

The effect of the think aloud strategy on fourth-grade primary school students' reading comprehension and summarization skills

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ABSTRACT

This study aims to examine the effect of the think-aloud strategy on fourth-grade primary school students' reading comprehension and summarization skills. The study was conducted using a quasi-experimental design with a pretest–posttest control group, based on quantitative research methods. The study group consisted of 49 students attending a public school in the province of Ordu. A ten-week instructional process based on the think-aloud strategy was implemented with the experimental group. Students in the control group, on the other hand, continued their lessons in accordance with the current curriculum of the Ministry of National Education. In the data collection process, two tests consisting of multiple-choice and open-ended questions were used to assess reading comprehension, and an evaluation form for informational texts was used to assess summarization skills. The data were analyzed using parametric statistical methods. The findings revealed that students who received instruction through the think-aloud strategy showed a significant improvement in both reading comprehension and summarization skills. In contrast, no statistically significant change was observed in these skills in the control group. The results indicate that the think-aloud strategy can be an effective tool in enabling students to interact with the text, construct meaning, and develop cognitive awareness. In this respect, the study contributes to the consideration of the think-aloud strategy as an effective approach that can be used in teaching reading comprehension at the primary school level.

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Introduction

In today's information-oriented society, individuals' ability to engage actively in lifelong learning depends largely on the development of strong reading and comprehension skills. Reading is not merely the act of decoding printed words silently or aloud; rather, it is a complex mental process that involves constructing meaning, interpreting the author's intended message, and integrating new information with prior knowledge. Therefore, reading is a multidimensional cognitive activity in which cognitive, affective, and psychomotor domains function in coordination (Akyol, 2020; Güneş, 2016). As one of the most fundamental academic skills, reading must be effectively acquired in the early years of primary school, and it strongly influences students' success in all subject areas (Yüksel, 2010).

The essential component that determines the quality of reading is comprehension. Without comprehension, reading becomes a mechanical behavior lacking purpose and meaning. Reading comprehension is achieved when the reader constructs meaning in the mind, makes inferences, interprets ideas, evaluates information, and transfers what has been learned into real-life contexts (Karakaş, 2023; Pardo, 2004). For this reason, reading comprehension is considered a lifelong skill that not only affects

academic performance but also plays a significant role in social communication, decision-making processes, critical thinking, and problem-solving (Tok, 2024).

However, research indicates that many primary school students face difficulties in understanding what they read, often achieving only surface-level comprehension and struggling with deeper interpretation and analytical reasoning (Özyılmaz & Alcı, 2011; Yıldız & Akyol, 2011). The latest PISA 2022 results showed that Türkiye ranked 30th among 37 OECD countries in reading performance, which reveals the urgent need to strengthen reading comprehension instruction at the primary school level (MEB, 2022). This situation emphasizes the necessity of integrating strategy-based instruction into Turkish language classes.

Among the instructional approaches used to support comprehension, summarization is considered one of the most effective strategies. Summarization requires the identification of main and supporting ideas and reconstructing them concisely using one's own words (Fiorella & Mayer, 2015; Wormeli, 2005). This process deepens conceptual understanding, enhances long-term memory retention, and strengthens critical thinking (Eroğlu, 2023; Ülper, 2019).

One strategy highlighted frequently in the literature is the think-aloud strategy, which encourages readers to verbalize their cognitive processes while reading. Through this technique, students become aware of how they construct meaning, identify comprehension difficulties, and use appropriate strategies to resolve them (Wilhelm, 2012 as cited in Sönmez, 2017). Moreover, teachers can observe the mental processes students employ during reading, determine difficulties more accurately, and adjust instruction accordingly. The strategy also enables deeper and more permanent learning by increasing interaction between the reader and the text (Güneş, 2012). Grounded in Vygotsky's sociocultural learning theory, the think-aloud strategy highlights the importance of teacher-student and peer interactions in shaping learning experiences. Through think-aloud activities, reading becomes more structured and collaborative, supporting students' cognitive development within the zone of proximal development (Ceyhan & Yıldız, 2021).

Although numerous studies have explored the effect of the think-aloud strategy on reading comprehension skills (Baumann et al., 1993; Alqahtani, 2015; Ortlieb & Norris, 2012; Pressley & Afflerbach, 2012; Seng, 2007; Seyedi et al., 2012; Sönmez, 2017), research examining its impact on both reading comprehension and summarization at the primary level remains limited, particularly in Türkiye. Therefore, this study aims to examine the effects of the think-aloud strategy on fourth-grade students' reading comprehension and summarization skills and to add to the current body of research by presenting findings that may inform both theory and practice. In addition, the research findings are expected to contribute to instructional programs and classroom practices regarding the use of metacognitive reading strategies in Turkish language teaching. By making students' cognitive processes visible during reading, the think-aloud strategy enables learners to monitor their comprehension, recognize misunderstandings, and apply appropriate fix-up strategies. These metacognitive processes not only enhance reading comprehension but also directly support summarization by helping students identify main ideas, distinguish essential from non-essential information, and reorganize content meaningfully. Therefore, the theoretical connection between reading comprehension and summarization provides a rationale for examining the effects of the think-aloud strategy on both skills simultaneously. The purpose of this research is to examine the effect of the think-aloud strategy on fourth-grade primary school students' reading comprehension and summarization skills. In accordance with this purpose, answers to the following sub-problems were sought:

Reading Comprehension

1. Is there a statistically significant difference between the reading comprehension pretest scores of the students in the experimental and control groups?
2. Is there a statistically significant difference between the reading comprehension pretest and posttest scores of the students in the experimental group?
3. Is there a statistically significant difference between the reading comprehension pretest and posttest scores of the students in the control group?
4. Is there a statistically significant difference between the reading comprehension posttest scores of the students in the experimental and control groups?

Summarization

1. Is there a statistically significant difference between the summarization pretest scores of the students in the experimental and control groups?
2. Is there a statistically significant difference between the summarization pretest and posttest scores of the students in the experimental group?
3. Is there a statistically significant difference between the summarization pretest and posttest scores of the students in the control group?

4. Is there a statistically significant difference between the summarization posttest scores of the students in the experimental and control groups?

Method

Research design

This study was designed using a quasi-experimental pretest–posttest control group design in order to investigate the effect of the think-aloud strategy on fourth-grade primary school students' reading comprehension and summarization skills. Two naturally formed and academically equivalent classrooms were selected as the experimental and control groups. Both groups completed reading comprehension and summarization pretests prior to the intervention. The experimental group received ten weeks (20 instructional hours) of instruction based on the think-aloud strategy, whereas the control group received instruction aligned with the standard national curriculum. At the end of the instructional period, both groups were administered the same posttests. Statistical analyses were employed to examine the differences between the two groups.

Table 1. Symbolic representation of the quasi-experimental pretest–posttest control group design

Group	Assignment	Pretest	Intervention	Posttest
G1	K	O1	P	O3
G2	K	O2	P	O4

K = non-random assignment; O = measurement; P = experimental intervention

Study group

The study group consisted of 49 fourth-grade students enrolled in a public primary school located in the Altınordu district of Ordu during the second semester of the 2024–2025 academic year. Criterion sampling, a purposive sampling method, was used in participant selection. Students were included based on the following criteria: (1) enrollment in the fourth grade, (2) voluntary participation, and (3) absence of an officially documented special education diagnosis. One classroom was assigned as the experimental group ($n = 26$) and the other as the control group ($n = 23$).

Table 2. Gender distribution of students in the experimental and control groups

Group	Gender	N	%	Total
Experimental	Female	11	42	26
	Male	15	58	
Control	Female	10	43	23
	Male	13	57	
Total	Female	21	43	49
	Male	28	57	

Experimental procedure

The study was conducted using a pretest–posttest control group quasi-experimental design. The implementation process lasted for eight weeks and was carried out during regular Turkish language lessons in a primary school classroom. Each session lasted approximately 40 minutes. Prior to the intervention, both the experimental and control groups completed the reading comprehension and summarization pretests. During the intervention period, the experimental group received instruction based on the think-aloud strategy, while the control group continued reading instruction as outlined in the Turkish language curriculum.

In the experimental group, the think-aloud strategy was implemented through a structured sequence of steps. First, the teacher modeled the strategy by reading aloud and verbalizing cognitive processes such as predicting, questioning, clarifying, and summarizing. Next, guided practice was conducted in which students participated in think-aloud activities with teacher support. Finally, students engaged in independent practice, applying the strategy individually while reading informational texts. The classroom environment encouraged active participation and verbal interaction. Students were seated in a manner that facilitated discussion, and opportunities were provided for peer interaction and feedback throughout the process.

Data collection tools

The data collection tools used in the study included reading texts, reading comprehension tests, and a summarization assessment form. Informational texts were selected because they foster deep comprehension and conceptual learning. The texts used in the pretest and posttest were selected from

TÜBİTAK's Bilim Çocuk magazine and Ministry-approved Turkish textbooks and were matched with respect to length, vocabulary level, and readability.

To assess students' reading comprehension, two parallel tests were employed at different stages of the study. Reading Comprehension Test-1 (Edison Discovers the Light Bulb), developed by Sulak (2014), was administered as the pretest, while Reading Comprehension Test-2 (It All Started with a Kite), developed by Sönmez (2017), was used as the posttest. Each reading comprehension test consisted of five multiple-choice and five open-ended questions. Multiple-choice items were scored dichotomously (1 = correct, 0 = incorrect), whereas open-ended responses were evaluated using a rubric in which scores of 3, 1, and 0 represented adequate, partially adequate, and inadequate responses, respectively. The internal consistency of the reading comprehension tests was found to be acceptable, with Cronbach's alpha coefficients of .75 and .70. In addition to reading comprehension, students' summarization skills were assessed using the Summarization Assessment Form for Informational Texts developed by Bulut (2013). This form consists of 20 items, each scored as 2 (adequate), 1 (partially adequate), or 0 (inadequate), yielding a total possible score ranging from 0 to 40.

Data analysis

All data were analyzed using SPSS, with the significance level set at .05. Prior to the main analyses, the Shapiro-Wilk test was conducted to examine whether the data met the assumption of normal distribution. As the normality assumption was satisfied, parametric statistical techniques were employed. Accordingly, independent samples t-tests were used to compare the posttest scores of the experimental and control groups, while paired samples t-tests were applied to examine pretest-posttest differences within each group. To enhance internal validity, all instructional procedures and test administrations were carried out by the same researcher. In addition, content validity was supported through expert review of the measurement instruments.

Findings

Findings Regarding the Normality Test

In the study, it was examined whether the pre-test and post-test scores of the experimental and control groups were normally distributed. The results are presented in Table 3.

Tablo 3. Shapiro-Wilk Normality Test Results for the Pre-Test and Post-Test Scores of the Experimental and Control Groups

Reading Comprehension Test				
Group	Measurement	Skewness	Kurtosis	p
Experimental	Pre-test	0.400	-1.053	.059
Experimental	Post-test	-0.080	-0.157	.934
Control	Pre-test	-0.619	-0.612	.121
Control	Post-test	0.403	-1.024	.153
Summary Evaluation Form				
Group	Measurement	Skewness	Kurtosis	p
Experimental	Pre-test	0.125	-0.546	.438
Experimental	Post-test	-0.689	0.345	.240
Control	Pre-test	0.023	-0.297	.362
Control	Post-test	-0.167	-0.377	.737

According to the Shapiro-Wilk test results presented in Table 3, the pre-test and post-test scores of the students in the experimental and control groups display a normal distribution.

Examination of the Reading Comprehension Pre-Test Scores of the Experimental and Control Group Students

The problem statement "Is there a statistically significant difference between the reading comprehension pre-test scores of the students in the experimental and control groups?" was examined, and the analysis results regarding the pre-test scores of the experimental and control group students are reported in Table 4.

Table 4. Independent Samples t-Test Results for the Reading Comprehension Pre-Test Scores of Students in the Experimental and Control Groups

Group	N	M	SD	df	t	p	Cohen's d
Experimental	26	7.38	3.991	47	-0.164	.871*	-0.05
Control	23	7.57	4.860				

*p>.05

As shown in Table 4, there is no statistically significant difference between the pre-test mean score of the experimental group ($M = 7.38$) and that of the control group ($M = 7.57$) [$t(47) = -0.164, p > .05$]. This result confirms that, prior to the intervention, the two groups were equivalent in terms of their reading comprehension levels.

Examination of the Reading Comprehension Pre-Test and Post-Test Scores of the Experimental Group Students

The problem statement “Is there a statistically significant difference between the reading comprehension pre-test and post-test scores of the students in the experimental group?” was examined, and the analysis results regarding the pre-test and post-test scores of the experimental group students are reported in Table 5.

Table 5. Paired Samples t-Test Results for the Reading Comprehension Pre-Test and Post-Test Scores of Students in the Experimental Group

Group	Test	N	M	SD	df	t	p
Experimental	Pre-test	26	7.47	3.814	25	6.00	.000*
	Post-test	26	9.04	4.439			

* $p < .05$

According to Table 5, there is a statistically significant increase between the pre-test mean score ($M = 7.47$) and the post-test mean score ($M = 9.04$) of the experimental group [$t(25) = 6.000, p < .05$]. This finding indicates that the instruction based on the think-aloud strategy contributed positively to the reading comprehension performance of the students in the experimental group.

Examination of the Reading Comprehension Pre-Test and Post-Test Scores of the Control Group Students

The problem statement “Is there a statistically significant difference between the reading comprehension pre-test and post-test scores of the students in the control group?” was examined. The related analysis results are presented in Table 6.

Table 6. Paired Samples t-Test Results for the Reading Comprehension Pre-Test and Post-Test Scores of Students in the Control Group

Group	Test	N	M	SD	df	t	p
Control	Pre-test	23	7.57	3.689	22	-.540	.594*
	Post-test	23	7.17	4.380			

* $p > .05$

As seen in Table 6, the difference between the reading comprehension pre-test mean score ($M = 7.57$) and post-test mean score ($M = 7.17$) of the control group is not statistically significant [$t(22) = -.540, p > .05$], indicating that the control group showed no improvement in reading comprehension performance.

Examination of the Reading Comprehension Post-Test Scores of the Experimental and Control Group Students

The fourth sub-problem concerning reading comprehension was: “Is there a statistically significant difference between the reading comprehension post-test scores of the students in the experimental and control groups?” The related analysis results are presented in Table 7.

Table 7. Independent Samples t-Test Results for the Reading Comprehension Post-Test Scores of Experimental and Control Group Students

Group	N	M	SD	df	t	p	Cohen's d
Experimental	26	10.69	3.869	47	2.989	.004*	0.86
Control	23	7.17	4.380				

* $p < .05$

As shown in Table 7, there is a statistically significant difference between the post-test mean score of the experimental group ($M = 10.69$) and that of the control group ($M = 7.17$) [$t(47) = 2.989, p < .05$]. Moreover, the effect size (Cohen's $d = 0.86$) indicates a large effect, demonstrating that the think-aloud strategy had a strong positive impact on improving students' reading comprehension skills.

Examination of the Summarization Pre-Test Scores of the Experimental and Control Group Students

The problem statement “Is there a statistically significant difference between the summarization pre-test scores of the students in the experimental and control groups?” was examined. The results are shown in Table 8.

Table 8. Independent Samples t-Test Results for the Summarization Pre-Test Scores of Experimental and Control Group Students

Group	N	M	SD	df	t	p	Cohen's d
Experimental	26	19.92	7.316	47	0.085	.932*	0.02
Control	23	19.74	7.750				

* $p > .05$

As shown in Table 8, there is no statistically significant difference between the summarization pre-test scores of the experimental and control groups [$t(47) = 0.085, p > .05$], indicating that both groups were equivalent before instruction.

Examination of the Summarization Pre-Test and Post-Test Scores of the Experimental Group Students

To address the problem statement "Is there a statistically significant difference between the summarization pre-test and post-test scores of the students in the experimental group?", a paired samples t-test was performed. The related findings are presented in Table 9.

Table 9. Paired Samples t-Test Results for the Summarization Pre-Test and Post-Test Scores of Students in the Experimental Group

Group	Test	N	M	SD	df	t	p
Experimental	Pre-test	26	19.92	7.316	25	4.792	.000*
	Post-test	26	25.35	7.632			

* $p < .05$

As shown in Table 9, the difference between the pre-test mean score ($M = 19.92$) and the post-test mean score ($M = 25.35$) of the experimental group is statistically significant [$t(25) = 4.792, p < .05$]. This finding indicates that the instructional process based on the think-aloud strategy contributed positively to students' summarization skills.

Examination of the Summarization Pre-Test and Post-Test Scores of the Control Group Students

The problem statement "Is there a statistically significant difference between the summarization pre-test and post-test scores of the students in the control group?" was examined, and the results are presented in Table 10.

Table 10. Paired Samples t-Test Results for the Summarization Pre-Test and Post-Test Scores of Students in the Control Group

Group	Test	N	M	SD	df	t	p
Control	Pre-test	23	19.74	7.750	22	-2.472	.022*
	Post-test	23	18.87	7.871			

* $p < .05$

As seen in Table 10, the difference between the control group's summarization pre-test mean score ($M = 19.74$) and post-test mean score ($M = 18.87$) is statistically significant [$t(22) = -2.472, p < .05$], and the result indicates that the summarization performance of the control group significantly decreased over time.

Examination of the Summarization Post-Test Scores of the Experimental and Control Group Students

The problem statement "Is there a statistically significant difference between the summarization post-test scores of the students in the experimental and control groups?" was examined, and the analysis results regarding the post-test scores of the experimental and control group students are reported in Table 11.

Table 11. Independent Samples t-Test Results for the Summarization Post-Test Scores of Experimental and Control Group Students

Group	N	M	SD	df	t	p	Cohen's d
Experimental	26	25.35	7.632	47	2.923	.005*	0.84
Control	23	18.87	7.871				

* $p \leq 0.05$

As shown in Table 11, the post-test mean score of the experimental group ($M = 25.35$) is significantly higher than that of the control group ($M = 18.87$) [$t(47) = 2.923, p < .05$]. The effect size value (Cohen's $d = 0.84$) indicates a large effect, demonstrating that the think-aloud strategy had a strong positive impact on students' summarization skills.

Results and discussion

The results of this study show that the think-aloud strategy is highly effective in improving both reading comprehension and summarization skills of fourth-grade primary school students. The significant increases observed in both reading comprehension and summarization scores of the experimental group following the ten-week strategy-based instructional process, and the decrease in summarization scores in the control group, suggest that traditional classroom practices alone are insufficient to support these skills. The fact that Cohen's *d* values exceeded .80, indicating a "large effect," demonstrates that think-aloud can be considered not only a short-term intervention but also a powerful instructional tool. These results also support international studies conducted in different contexts regarding the effectiveness of reading instruction based on the think-aloud strategy. Wilhelm (2012) emphasizes that making the processes that proficient readers carry out internally during reading visible through think-aloud provides a strong model for struggling readers, and that students can learn metacognitive processes such as making inferences, monitoring meaning, and reconstructing text step by step. Similarly, Duke and Pearson (2002) place strategy modeling, guided practice, and gradual release of responsibility at the center of effective reading instruction, viewing think-aloud as one of the essential tools of this process. The results of this study also demonstrate that teacher and student engagement in collaboratively thinking aloud while working with a text significantly supports meaning-construction processes, particularly in informational texts. In international assessments such as PISA, Türkiye's performance below the OECD average in reading comprehension indicates the need for reading strategies to be taught more systematically starting from the early grades (MEB, 2022). Various studies have shown that primary school students are able to comprehend text only at a surface level and struggle with deeper meaning-building processes such as making inferences, identifying main ideas, and establishing intertextual connections (Yıldız & Akyol, 2011; Ülper, 2019). In this context, the results of this research demonstrate that the think-aloud strategy is an effective and contextual tool that can be used particularly in the teaching of informational texts in the Turkish language curriculum.

The results related to summarization skills reveal that think-aloud affects not only "reading" but also the process of producing "written output." The significant increase in summarization scores in the experimental group indicates that students improved their skills in distinguishing main and supporting ideas, eliminating unnecessary details, and reconstructing the text in their own words. The fact that summarization is a generative learning activity that involves selecting, organizing, and integrating information is also emphasized within Fiorella and Mayer's (2015) generative learning theory. Wormeli (2005) also sees summarization as one of the most effective indicators for determining whether students truly understand a topic and recommends its regular use in every lesson. The results of this study show that summarization activities structured together with think-aloud evolved into a deeper process in which students reconstruct meaning rather than simply shortening text. The downward trend in summarization scores in the control group suggests that summarization in routine classroom practices is often limited to removing certain sentences or shortening paragraphs. This situation is frequently observed in classroom environments where summarization is not systematically taught as an independent metacognitive skill. The studies of Özyılmaz and Alıcı (2011) and Yüksel (2010) reveal that many students experiencing reading difficulties are unable to construct the basic meaning of a text and fail to differentiate between important and unimportant information. The use of the think-aloud strategy in conjunction with summarization in this study enabled students to learn step by step "how to think" and "what to focus on." The results obtained are also consistent with Vygotsky's (1978) sociocultural learning theory. During think-aloud instruction, the teacher's sharing of his or her thinking processes with students means supporting them within the "zone of proximal development." As students listen to think-aloud examples from the teacher and peers, they gradually internalize these strategies and develop self-talk and self-regulation skills. This dynamic is similarly emphasized in Palincsar and Brown's (1984) reciprocal teaching approach, which states that predicting, questioning, clarifying, and summarizing become more permanent when teacher and student roles are alternated. The present study shows that integrating think-aloud into classroom instruction through both teacher-centered modeling and student-centered practice produces meaningful results at the fourth-grade level. The results of the research can also be evaluated in the context of reading motivation and attitude. In a study conducted with interactive reading practices, Tok (2024) reported simultaneous improvement in students' reading comprehension, reading motivation, and reading fluency. In think-aloud-based lessons, students experience the reading process as a more meaningful and engaging activity because they take an active role in the text, articulate their own thoughts, and hear the perspectives of their peers. This situation also aligns with the dimensions of "autonomy, purpose, and collaboration" emphasized in Guthrie and Wigfield's (2000) studies on reading motivation. From this perspective, it can be said that the think-aloud strategy has not only a cognitive but also a motivational function.

Recommendations

Based on the findings of the present study, it is recommended that teachers systematically incorporate the think-aloud strategy into Turkish language lessons, particularly when working with informational texts. In this study, the strategy was implemented through teacher modeling followed by guided and independent practice, and the results suggest that such structured use can effectively support students' reading comprehension and summarization skills. Accordingly, teachers should first model their own thinking processes and then support students' think-aloud practice through paired and small-group activities. Furthermore, the findings indicate that summarization should not be treated merely as a text-shortening exercise. Instead, summarization activities should be designed as a structured instructional process that includes identifying the main idea, selecting important information, eliminating unnecessary details, and rewriting the text in students' own words. Since the present study focused exclusively on informational texts, future instructional practices and research may extend the use of think-aloud and summarization strategies to other text genres, such as narrative, poetry, and digital texts, to examine their effectiveness across different textual contexts. In addition, as this study was limited to Turkish language lessons, an interdisciplinary approach is recommended. Integrating think-aloud and summarization activities into content-heavy subjects such as Science, Social Studies, and Mathematics may further support students' comprehension of complex texts and contribute to transfer of strategy use across disciplines. From a teacher education perspective, the findings highlight the need to strengthen teachers' instructional knowledge of metacognitive reading strategies. Therefore, workshops that provide hands-on training in think-aloud and related strategies (e.g., predicting, questioning, analyzing text structure, and reciprocal teaching) should be expanded in both pre-service teacher education programs and in-service professional development initiatives. Finally, because the present study employed only quantitative data collection tools, future research is recommended to incorporate qualitative methods such as interviews, focus group studies, and classroom video analyses. These methods would allow for a deeper exploration of students' emotions, attitudes, and motivations toward lessons based on the think-aloud strategy, thereby providing a more comprehensive understanding of its instructional impact.

Declarations

Ethics statements

Ethical approval for this study was obtained from the Ordu University Ethics Committee (Decision No: 2025-11; Meeting Date: 21.01.2025; Meeting Number: 2). Prior to conducting the research, the purpose, scope, and procedures of the study were explained to the school administration and classroom teachers. The study was conducted in accordance with ethical guidelines, ensuring that no participant was exposed to any physical, emotional, social, or academic harm, and that confidentiality and anonymity were maintained throughout the research process.

Informed consent

In this study, which involved primary school students as participants, informed consent was obtained from all legal guardians. Prior to data collection, the purpose, procedures, and scope of the research were clearly explained to the school administration, classroom teachers, and the parents of the students. Written Parental Consent Forms were collected for each participating student. Since the participants were minors, only parental written consent was required; no identifying images or personal data were gathered, and therefore no additional consent procedures were necessary. All participation was voluntary, and students were allowed to withdraw from the study at any time without any negative consequences.

Availability of data and materials

All data generated or analyzed in this study are included in the article.

Competing interests

There are no financial or non-financial competing interests for this research.

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Authors' contributions

Selinay Özenç conducted the research and wrote the manuscript. Süleyman Erkam Sulak provided guidance, reviewed the manuscript, and contributed to the interpretation of the findings.

Artificial intelligence

Artificial intelligence was used in the preparation of this article. Specifically, ChatGPT was utilized to assist in language editing and grammar checking.

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