirel okuma, üst bilişsel farkındalık, problem çözme

## Introduction

In twenty-first-century cultures, the responsibility of education is to develop individuals capable of realizing their own learning. It is feasible to argue that students' responsibility is to assimilate the material they have learned and apply it in new situations. Erdem and Demirel (2002) define learners as those who investigate, wonder, question, criticize, analyze, interpret, and debate what they discover. In this setting, it is vital to develop children who have 21st-century abilities, are creative, think critically, can communicate effectively, and arrange their own learning. Individuals can be aware of their learning, make meaning of it, and observe it through metacognition. Metacognition is a person's awareness of their own cognitive processes. Özsoy (2008) defines metacognition as the combination of learning skills and constructivist method outputs.

A metacognitive learning environment also provide students with multiple paths, and students utilize their own learning to adapt to these changes. This will also result in metacognitive learning. Metacognitive learning involves learners' ability to plan, monitor, regulate, and evaluate their cognitive strategies during learning tasks. It is critical for students to identify the process of understanding what knowledge is and how they structure knowledge (Belet & Güven, 2011). Metacognitive awareness is the awareness of one's own learning. Metacognitive awareness is the awareness of one's own thinking styles and processes (Jaleel & Premachandran, 2016). Individuals who are unaware of these processes are unable to recognize their learning and take responsibility for it. As a result, learners can plan, monitor, and evaluate their own learning, and thus metacognitive awareness facilitates self-learning, and problem-solving skills improve (Schraw & Dennison, 1994). Metacognitive awareness is considered a predictor of problem-solving skills.

Problem solving is a complex cognitive process that requires individuals to understand a problem, identify relevant information, select appropriate strategies, monitor their progress, evaluate possible solutions, and revise strategies when necessary (Mayer, 1998). Rather than being limited to producing solutions, effective problem solving requires individuals to regulate their cognitive processes throughout the problem-solving process. In educational contexts, students encounter various academic tasks that require them to identify difficulties, apply strategies, and evaluate the effectiveness of their solutions. Therefore, problem-solving skills represent an important component of students' cognitive development and learning processes.

Students' problem-solving abilities can be supported through educational experiences that encourage active thinking and self-regulation. When students encounter a problem, they need to analyze the situation, consider alternative strategies, and make decisions based on available information (Kutlu et al., 2010). These processes are closely associated with metacognitive skills because successful problem solving requires individuals to monitor their understanding and regulate their strategies. In this regard, metacognitive awareness is considered an important factor associated with students' problem-solving skills. Students who are aware of their cognitive processes may be better able to select appropriate strategies, evaluate their progress, and modify ineffective approaches during problem-solving activities.

Problem-solving skills are also closely related to higher-order thinking processes, including critical thinking and critical reading. Critical reading requires readers not only to understand the

information presented in a text but also to analyze, evaluate, and interpret this information. In this respect, critical reading involves problem-solving processes because readers need to identify claims, examine evidence, recognize inconsistencies, resolve meaning-related difficulties, and make reasoned judgments about the information presented in texts. Therefore, problem-solving skills may contribute to students' ability to approach texts analytically and evaluate information from different perspectives.

Critical reading is an essential skill for developing critical thinking, which is considered one of the key competencies of the twenty-first century (ISTE, 2007; OECD, 2005). Critical reading should not be understood merely as criticizing a text; rather, it is an analytical and evaluative reading process in which individuals examine the reliability of information, compare different viewpoints, evaluate evidence, interpret meanings, and form judgments based on the information they encounter (Afflerbach et al., 2008). The development of critical reading skills enables individuals to question textual information, construct meaning, and make informed decisions. In this context, critical reading plays an important role in preparing students to become reflective and analytical thinkers.

The Turkish Language Curriculum emphasizes the development of students' abilities to use language effectively, think critically, and develop creativity (MEB, 2019). Although critical reading is not always presented as an independent skill in curriculum documents, the concept of critical literacy is included within the broader framework of reading culture and literacy development. Therefore, developing students' critical reading skills is consistent with the educational aim of raising individuals who can evaluate information and think critically.

Critical reading requires a certain level of cognitive and linguistic preparation. According to Güleryüz (2003), individuals need adequate vocabulary knowledge, reading fluency, and prior knowledge about the subject in order to engage in critical reading. Readers who possess these competencies can analyze texts, evaluate ideas, and reach conclusions based on textual information. Comparing, evaluating, questioning, and interpreting information are essential characteristics of critical readers (Işık, 2010; Uğurlu, 2022). However, previous studies indicate that critical reading skills are not sufficiently emphasized in educational settings and that students' critical reading abilities remain below the desired level (Özdemir, 2017; Özensoy, 2012; Türkben & Karaman, 2022).

The relationship between problem-solving skills and critical reading skills can be understood through their shared reliance on higher-order cognitive processes. Both skills require individuals to analyze information, evaluate alternatives, monitor understanding, and make decisions based on evidence. Previous studies have shown positive associations between problem-solving skills, critical thinking, and critical reading skills (Fitriana & Nurhusna, 2023; Koray & Çetinkılıç, 2020; Priyatni & Martutik, 2020; Suhendi et al., 2018). These findings suggest that strengthening problem-solving skills may support students' ability to process and evaluate information during reading activities.

The relationship among metacognitive awareness, problem-solving skills, and critical reading skills can be explained through the self-regulatory functions of metacognition. Metacognitive awareness enables individuals to plan, monitor, and evaluate their cognitive activities. These regulatory processes support problem solving by helping students identify problems, select effective strategies, monitor their progress, and revise ineffective approaches. Previous research has indicated that metacognitive knowledge and skills, such as planning, monitoring, and organizing, are associated with improved problem-solving performance (Aşık & Erktin, 2019; Garcia et al., 2015; Howard et al., 2001).

Similarly, metacognitive awareness is considered important for reading-related processes because effective readers monitor their comprehension, evaluate their understanding, and use appropriate strategies when difficulties occur (Gundin et al., 2012; Parson, 1985). Students with higher metacognitive awareness may therefore be more capable of engaging in analytical reading processes. However, the relationship between metacognitive awareness and critical reading may not occur independently from other cognitive skills. Problem-solving skills may serve as a mechanism that helps explain how metacognitive awareness is associated with critical reading skills. Students who regulate their cognitive processes effectively may develop stronger problem-solving skills, and these skills may support their ability to analyze texts, evaluate evidence, resolve ambiguities, and make reasoned judgments during critical reading.

Although previous studies have examined metacognitive awareness, problem-solving skills, and reading-related abilities separately, limited research has investigated the mediating role of problem-solving skills in the relationship between metacognitive awareness and critical reading skills among primary school students. Therefore, this study aims to examine the mediating role of problem-solving skills in the relationship between metacognitive awareness and critical reading skills among fourth-grade primary school students. The proposed model is presented in Figure 1.

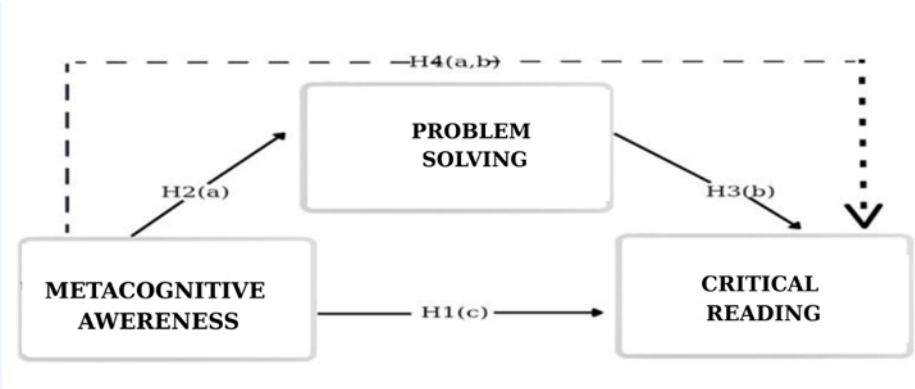



*Figure 1.* The Mediating Role of Problem-Solving Skills in the Relationship Between Metacognitive Awareness and Critical Reading Skills

**Research Hypotheses**

H1: Students' metacognitive awareness positively predicts their critical reading skills.

H2: Students' metacognitive awareness positively predicts their problem-solving skills.

H3: Students' problem-solving skills positively predict their critical reading skills.

H4: Problem-solving skills mediate the relationship between students' metacognitive awareness and critical reading skills.

## Method

This section of the study includes information on the research model, the universe and sample of the study, data collection tools, the data collection process, and the statistical analysis techniques used in the evaluation of the collected data.

**Research Design**

This study employed a a correlational research design to examine the statistical associations among metacognitive awareness, problem-solving skills, and critical reading skills among fourth-grade primary school students. The study aimed to investigate whether problem-solving skills statistically mediated the association between metacognitive awareness and critical reading skills.

A correlational research design examines the relationships among variables by collecting data at a single point in time without manipulating any variables (Karasar, 2012). This design enables researchers to determine whether variables change together and to examine the strength and direction of associations among variables. According to Büyüköztürk et al. (2012), correlational research designs provide information about relationships among multiple variables and allow researchers to examine statistical patterns among variables.

Since the present study was based on cross-sectional data, the findings were interpreted in terms of statistical associations. The study examined the direct and indirect associations among metacognitive awareness, problem-solving skills, and critical reading skills. In the proposed model, metacognitive awareness was specified as the predictor variable, problem-solving skills as the mediator variable, and critical reading skills as the outcome variable. The proposed model of the study is presented in Figure 2.

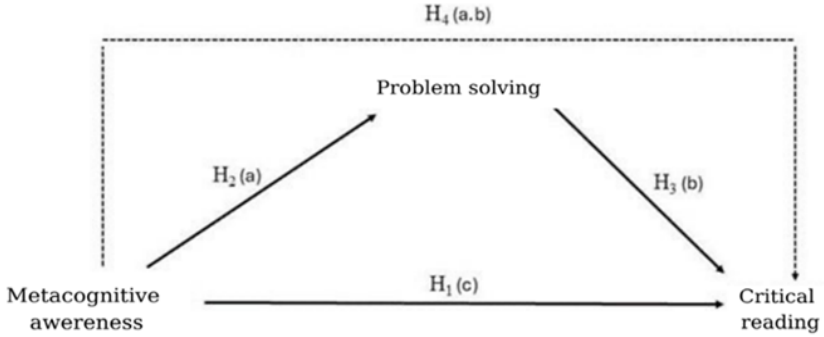



*Figure 2.* Research Model

**Sample / Group**

The study group consisted of 332 fourth-grade students (160 females and 172 males) enrolled in public schools located in the Antakya and Defne districts of Hatay province during the 2024–2025 academic year. Since the research was conducted in the post-disaster period, accessibility to educational settings was considered during the selection of schools and participants. Therefore, convenience sampling, a non-probability sampling method, was used to reach the study group.

The schools included in the study were located in areas with moderate socioeconomic characteristics. The sample size was determined considering the requirements of structural equation modeling. According to Kelloway (1998), a minimum sample size of 200 participants is recommended for testing hypotheses in structural equation modeling with minimal measurement error. Accordingly, the sample size of 332 students was considered sufficient for the analyses conducted in this study.

**Data Collection Tools**

Three measurement instruments were used for data collection in this study: the Metacognitive Awareness Scale for Children, the Problem Solving Inventory for Children, and the Critical Reading Scale. The psychometric characteristics, validity evidence, and reliability coefficients of each instrument are presented below.

***Metacognitive Awareness Scale for Children***

The Metacognitive Awareness Scale for Children was originally developed by Sperling, Howard, Miller, and Murphy (2002) to assess the metacognitive abilities of students in grades 3–9. The scale was adapted into Turkish by Karakelle and Saraç (2007). The Turkish version was administered to 565 third-, fourth-, and fifth-grade students. The scale consists of 12 items and uses a three-point Likert-type response format.

In the adaptation study, construct validity was examined through exploratory factor analysis. Although the analysis initially indicated a four-factor structure, several items showed cross-loadings across factors. Therefore, the scale was evaluated as a unidimensional structure based on theoretical considerations and the characteristics of the items. The KMO coefficient (.72) and Bartlett's test result ($\chi^2$=528.74, p<.001) indicated that the data were suitable for factor analysis. The findings reported by Karakelle & Saraç (2007) suggested that the scale demonstrated acceptable validity and reliability for research purposes.

***Problem Solving Inventory for Children***

The Problem Solving Inventory for Children was developed by Serin et al. (2010) to assess the problem-solving skills of primary school students. The scale was developed for students in grades 4–8 and was tested with 568 primary school students. The inventory consists of 24 items and includes three dimensions: "confidence in problem-solving skills," "self-control," and "avoidance."

The construct validity of the scale was examined through factor analysis. The KMO value (.85) and Bartlett's test result ($\chi^2$=3512, p<.001) indicated that the data were appropriate for factor analysis. The internal consistency coefficient of the scale was reported as .80 by Serin et al. (2010), indicating acceptable reliability. In the current study, the reliability coefficient of the Problem Solving Inventory for Children was calculated as .84.

***Critical Reading Scale***

The Critical Reading Scale was developed by Ünal (2006) to assess the critical reading skills and reading attitudes of primary school students. The original scale was developed with data obtained from 1,012 fifth-grade students. The scale consists of 22 items, has a single-factor structure, and uses a five-point Likert-type response format. The internal consistency coefficient was reported as .88 in the original development study.

The validity and reliability of the scale were further examined by Dilidüzgün et al. (2020) with 550 fourth-grade students aged between 8 and 10 years. Following data screening procedures, the internal consistency coefficient was calculated as .91. Confirmatory factor analysis was conducted to examine the factor structure of the scale. The distribution of the items was examined through skewness and kurtosis values, and Robust Maximum Likelihood (MLR) estimation was used due to the non-normal distribution of one item. The results indicated that the one-factor model demonstrated acceptable validity evidence. In the present study, the reliability coefficient of the Critical Reading Scale was calculated as .86.

**Data Collection**

Hatay Mustafa Kemal University Ethics Committee authorization (Document no: 902-01-FR 006) was acquired for the research, as well as authorization from the Hatay Provincial Directorate of National Education to gather data from elementary school children. The school administrations where the application was submitted were contacted, parental consent forms were disseminated, and the relevant parental approvals were secured. Students who applied were contacted and informed about the research. The Metacognitive Awareness Scale, Critical Reading Scale, and Problem Solving Inventory were administered to students by the classroom teachers, and data were collected.

**Analysis**

Before proceeding to hypothesis-based analyses, Mahalanobis distance values were determined to identify outliers, and three data point with p<0.01 (Field, 2018) were excluded from the analysis process. Thus, the number of data points was reduced from 335 to 332. The normality of the data obtained from 332 students was checked via SEM path analysis. In addition, the multivariate normality range was determined using Mardia's coefficient, Critical Ratio (C.R.). As seen in Table 1, skewness, kurtosis, and Mardia's kurtosis coefficients for multivariates were examined. Then, the Pearson Moment Correlation Coefficient for autocorrelation and VIF and Tolerance values for the multicollinearity problem were determined in the regression-based Structural Equation Model. Since the total scores of the measurement instruments used in the current study were used, internal reliability coefficients were calculated using the Cronbach's alpha method to determine the reliability levels of the total scores of each measurement instrument. Bootstrapping method was used for the mediation analysis (Hayes, 2009), which is the subject of the structural model created within the scope of the research. In the bootstrapping method, calculating the confidence intervals for the relationships between variables is of great importance. If the confidence interval does not include zero, the effect is considered statistically significant. In the analysis conducted in this study, the resampling number was determined as 5000, and the confidence interval was calculated as .95.

**Research and Publication Ethics**

This study was conducted in accordance with all the rules specified in the "Higher Education Institutions Scientific Research and Publication Ethics Guidelines." None of the actions listed under the

heading "Actions Contrary to Scientific Research and Publication Ethics" in the second section of the guidelines was carried out.

***Ethics Committee Approval***

Name of the board = Mustafa Kemal University Social and Humanities Research Ethics Committee

Date of decision= 07/04/2023

Document number= 02/09 (902-01-FR 006)

**Findings**

This section presents the descriptive statistics, correlation coefficients, reliability coefficients, and multicollinearity diagnostics for the study variables. Because the variables were represented by the total scores obtained from the measurement instruments, the proposed mediation model was examined using SEM path analysis with observed variables.

Table 1 presents the means, standard deviations, skewness and kurtosis coefficients, Cronbach's alpha coefficients, and multicollinearity diagnostics for critical reading skills, metacognitive awareness, and problem-solving skills.

Table 1

*Correlation Coefficients of Variables and Descriptive Findings*

| Variables | 1 | 2 | 3 |
|---|---|---|---|
| 1-Critical Reading | 1 | | |
| 2-Metacognitive Awareness | .63** | 1 | |
| 3-Problem Solving | .50** | .50** | 1 |
| M | 77.09 | 29.43 | 89.17 |
| SD | 14.44 | 3.21 | 14.40 |
| Skewness | -.098 | -.478 | -.472 |
| Kurtosis | -.427 | .530 | -.036 |
| Mardia’s Kurtosis Value | -.73 | -3.52 | -3.49 |
| Cronbach’s α | .86 | .71 | .84 |
| Tolerance | | .75 | .75 |
| VIF | | 1.32 | 1.32 |

***p < .01*

As shown in Table 1, critical reading skills were positively and significantly correlated with metacognitive awareness (r = .63, $p < .001$) and problem-solving skills (r = .50, $p < .001$). In addition, metacognitive awareness was positively and significantly associated with problem-solving skills (r = .50, $p < .001$).

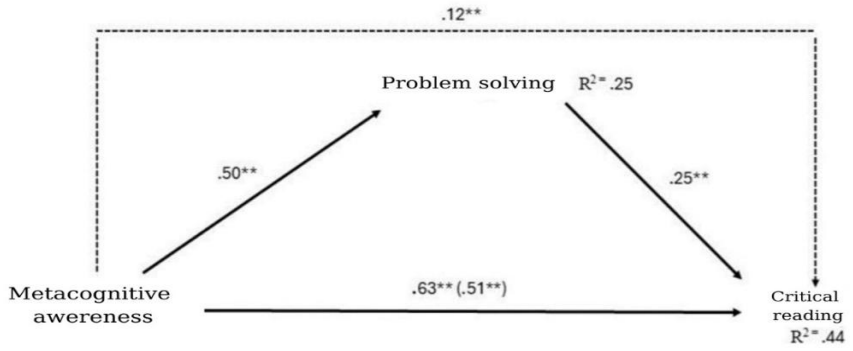
Examination of the skewness and kurtosis coefficients indicated that the observed variables satisfied the assumption of univariate normality. All values fell within the ±2.0 range, suggesting that the data exhibited an acceptable level of normal distribution (Tabachnick & Fidell, 2019). For the Structural Equation Model, the normal distribution range is accepted as Skewness (±2) and Kurtosis (±7) (Hair et al, 2019; West et al., 1995). In addition, Mardia's kurtosis coefficient for multiple variables was determined as -0.73 for critical reading, -3.52 for metacognitive awareness, and -3.49 for problem-solving. Accordingly, it is expected that the Critical Ratio (C.R.) value, which is Mardia's kurtosis

coefficient, should be below ±5 (Byrne, 2016). According to these results, it was determined that the data show a normal distribution.

The internal consistency reliability coefficients of the measurement instruments ranged from acceptable to good (α = .71–.86), indicating that the scores obtained from the current sample demonstrated satisfactory reliability.

To assess the potential presence of multicollinearity among the predictor variables, tolerance and Variance Inflation Factor (VIF) values were examined. The obtained values indicated that multicollinearity was not a concern. Specifically, tolerance values greater than .20 and VIF values below 10 are generally considered acceptable criteria for the absence of multicollinearity (Tabachnick & Fidell, 2019).

The mediating role of problem-solving skills in the relationship between metacognitive awareness and critical reading skills was examined using the bootstrap procedure. The results of the path analysis are presented in Figure 3.




***p < .001*

*Figure 3.* Findings Regarding the Indirect Association Between Metacognitive Awareness and Critical Reading Skills Through Problem-Solving Skills

As shown in Figure 3, the total association of metacognitive awareness on critical reading skills was statistically significant before the inclusion of problem-solving skills in the model (β = .63). After problem-solving skills were entered as a mediator, the direct effect of metacognitive awareness on critical reading skills remained statistically significant (β = .51), while a significant indirect effect through problem-solving skills also emerged (β = .12).

Although the magnitude of the direct association decreased following the inclusion of problem-solving skills, it remained statistically significant, indicating that problem-solving skills partially mediated the relationship between metacognitive awareness and critical reading skills.

Furthermore, metacognitive awareness explained 25% of the variance in problem-solving skills. When metacognitive awareness and problem-solving skills were considered simultaneously, they explained 44% of the variance in critical reading skills.

The bootstrap confidence intervals and the direct and indirect effect coefficients are presented in Table 2.

Table 2
*Total, Direct, Indirect Association of Metacognitive Awareness on Critical Reading and Bootstrap Confidence Intervals*

| Types | | | Total Association (95% CI) | Direct Association (95% CI) | Indirect Association (95% CI) | Result |
|---|---|---|---|---|---|---|
| Metacognitive Awareness | → | Critical Reading | .63** (.55**, .70**) | .51** (.41** , .60**) | .12** (.07**, .18**) | Partial Mediation |
| Metacognitive Awareness | → | Problem Solving | | .50** (.41**, .60**) | | |
| Problem Solving | → | Critical Reading | | .25** (.15**, .34**) | | |

The total association between metacognitive awareness and critical reading skills was positive and statistically significant (β = .63, 95% CI [.55, .70], $p$ < .001). The direct association between metacognitive awareness and critical reading skills also remained statistically significant (β = .51, 95% CI [.41, .60], $p$ < .001).

In addition, the association between metacognitive awareness and problem-solving skills (β = .50, 95% CI [.41, .60], $p$ < .001) and the association between problem-solving skills and critical reading skills (β = .25, 95% CI [.15, .34], $p$ < .001) were both positive and statistically significant.

The indirect association between metacognitive awareness and critical reading skills through problem-solving skills was also statistically significant (β = .12, 95% CI [.07, .18]). Because the bootstrap confidence interval did not include zero, the indirect association was considered statistically significant. These findings indicate that problem-solving skills partially account for the association between metacognitive awareness and critical reading skills.

Because the tested model was a saturated (just-identified) path model with observed variables (df = 0), model fit indices were not interpreted. Fit indices do not provide meaningful information for the evaluation of saturated models (Bollen, 1989; Kline, 2016).

## Discussion and Conclusion

This section discusses the findings of this study, which examined the mediating role of problem-solving skills in the relationship between metacognitive awareness and critical reading skills among fourth-grade primary school students. The findings are discussed in relation to previous studies in the literature, and suggestions are presented based on the results.

### Interpretation and Discussion of the Finding Regarding the Association Between Students' Metacognitive Awareness Skills and Critical Reading Skills

In the study, a strong positive association was found between students' metacognitive awareness skills and critical reading skills. Since individuals need to activate metacognitive processes and use these skills during critical reading activities, the positive relationship between metacognitive awareness and critical reading can be considered an expected finding. These two skills may support each other by enabling individuals to monitor, evaluate, and regulate their cognitive processes while engaging with texts.

When the literature is examined, no direct study investigating the relationship between critical reading skills and metacognitive awareness strategies was identified; however, similar studies focusing on reading strategies and critical thinking were found. In the study examining the reading strategies used by prospective teachers and their metacognitive awareness levels (Yemenici & Ulu, 2020), the findings obtained from the dimensions of reading organization, planning, and evaluation indicated that participants had high levels of metacognitive awareness. Similarly, Çeliköz (2018), in a study conducted

with primary school teachers, reported that metacognitive reading strategies were frequently used during reading processes.

These findings suggest that metacognitive awareness is associated with individuals' ability to regulate cognitive processes and approach reading tasks through different perspectives. In this context, the relationship between metacognitive awareness and critical reading may support students' ability to evaluate information more deeply and analyze texts more effectively. Magno (2010) examined critical thinking skills, which constitute an important foundation of critical reading (Demir & Kan, 2017), and reported that students used critical thinking processes while regulating their own cognition. This finding supports the view that metacognition and critical thinking are closely related cognitive processes. While metacognitive awareness enables students to monitor and evaluate their thinking processes, critical thinking skills may contribute to more detailed analysis and interpretation of information.

Different from the findings of the current study, Karadüz (2011), who examined the reading purposes and meaning-making strategies of prospective teachers during leisure reading activities, concluded that education faculty students did not sufficiently use metacognitive thinking strategies during reading processes. Based on the findings of the present study, it can be suggested that students' ability to organize knowledge and evaluate textual information critically may be related to their awareness of their own cognitive processes.

**Interpretation and Discussion of the Finding Regarding the Association Between Students' Metacognitive Awareness Skills and Problem-Solving Skills**

The study revealed a positive and significant association between students' metacognitive awareness and problem-solving skills. This finding indicates that students with higher levels of metacognitive awareness also tended to report higher levels of problem-solving skills. This relationship may be explained by the fact that metacognitive awareness includes planning, monitoring, and evaluating cognitive processes, which are also important components of effective problem solving.

When students encounter problems, they need to identify the problem, select appropriate strategies, monitor their progress, and evaluate possible solutions. These processes are closely related to metacognitive skills because successful problem solving requires individuals to be aware of their thinking processes and regulate their strategies when necessary.

The findings of the current study are consistent with previous research. Karakelle (2012), in a study examining university students' metacognitive awareness, perceptions of problem solving, and need for cognition, reported a significant relationship between metacognitive awareness and problem-solving skills. Similarly, Metallidou (2009) and Kışkır (2011) found that metacognitive awareness was associated with problem-solving abilities among different participant groups.

In a study examining secondary school students' use of metacognitive skills during problem-solving processes, Güner and Erbay (2021) found that students with higher metacognitive skills demonstrated higher problem-solving performance, whereas students with lower metacognitive awareness experienced more difficulties during problem-solving activities. These findings support the idea that metacognitive awareness and problem-solving skills are closely related cognitive abilities.

Based on the findings of the present study and previous research, students who are more aware of their cognitive processes may be better able to plan, monitor, and evaluate their approaches when dealing with problems. Therefore, metacognitive awareness may be considered an important factor associated with students' problem-solving skills.

**Interpretation and Discussion of the Finding Regarding the Association Between Students' Problem-Solving Skills and Critical Reading Skills**

In this study, problem-solving skills were found to be positively associated with critical reading skills. This finding may be explained by the fact that both skills require higher-order cognitive processes, such as analyzing information, evaluating alternatives, monitoring understanding, and making decisions based on available evidence. During problem-solving processes, students need to

identify problems, examine possible solutions, and evaluate outcomes. Similarly, critical reading requires students to analyze textual information, evaluate different perspectives, and reach reasoned conclusions.

In the study examining the critical reading and problem-solving skills of fourth-grade primary school students, Şara Hürsoy and Karadedeli (2023) found a positive moderate relationship between these skills. The researchers reported that students' critical reading levels were high, while their problem-solving skills were at a moderate level. Similarly, Yüksel et al. (2020), who examined university students' critical reading and problem-solving tendencies, found a significant relationship between these two skills.

These findings support the view that critical reading and problem-solving skills involve similar cognitive processes. Since critical reading requires individuals to question information, evaluate evidence, and construct meaning, problem-solving skills may contribute to students' ability to approach texts analytically. In addition, studies focusing on critical thinking, which is closely related to critical reading, provide similar findings. Kanbay et al. (2013) reported that individuals with higher problem-solving levels also tended to demonstrate higher levels of critical thinking skills. Similarly, Ocak et al. (2023) found a positive relationship between problem-solving and critical thinking skills among secondary school students.

Previous studies conducted with university students (Kanbay, 2013; Erdem & Yazıcıoğlu, 2015) also indicated a positive relationship between these skills. Considering these findings together, it can be suggested that problem-solving skills are associated with students' ability to analyze, evaluate, and interpret information during critical reading processes. Therefore, problem-solving skills may contribute to students' engagement in more analytical reading practices.

**Interpretation and Discussion of the Finding Regarding the Indirect Association Between Students' Metacognitive Awareness Skills and Critical Reading Skills Through Problem-Solving Skills**

In the study, metacognitive awareness skills were found to be positively associated with critical reading skills both directly and indirectly through problem-solving skills. The findings indicated that problem-solving skills had a partial mediating role in the relationship between metacognitive awareness and critical reading skills. This result suggests that problem-solving skills may help explain part of the association between students' metacognitive awareness and critical reading skills.

Students with higher metacognitive awareness may be more capable of planning, monitoring, and evaluating their cognitive processes. These abilities may support problem-solving processes by enabling students to select appropriate strategies, evaluate possible solutions, and regulate their thinking. In turn, problem-solving skills may support critical reading processes by helping students analyze textual information, identify relationships among ideas, evaluate evidence, and make reasoned judgments.

When the literature was examined, no study directly investigating the mediating role of problem-solving skills in the relationship between metacognitive awareness and critical reading skills was identified. However, related studies examining similar cognitive skills support the findings of the current study. Kozikoğlu (2019), who examined the relationships among metacognition, problem-solving, academic self-efficacy, and critical thinking skills among teacher candidates, found positive relationships among these variables. The study also reported that metacognitive awareness, problem-solving skills, and academic self-efficacy together explained a significant proportion of the variance in critical thinking skills.

Similarly, Artuğ and Alkın Şahin (2023) examined secondary school students' reading strategies, cognitive awareness, and reflective thinking skills and found that reading strategies and cognitive awareness were related to reflective thinking. Karasakaloğlu et al. (2012) also reported positive relationships among metacognitive reading strategies, metacognitive competencies, and critical thinking attitudes among education faculty students.

Furthermore, Boran and Karakuş (2022) found that gifted and talented students had high levels of critical thinking tendencies, perceived problem-solving abilities, and metacognitive awareness. Their findings also indicated relationships among these variables.

Considering the findings of the current study and previous research, it can be suggested that metacognitive awareness, problem-solving skills, and critical reading skills are interconnected cognitive abilities. Students who are aware of their cognitive processes may use problem-solving strategies more effectively, and these strategies may support their ability to analyze and evaluate texts critically. Therefore, the partial mediating role of problem-solving skills provides an explanation for the relationship between metacognitive awareness and critical reading skills with in the context of this study.

**Suggestions**

- Given the positive relationship between cognitive metacognitive awareness and critical reading skills, it is recommended that metacognitive strategies be incorporated into curricular practices. Specifically, activities that encourage goal setting before reading, understanding during reading, evaluating information after reading, and considering different interpretations can contribute to students' critical reading processes.
- Since the findings showed that problem-solving skills are positively correlated with critical reading skills and partially explain the relationship between metacognitive awareness and critical reading skills, classroom activities that integrate problem-solving processes with reading tasks and have logical conclusions can be developed.
- Given the relationship between metacognitive awareness, problem-solving skills, and critical reading skills, activities targeting these skills could be incorporated into school-based educational programs. Guidance and instruction programs can include problem-solving activities that encourage students to analyze, evaluate, and reflect on information.
- Since this study was conducted with fourth-grade primary school students, future studies may examine these relationships with different age groups and students at different developmental levels.
- Future research may employ experimental and longitudinal designs to examine how instructional practices related to metacognitive awareness and problem-solving skills are associated with changes in critical reading skills over time.
- Future studies could also investigate whether different cognitive variables play a mediating role in the relationship between metacognitive awareness and critical reading skills.

**Research and Publication Ethics**

This study was conducted in accordance with all the rules specified in the "Higher Education Institutions Scientific Research and Publication Ethics Guidelines." None of the actions listed under the heading "Actions Contrary to Scientific Research and Publication Ethics" in the second section of the guidelines was carried out.

***Ethics Committee Approval***

Name of the board = Mustafa Kemal University Social and Humanities Research Ethics Committee

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**Authors' Contribution**

Author 1: Writing the introduction and method, collecting the data, coding data via SPSS, obtaining research permissions, writing the discussion and reporting the study. Author 2: Designing the study and supervising all stages of the study.

**Artificial Intelligence Usage Statement**

Artificial intelligence tools were used only for language translation during manuscript preparation.

**Conflict of Interest**

The authors declare that there is no conflict of interest.

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## Genişletilmiş Özet

### Giriş

21. yüzyıl toplumlarında eğitimin üstlendiği görev, kendi öğrenmelerini gerçekleştiren bireyler yetiştirmektir. Öğrencilere düşen görevin ise edindiği bilgiyi özümseyip yeni öğrenmelerde kullanması olduğunu belirtmek mümkündür. Erdem ve Demirel'e (2002) göre öğrenenler; bilgiyi araştıran, merak eden, sorgulayan, eleştiren, analiz eden, yorumlayan ve buldukları hakkında tartışabilen bireyler olmalıdır. Bu bağlamda 21. yüzyıl becerilerini edinmiş yaratıcı, eleştirel düşünen, etkili iletişim kurabilen ve kendi öğrenmelerini organize edebilen öğrenciler yetiştirmek büyük önem arz etmektedir.

Eleştirel okuma ve problem çözme stratejileri bir arada düşünüldüğünde öğrencilerin akademik başarısını ve düşünmeye yönelik becerilerini önemli ölçüde artırabileceği söylenebilir. Yapılan çalışmalar (Fitriana vd., 2023; Koray ve Çetinkılıç, 2020; Priyatni ve Martutik, 2020; Suhendi vd., 2018) ile problem çözme becerilerinin geliştirilmesinin, öğrencilerin eleştirel düşünme ve eleştirel okuma becerilerine olumlu etki ettiği; bu etki sayesinde birbirini geliştirdiği ortaya konmuştur. Bundan yola çıkarak akademik başarıyı artırmak ve çağdaş toplum gereği düşünme becerilerini geliştirmek için; eleştirel okuma ve problem çözme yaklaşımlarını geliştirici farklı yaklaşımların da eğitime entegre edilmesi gerektiği belirtilebilir. Üst bilişsel farkındalıkların problem çözme ve eleştirel okuma becerilerine etkisine ayrı ayrı bakıldığında bu önem anlaşılabilir. Planlama, izleme ve düzenleme dahil olmak üzere üst bilişsel bilgi ve beceriler problem çözme kabiliyetini önemli ölçüde artırır (Aşık ve Erktin, 2019). Üst bilişi düzenleyen bireyler, problem çözme başarısına sıklıkla ulaşır (Howard vd., 2001), bilgi ve becerilerini problem çözme ile ilişkilendirir (Garcia vd., 2015). Bu bağlamda eğitimde problem çözme becerilerini geliştirmek için üst bilişsel becerilerin geliştirilmesi gerekmektedir. Üst bilişsel farkındalık becerilerinin geliştirilmesi okuduğunu anlamada da önemli rol oynar (Parson, 1985). Okuduğunu anlamayı iyileştirmek için hem üst bilişsel strateji bilgisi geliştirilmeli hem de uygulama öğretimi yapılmalıdır (Gundin vd., 2012). Bunlardan yola çıkarak bireylerin üst bilişsel farkındalığı problem çözme becerisini etkilemekte, geliştirmektedir. Ayrıca üst bilişsel farkındalık becerisi eleştirel okumayı etkilemekte, geliştirmektedir. Problem çözme becerisi de eleştirel okumayı etkilemektedir. Bu bağlamda problem çözme becerisine, eleştirel okuma ve üst bilişsel farkındalık becerileri ile birlikte bakılıp aralarındaki ilişki durumu incelenmek istendiğinden; bu araştırmada değişkenler arası ilişkileri saptamak amacıyla problem çözme becerisinin; problem çözme ve üst bilişsel farkındalık arasındaki ilişki ve üst bilişsel farkındalık ve eleştirel okuma becerisi ile olan ilişkisinde aracılığının olup olmadığını ortaya koymak hedeflenmiştir. Bu yüzden bu çalışmada ilkokul 4.sınıf öğrencilerinin üst bilişsel farkındalık becerilerinin, eleştirel okuma becerileri ile ilişkisinde problem çözme becerilerinin aracılık rolü üstlenip üstlenmediği incelenmiştir.

### Yöntem

Bu çalışma, ilkokul dördüncü sınıf öğrencilerinde üstbilişsel farkındalık, problem çözme becerileri ve eleştirel okuma becerileri arasındaki istatistiksel ilişkileri incelemek için korelasyonel tarama modeli araştırma tasarımı kullanmıştır. Çalışma, problem çözme becerilerinin, üstbilişsel farkındalık ve eleştirel okuma becerileri arasındaki ilişkiye istatistiksel olarak aracılık edip etmediğini araştırmayı amaçlamıştır. Korelasyonel tarama modeli herhangi bir değişkeni manipüle etmeden tek bir zaman noktasında veri toplayarak değişkenler arasındaki ilişkileri inceler (Karasar, 2012). Bu tasarım, araştırmacıların değişkenlerin birlikte değişip değişmediğini belirlemelerini ve değişkenler arasındaki ilişkilerin gücünü ve yönünü incelemelerini sağlar. Büyüköztürk ve diğerlerine (2012) göre, korelasyonel araştırma tasarımları, birden fazla değişken arasındaki ilişkiler hakkında bilgi sağlar ve araştırmacıların değişkenler arasındaki istatistiksel kalıpları incelemelerine olanak tanır. Mevcut çalışma kesitsel verilere dayandığı için, bulgular istatistiksel ilişkiler açısından yorumlanmıştır. Çalışma, üstbilişsel farkındalık, problem çözme becerileri ve eleştirel okuma becerileri arasındaki doğrudan ve dolaylı ilişkileri incelemiştir. Önerilen modelde, üstbilişsel farkındalık tahmin değişkeni, problem çözme becerileri aracı değişken ve eleştirel okuma becerileri sonuç değişkeni olarak belirlenmiştir. Bu araştırmanın çalışma grubunu 2024-2025 eğitim – öğretim yılında Hatay ili Antakya ve Defne ilçelerindeki devlet okullarında öğrenim gören 160' ı kız, 172' si erkek olmak üzere; toplam 332 4. sınıf

öğrencisi oluşturmaktadır. Araştırma için Hatay Mustafa Kemal Üniversitesi Etik Kurul İzni (Doküman no: 902-01-FR 006) alınmış, ilkokul öğrencilerinden veri toplama amacıyla Hatay İli Milli Eğitim Müdürlüğünden gerekli izinler alınmıştır. Uygulama yapılacak olan öğrencilere sınıf öğretmenleri tarafından Üst Bilişsel Farkındalık Ölçeği, Eleştirel Okuma Ölçeği ve Problem Çözme Envanteri uygulanmış, böylece veriler toplanmıştır. Çalışmada verilerin analizi için SPSS 25 ve Amos istatistik programları kullanılmıştır. Hipotezlere bağlı analizlere geçilmeden önce elde edilen verilerin normal dağılım gösterip göstermediğine bakılmıştır. Analizler ölçüm araçlarından elde edilen toplam puanlara dayalı olduğundan, değişkenler modele gözlemlenen değişkenler olarak dahil edilmiştir. Buna göre, önerilen arabuluculuk modeli, gözlemlenen değişkenlerle yol analizi kullanılarak test edilmiştir. Tablo 1'de görüldüğü üzere çarpıklık (Skewness) ve basıklık (Kurtosis) katsayıları incelenmiş ve verilerin normal dağılım gösterdiği anlaşılmıştır. Mevcut çalışmada kullanılan ölçme araçlarının güvenirlik düzeylerini belirlemek için ise Cronbach Alpha yöntemiyle iç güvenirlik katsayıları hesaplanmıştır. Verilerin normal dağılım gösterdiği anlaşıldığından öncelikle değişkenler arasındaki ilişkiyi belirlemek için Pearson Momentler Çarpımı Katsayısı kullanılmıştır. Çoklu bağlantı sorunu için VIF ve Tolerance değerleri belirlenmiştir.

**Bulgular**

Üst bilişsel farkındalığın eleştirel okuma üzerindeki doğrudan ilişkisi, aracı değişken olan problem çözme olmadan .63'tür. Aracı değişken problem çözme bu ilişkiyi .51 düzeyine düşürerek .12 düzeyinde dolaylı ilişkiye neden olmaktadır. Bu duruma göre aracı değişkenin analize dahil edilmesiyle değişkenler arasındaki ilişki düzeyi azalsa da anlamlılık devam etmektedir. Buna göre problem çözmenin kısmi aracılık rolü üstlendiği söylenebilir. Ayrıca üstbilişsel farkındalık ile problem çözme arasındaki ilişkide üst bilişsel farkındalığın varyansın yüzde 25'ini, üstbilişsel farkındalık ile problem çözmenin birlikte eleştirel okumanın varyansının toplam yüzde 44'ünü açıkladığı görülmektedir. Bu bulgulara ilişkin bootsrapping güven aralıkları, doğrudan, dolaylı ve toplam ilişki katsayıları tablolarda sunulmuştur.

Üst bilişsel farkındalığın eleştirel okuma ile olan toplam ilişkisi pozitif yönde anlamlıdır ($\beta$= .63, %95 GA [.55 ile .70], $p$<.001). Doğrudan ilişkiler incelendiğinde ise üst bilişsel farkındalığın eleştirel okuma ile olan doğrudan ilişkisinin pozitif yönde anlamlı olduğu görülmektedir ($\beta$= .51, %95 GA [.41ile .60], $p$<.001); Üst bilişsel farkındalığın problem çözme ile arasındaki doğrudan ilişkisi ise yine pozitif yönde anlamlıdır ($\beta$= .50, %95 GA [.41ile .60], $p$<.001); problem çözmenin eleştirel düşünme ile doğrudan ilişkisi de yine pozitif yönde anlamlıdır ($\beta$= .25, %95 GA [.15ile .34], $p$<.001). Üst bilişsel farkındalığın problem çözme aracılığıyla eleştirel okuma ile olan dolaylı ilişkisi ise pozitif yönde anlamlıdır $\beta$= .12, %95 GA [.07 ile .18], $p$<.001). Elde edilen bulgulara göre problem çözmenin, üst bilişsel farkındalığın eleştirel okuma ile olan ilişkisinde kısmi aracılık rolüne sahip olduğu görülmektedir.

**Tartışma ve Sonuç**

Araştırmada öğrencilerin üst bilişsel farkındalık becerilerinin, eleştirel okuma ile doğrudan ve problem çözme aracılığı ile dolaylı olarak ilişki kurduğu, problem çözme becerisinin kısmı aracılık rolüne sahip olduğu saptanmıştır. Bu sonuca göre, üst bilişsel farkındalık becerisi, problem çözme becerisini artırmakta; problem çözme de eleştirel okumayı artırmaktadır. Üst bilişsel farkındalık becerisinin problem çözmeye katkısının önemli olduğu, problem çözmenin de eleştirel okumaya katkı sağladığı ve bu açıdan üst bilişsel farkındalık becerisi ile eleştirel okuma becerisi arasında problem çözme becerisinin aracı rolü olduğu söylenebilir. Elde edilen bulgular, söz konusu beceriler arasındaki ilişkinin gücünü ve birbirlerini desteklediğini ortaya koymaktadır. Araştırma bulguları, üst bilişsel farkındalığı yüksek olan öğrencilerin, problem çözme ve eleştirel okuma süreçlerinde daha becerili olduklarını düşündüklerini göstermektedir. Öğrencilerin, problem çözme süreçlerinde farklı stratejiler kullanmasının, eleştirel okuma becerilerini de geliştirdiği söylenebilir. Alanyazın incelendiğinde problem çözme becerisinin; üst bilişsel farkındalık ve eleştirel okuma becerisine aracılığının incelendiği bir çalışmaya rastlanmamıştır. Benzer olarak öğretmen adaylarının üst biliş, problem çözme ve akademik öz yeterliliklerinin eleştirel düşünme becerilerine etkisinin incelendiği araştırma (Kozikoğlu, 2019) sonucunda değişkenler arası pozitif orta düzeyde anlamlı ilişki saptanmıştır. Çalışmada ayrıca

öğretmen adaylarının üst bilişsel farkındalıklarının, problem çözme ve akademik öz yeterlik algılarının birlikte eleştirel düşünme becerilerindeki varyansın yaklaşık yarısını yordadığı problem çözmenin toplam varyansa katkı sağlamadığı ve eleştirel düşünme eğilimlerini yordamadığı sonucuna varılmıştır. Ortaokul öğrencilerinin okuma stratejileri, bilişsel farkındalıkları ve problem çözmede kullandıkları yansıtıcı düşünme becerilerinin incelendiği araştırmada (Artuğ ve Alkın Şahin, 2023) benzer bulgular saptanmış, okuma stratejilerinin, bilişsel farkındalıkların, yansıtıcı düşünmeyi yordadığı ve aralarında anlamlı bir ilişki olduğu tespit edilmiştir. Karasakaloğlu ve diğerlerinin (2012) eğitim fakültesi öğrencilerinin üst bilişsel okuma stratejiler, biliş üstü yeterlikleri ve eleştirel düşünme tutumlarının incelendiği araştırması da mevcut araştırmayı destekler nitelikte olup ele alınan değişkenler genel olarak pozitif yönde anlamlıdır. Benzer olarak üstün yetenekli ve yetenekli öğrencilerin, eleştirel düşünme eğilimleri, algılanan problem çözme becerileri ve üstbilişsel farkındalıkları arasındaki ilişkilerin incelendiği çalışmada (Boran ve Karakuş, 2022) öncelikle öğrencilerin söz konusu becerilerinin yüksek olduğu bulunmuş, eleştirel düşünme eğilimlerinin; algılanan problem çözme ve üst bilişsel farkındalık arasında tam aracı olduğu sonucuna ulaşılmıştır. Problem çözme, öğrencilerin okuduklarını analiz etme sürecinde kullandıkları bir araç olduğundan; eleştirel okuma, düşünme sürecini de içerdiğinden, üst bilişsel farkındalık ve problem çözme becerilerinin birlikte kullanımının, öğrencilerin metinleri daha etkili bir şekilde ele almasına olanak tanıdığı belirtilebilir. Sonuç olarak, üst bilişsel farkındalık, problem çözme ve eleştirel okuma becerilerinin birbirini tamamlayan ve etkileyen beceriler olduğunu söylemek mümkündür.