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تأثیر مدل یادگیری هفت‌مرحله‌ای بر مهارت تفکر انتقادی دانش‌آموزان در محیط‌های یادگیری مبتنی بر وب

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چکیده

در عصر حاضر، تفکر انتقادی به عنوان یکی از مهارت‌های ضروری و اساسی برای موفقیت در زندگی فردی و اجتماعی شناخته می‌شود. پژوهش حاضر با هدف بررسی تأثیر تلفیق مدل یادگیری هفت‌مرحله‌ای در تدریس برخط بر تفکر انتقادی دانش‌آموزان پایه ششم ابتدایی، به دنبال ارائه شواهدی تجربی در خصوص اثربخشی این رویکرد نوین آموزشی است. این مطالعه نیمه‌آزمایشی با طرح پیش‌آزمون-پس‌آزمون و گروه کنترل، شامل ۴۰ دانش‌آموز پایه ششم شهر اراک بود که به دو گروه آزمایش (تدریس با مدل یادگیری هفت‌مرحله‌ای) و کنترل (روش سنتی) تقسیم شدند. داده‌ها از طریق پرسشنامه تفکر انتقادی ریکتس (۲۰۰۳) جمع‌آوری و با استفاده از نرم‌افزار SPSS تحلیل شد. نتایج نشان داد که گروه آزمایش پس از اجرای مدل یادگیری هفت‌مرحله‌ای، بهبود معناداری در تفکر انتقادی داشتند. این یافته‌ها همسو با مطالعات قبلی، نقش مؤثر این مدل در ارتقای مهارت‌های تحلیلی و تصمیم‌گیری را تأیید کرد. مدل یادگیری هفت‌مرحله‌ای با تأکید بر مراحل کاوش، مشارکت، تحلیل، ترکیب، ارزیابی، کاربرد و بازتاب، فرصت‌های یادگیری عمیق و معناداری را برای دانش‌آموزان فراهم می‌کند. تلفیق این مدل با محیط‌های یادگیری مبتنی بر وب، که از نوآوری‌های این پژوهش محسوب می‌شود، امکان دسترسی به منابع متنوع، تعاملات غنی و بازخوردهای فوری را فراهم می‌کند و در نتیجه، به یادگیری فعال و تفکر انتقادی دانش‌آموزان کمک می‌کند. با توجه به نتایج این پژوهش، پیشنهاد می‌شود که سیاست‌گذاران آموزشی و طراحان برنامه درسی، مدل یادگیری هفت‌مرحله‌ای را به عنوان یک رویکرد مؤثر در برنامه‌های آموزشی و دوره‌های ضمن خدمت معلمان مد نظر قرار دهند. همچنین، لازم است که معلمان با نحوه طراحی و اجرای فعالیت‌های یادگیری مبتنی بر این مدل در محیط‌های وب آشنا شوند.

واژه‌های کلیدی

مدل یادگیری هفت‌مرحله‌ای، تفکر انتقادی، محیط‌های یادگیری مبتنی بر وب، آموزش برخط، سازنده‌گرایی.

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ORIGINAL ARTICLE

The Effect of the Seven-Step Learning Cycle Model on Students' Critical Thinking Skills in Web-Based Learning Environments

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ABSTRACT

In the contemporary era, critical thinking is recognized as an essential and fundamental skill for success in individual and social life. The present research aims to investigate the effect of integrating the seven-step learning cycle model in online instruction on the critical thinking of sixth-grade elementary school students, seeking to provide empirical evidence regarding the effectiveness of this innovative educational approach. This semi-experimental study, employing a pre-test-post-test control group design, included 40 sixth-grade students from Arak city, who were divided into two groups: experimental (taught with the seven-step learning cycle model) and control (traditional method). Data were collected through the Ricketts Critical Thinking Disposition Questionnaire (2003) and analyzed using SPSS version 26 software. The results indicated that the experimental group demonstrated a significant improvement in critical thinking after implementing the seven-step learning cycle model. These findings are consistent with previous studies, confirming the effective role of this model in promoting analytical and decision-making skills. The seven-step learning cycle model (7E; Eisenkraft, 2003), emphasizing the stages of elicitation, engagement, exploration, explanation, elaboration, extension, and evaluation, provides opportunities for deep and meaningful learning for students.The integration of this model with web-based learning environments, which constitutes an innovation of this research, facilitates access to diverse resources, rich interactions, and immediate feedback, consequently contributing to students' active learning and critical thinking. Based on the findings of this research, it is suggested that educational policymakers and curriculum designers consider the seven-step learning cycle model as an effective approach in educational programs and in-service teacher training courses. Furthermore, teachers must become familiar with the design and implementation of learning activities based on this model in web-based environments.

KEYWORDS

Seven-Step Learning Cycle Model, Critical Thinking, Web-Based Learning Environments, Online Education, Constructivism.

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Introduction

In the present era, critical thinking is recognized as an essential and pivotal skill for success in both individual and social life. Critical thinking is a process through which individuals, by employing reasoning, analysis, and evaluation of information, arrive at informed and logical judgments (Essien et al., 2024). This mode of thought enables individuals to make effective and evidence-based decisions when confronted with challenges and complex issues. Educational specialists posit that the cultivation of critical thinking should be considered a primary objective of educational systems, as this skill underpins the development of analytical and decision-making abilities in individuals (Garcia et al., 2024). In today's world, where information is produced and disseminated at an accelerating rate, the ability to distinguish credible from unreliable information and to select appropriate options has become increasingly important. Critical thinking is not solely limited to access to information but is also related to how it is processed and effectively utilized. In contemporary information societies, the acquisition of high-level thinking skills, such as critical thinking, holds a position of particular significance (Izadpanah et al., 2022). With the progression towards a knowledge-based society, the instruction of information processing skills has become a central priority for educational systems (Lizitsa, 2025).

Despite significant advancements in the field of education, traditional teaching methods remain prevalent in many educational systems. These methods, which often emphasize the memorization and recitation of information, do not adequately address the educational needs of the present era. Consequently, novel and active approaches in the teaching-learning process have garnered increasing attention. These approaches, by focusing on engaging students with real-life issues, fostering creativity, and enhancing their participation in learning, seek to create meaningful and sustainable learning experiences (Bibby et al., 2025). Among these, learner-centered teaching methods, particularly constructivist-based approaches, play a crucial role in the development of critical thinking. One such method is the seven-step learning cycle model, which, as a learner-centered paradigm, facilitates deep and meaningful learning. The seven-step learning cycle model (7E), originally designed by Eisenkraft (2003), extends the traditional learning cycle by incorporating two additional phases: "Elicit" and "Extend". This model systematically progresses through seven stages: Elicit (activating prior knowledge), Engage (stimulating curiosity), Explore (hands-on investigation), Explain (introducing formal concepts), Elaborate (applying knowledge), Extend (transferring learning to new contexts), and Evaluate (assessing understanding and reflection) (Eisenkraft, 2003). Globally recognized as one of the most comprehensive constructivist instructional frameworks, the 7E model is particularly effective in promoting higher-order thinking skills, including critical thinking.

The seven-step learning cycle model encourages students to review their beliefs and construct new knowledge through reasoning, prediction, and hypothesis testing. In this model, the learning process commences with a simple activity or a thought-provoking question, and subsequently, students attain a deeper understanding of concepts through exploration and group participation. Ultimately, they apply their learning in novel situations and engage in the evaluation of the learning process (Fahrdin et al., 2025). This model, comprising the stages of elicitation, engagement, exploration, explanation, elaboration, extension, and evaluation, is

recognized as one of the most recent and comprehensive teaching paradigms. The present research investigates the effect of this model in online learning environments on the critical thinking of elementary school students. Accordingly, it is hypothesized that the integration of the seven-step learning cycle model in online instruction can have a significant effect on the critical thinking of sixth-grade elementary school students in the "Thinking and Research" course.

Given the significance of this subject, numerous studies at both international and domestic levels have investigated the effectiveness of this learning model. For instance, Ninot et al. (2019) found that the integration of the seven-step learning cycle model with online instruction leads to an improvement in students' analytical and reasoning skills. The study by Huang and Chuang (2008) also demonstrated that learning based on this model, due to its gradual structure, enhances learner interaction and problem-solving abilities. The findings of Lavonen et al. (2016) further emphasize the importance of designing instructional activities based on this model, indicating that this approach can strengthen critical thinking skills in online learning. In addition to international studies, domestic research has also highlighted the positive impact of this model in digital educational environments. The research by Bayat (1403) showed that the seven-step learning cycle model, particularly when combined with modern educational technologies, can create a significant improvement in students' analytical and decision-making abilities. Furthermore, the research by Mousavizadeh et al. (1403) stated that this learning model not only influences critical thinking but also increases collaborative and problem-solving skills in web-based learning environments. Recent research has also indicated that this instructional model can be utilized across various educational levels. Grantcharov and Swinkels (2021) found in their research that this model can also have a positive effect on the understanding and analysis of complex concepts in various fields, including medical education and social sciences. In the same vein, the research by Motavali and colleagues (2021) demonstrated that combining game-based learning with the seven-step model has a substantial impact on increasing students' motivation and participation in online classes.

Based on the studies conducted, it appears that the seven-step learning cycle model, with its emphasis on cognitive engagement, active interaction, and analytical thinking, can be an effective approach for cultivating critical thinking in online learning environments. However, in the information age and with the emphasis on the use of modern teaching methods in web-based learning environments, systematic investigations regarding the impact of specific learning models, such as the constructivist-based seven-step model, on enhancing this skill in students, particularly at the elementary level, are limited. Many previous studies have examined the overall impact of modern teaching methods on critical thinking and have paid less attention to investigating the effect of the specific stages of a particular learning model in online environments. Furthermore, the diversity in web-based learning environments and the lack of a clear framework for the use of this model in these environments have created ambiguities regarding its effectiveness. On the other hand, given the urgent need to educate questioning, analytical, and critical students in the educational system, conducting research that can provide practical and evidence-based strategies for promoting critical thinking in online learning environments appears necessary.

Considering the aforementioned research gaps, the primary objective of this research is to investigate the effect of the constructivist-based seven-step learning cycle model on the critical thinking skills of sixth-grade students in web-based learning environments. This research endeavors to clarify the role of this innovative learning model in enhancing students' analytical and decision-making skills within the context of online education by providing empirical evidence. It is hoped that the results of this research can contribute to the development of more effective and evidence-based educational approaches in the country's educational system.

Research Methodology

The present research is applied in terms of purpose and employs a semi-experimental design with a pre-test-post-test control group. The objective of this study is to investigate the effect of the seven-step learning cycle model on the critical thinking skills of sixth-grade students in web-based learning environments. The statistical population of this research comprised all sixth-grade elementary school students in Arak City during the 2024-2025 academic year. Utilizing an available sampling method, 40 students were selected from Ebrahim Fakhar Boys' School located in District One of Arak City. Subsequently, these students were randomly assigned to two equal groups of 20 (experimental and control). Random assignment was performed using a simple randomization technique (drawing lots) to ensure initial equivalence between groups. Participants were matched on key variables including age, gender (all male), pre-test critical thinking scores, and prior academic performance in the "Thinking and Research" course. Table 3 presents the baseline characteristics of both groups, confirming no significant pre-intervention differences.

Inclusion criteria: (a) being a sixth-grade student at Ebrahim Fakhar Boys' School, (b) regular attendance in online classes, (c) parental informed consent, and (d) completion of the pre-test.

Exclusion criteria: (a) absence in more than one session, (b) incomplete post-test, or (c) use of additional critical thinking training outside the study. No participants were excluded during the intervention.

The data collection instrument in this study was the Ricketts Critical Thinking Disposition Questionnaire (2003). This questionnaire consists of 33 items and three subscales: Engagement (Commitment): comprising 13 items that address the individual's level of commitment and motivation for critical thinking; Cognitive Maturity: comprising 9 items that refer to cognitive abilities related to critical thinking, such as the analysis and evaluation of information; and Innovativeness: comprising 11 items that address the individual's level of creativity and innovation in the critical thinking process. The validity of this questionnaire was previously confirmed by Biabangard (1387) through the calculation of correlation coefficients between subjects' scores at two-time points. Furthermore, its reliability was reported by Izadifard and Ashtiani (1389) through the calculation of a Cronbach's alpha coefficient of 0.94, indicating high instrument reliability. The research implementation stages were carried out in several phases:

Before the commencement of the intervention, the Ricketts Critical Thinking Disposition Questionnaire (2003) was administered to both the experimental and control groups. Subsequently, the experimental group received instruction based on the seven-step (7E) learning

cycle model (Eisenkraft, 2003), a constructivist instructional framework originally developed for science education and widely validated across disciplines and age groups. This model comprises seven sequential stages: elicitation, engagement, exploration, explanation, elaboration, extension, and evaluation (see Table 2). The intervention was delivered in web-based learning environments (Shad and Skyroom platforms) for 8 sessions, each lasting 45 minutes (one session per week).In each session, educational content (including videos, PowerPoint presentations, and text) was presented in the form of specific topics from the sixth-grade "Thinking and Research" curriculum, and students engaged in various activities (such as discussion, question and answer sessions, and project work) in the online environments. The teacher in the experimental group played the role of a facilitator, interacting with students and providing feedback using the features of the Shad and Skyroom platforms. The control group received the same educational content through traditional teaching methods in a face-to-face classroom setting. In this method, the teacher delivered lectures and conducted question-and-answer sessions, and students engaged in note-taking and answering the teacher's questions. Following the completion of the instructional period, the Ricketts Critical Thinking Disposition Questionnaire (2003) was administered to both the experimental and control groups. The research implementation stages are shown in Table 1.

Table 1. Research Implementation Stages

Research Stages	Group Learning with the 7-Step Learning Cycle	Group Learning with the Traditional Method
Content Recording, Preparation, and Development	*	*
Pre-test of Critical Thinking	*	*
Learning Based on the Traditional Method	-	*
Learning Based on the Seven-Step Learning Cycle	*	-
Post-test of Critical Thinking	*	*

To foster an interactive and engaging learning environment, the instructional design was implemented as follows:

Provision of Multimedia Content: In the initial 15 minutes of each session, educational content comprising instructional videos (featuring conceptual explanations and practical examples relevant to the topics of the "Thinking and Research" course) was made available to students on the Shad platform.

Facilitation of Online Interactions: Following the viewing of the videos, students transitioned to the Skyroom environment. Within this platform, educational interactions were conducted live and dynamically using tools such as a whiteboard and screen sharing. Students participated in discussions and exchanges of ideas, posed their questions, and presented their opinions and analyses. The instructor facilitated the deepening of the learning process by providing constructive feedback and precise guidance.

Implementation of the Seven-Step Learning Cycle Model: Across the eight instructional sessions, seven lessons from the "Thinking and Research" course were presented using the seven-step learning cycle model (comprising the stages of elicitation, engagement, exploration,

explanation, elaboration, extension, and evaluation). In each session, efforts were made to implement the stages of the model accurately and systematically. For example:

- In the elicitation stage, students gained an initial understanding of the topic by observing instructional videos and posing related questions.
- In the engagement stage, students' motivation and curiosity for learning were stimulated by presenting a challenging problem or question.
- The exploration stage was conducted through group and individual activities such as searching for relevant materials and engaging in discussions and dialogues.
- The explanation stage involved students presenting the results of their exploration and analysis of information.
- In the elaboration stage, students applied their learning to new situations.
- In the extension stage, students broadened their understanding by applying their knowledge in more complex contexts.
- In the evaluation stage, students assessed their learning process and provided feedback to each other and the instructor.

Table 2. Summary Table of Seven-Step Learning Cycle Teaching Sessions in One Session

Stage	Educational Activities	Practical Examples	Teacher Role	Instructional Tools	Time Allocation
Elicitation	Assessing students' prior knowledge regarding the topic under discussion.	Oral questioning and answering, completion of an online questionnaire.	Facilitator	Online questionnaire (Google Forms), oral questions, Miro interactive whiteboard for brainstorming.	10 minutes
Engagement	Establishing empathy and stimulating students' curiosity.	Displaying engaging videos, posing challenging questions, presenting relevant narratives.	Motivator	Educational videos (YouTube, Aparat), narratives, challenging questions, interactive platforms such as Mentimeter for polling and Q&A.	10 minutes
Exploration	Gathering information through observational and experiential activities.	Observing educational videos, conducting virtual experiments, searching for information on the internet.	Guide	Interactive educational videos (Edpuzzle), virtual experiments (PhET Interactive Simulations), internet, Miro interactive whiteboard for collecting and organizing information.	15 minutes
Explanation	The teacher synthesizes students' findings and elucidates new concepts.	Providing conceptual explanations, presenting practical examples, answering students' questions.	Content Provider	PowerPoint, educational videos, practical examples, Miro interactive whiteboard for presenting concepts and summarizing findings.	20 minutes
Elaboration	Ensuring that students can apply their learning in novel contexts.	Engaging in practical activities, solving new problems, presenting individual and group projects.	Guide	Practical activities, new problems, individual and group projects, interactive platforms such as Padlet for sharing ideas and projects.	-

Stage	Educational Activities	Practical Examples	Teacher Role	Instructional Tools	Time Allocation
Extension	Utilizing knowledge in broader situations.	Discussing the applications of knowledge in real-life scenarios, providing examples related to other topics.	Facilitator	Group discussion, relevant examples, Miro interactive whiteboard for creating concept maps and connecting concepts.	15 minutes
Evaluation	Assessing the extent to which students have achieved the educational objectives.	Completing an online questionnaire, answering written questions, providing feedback on projects.	Assessor	Online questionnaire (Google Forms), written questions, written feedback, interactive platforms such as Kahoot! for gamification and evaluation.	10 minutes

Note. The seven stages of the 7E learning cycle model are adapted from Eisenkraft (2003).

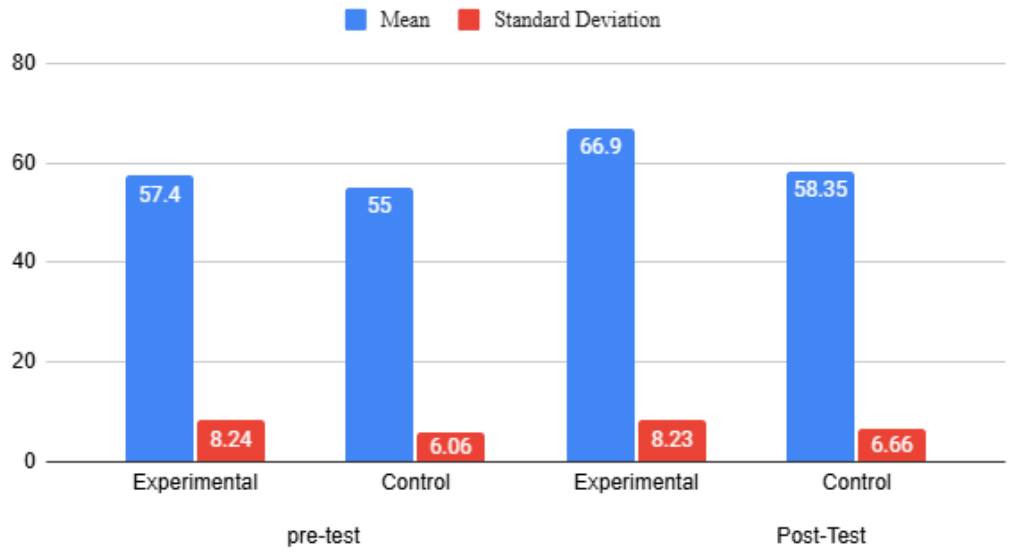
To analyze the collected data, descriptive statistics (mean and standard deviation) and inferential statistics (independent samples t-test and analysis of covariance [ANCOVA]) were employed using SPSS version 26 software. Analysis of covariance was utilized to control for the pre-test as a covariate. Furthermore, adherence to ethical considerations was of paramount importance in this research. To this end, in a meeting with the students' parents, assurances were provided that information pertaining to their children would be kept confidential and that the research results would be presented in aggregate form. Parents and students were also granted the right to withdraw from participation in the research at any stage. Finally, this research received ethical approval under the identifier IR.ARAKU.REC.1402.097 from Arak University.

Research Findings

This section presents the results obtained from the analysis of the collected data using descriptive and inferential statistical methods. Accordingly, information pertaining to descriptive statistics (mean and standard deviation of the critical thinking variable) is presented first, followed by information related to inferential statistics. In the descriptive findings section, as observed in Table 4, the mean and standard deviation of the critical thinking variable were determined for the pre-test and post-test phases in both groups. The pre-test mean and standard deviation of the critical thinking variable in the experimental group were 57.40 and 8.24, respectively, while in the control group, they were 55.00 and 6.06, respectively. The post-test mean and standard deviation of the critical thinking variable in the experimental group were 66.90 and 8.23, respectively, and in the control group, they were 58.35 and 6.66, respectively. Figure 1 illustrates a graphical representation of these results for enhanced clarity.

Table 4. Mean and Standard Deviation of Critical Thinking Variable in Pre-test and Post-test for Experimental and Control Groups

Variables	Experimental Group					Control group				
	Pre-test		Post-test			Pre-test		Post-test		
	Mean	SD	Mean	SD	Adjusted Mean	Mean	SD	Mean	SD	Adjusted Mean
Critical Thinking	57.40	8.34	66.90	8.23		55.00	6.06	58.35	6.66	



Mean and Standard Deviation of Critical Thinking Scores Across Pre-Test and Post-Test for Experimental and Control Groups

Prior to conducting the one-way analysis of covariance (ANCOVA), it is necessary to examine the assumption of normality in the data distribution. To this end, the Kolmogorov-Smirnov test was employed to assess the normality of the critical thinking variable within both the experimental and control groups. The results of this test are presented in Table 5.

Table 5. Kolmogorov-Smirnov Test for Checking the Assumption of Normality in Critical Thinking

Variable	Groups	Test	Statistic	Degrees of Freedom	Significance Level
Critical Thinking	Experimental	Pre-test	0.12	20	0.20
		Post-test	0.13	20	0.20
	Control	Pre-test	0.14	20	0.20
		Post-test	0.11	20	0.20

As Table 5 shows, the assumption of normality in the critical thinking variable in both groups at both measurement stages was confirmed with a significance level of $p > 0.05$.

Table 6. Levene's F Test for Checking the Assumption of Equality of Error Variances in the Critical Thinking Variable in the Two Experimental and Control Groups.

Variable	Statistical Indicators			
Critical Thinking	Degrees of Freedom 1	Degrees of Freedom 2	F	Significance Level
	1	38	1.74	0.19

Table 6 presents the result of Levene's F test to examine the assumption of homogeneity of error variances. Based on the results, the assumption of homogeneity of variances in the critical thinking variable is confirmed with a significance level of $p > 0.05$.

Table 7. Analysis of Variance (ANOVA) to Examine the Assumption of Regression Slope in the Dependent Variable

Source of Variation	Dependent Variable	Sum of Squares	Degrees of Freedom	F	Significance Level
Group * Pre-test	Critical Thinking	16.07	2	0.85	0.44

Table 7 presents the results of the analysis of variance (ANOVA) conducted to examine the assumption of homogeneity of regression slopes. Based on the reported results, the assumption of homogeneous regression slopes for the critical thinking variable is confirmed, as the significance level is greater than 0.05 ($p > 0.05$).

Table 8. Results of One-Way Analysis of Covariance for Comparing the Two Study Groups in the Critical Thinking Variable

Source of Variation	Sum of Squares	Degrees of Freedom	F	Significance	Effect Size	Test Power
Pre-test	1504.76	1	160.33	0.001	0.82	1.00
Group	750.45	1	79.96	0.001	0.69	1.00
Error	337.86	36				
Total	166173.00	40				

Based on the results presented in Table 8, a statistically significant difference was observed in the critical thinking variable between the experimental and control groups ($F = 79.96$, $p < 0.025$) after adjusting for pre-test scores. In summary, the analysis of covariance indicates that a significant difference exists in the mean critical thinking scores between the two groups after controlling for the effect of the pre-test. Specifically, the experimental group, which received instruction based on a seven-stage learning cycle, achieved higher scores on the post-test.

Discussion and Conclusion

The primary objective of the present study was to examine the effect of the seven-step (7E) learning cycle model on critical thinking skills of sixth-grade elementary students in web-based learning environments. Results showed that the experimental group, taught using the 7E model (Eisenkraft, 2003) via Shad and Skyroom platforms, achieved significantly higher post-

test critical thinking scores (M = 66.90, SD = 8.23) than the control group taught through traditional methods (M = 58.35, SD = 6.66), with a large and statistically significant effect ($F(1,36) = 79.96$, $p < 0.001$, $\eta^2 = 0.69$).

These findings align closely with previous research demonstrating the effectiveness of the 7E learning cycle in developing higher-order thinking skills. For instance, Septiningrum et al. (2019) and Nouri et al. (2024) reported significant gains in critical thinking among elementary students when all seven stages were systematically implemented. Similarly, Hosseinpour et al. (2022) found improved analytical and problem-solving abilities in Iranian elementary students, while Zhang and Liu (2023) documented comparable effect sizes in fully online settings. The current study extends this evidence by confirming the model's efficacy within the Iranian "Thinking and Research" curriculum delivered through local web-based platforms. The superior performance of the experimental group can be attributed to the structured progression of the seven-step (7E) learning cycle model. These results are highly consistent with previous studies that have systematically implemented the full 7E sequence. For instance, Septiningrum et al. (2019) and Nouri et al. (2024) reported that rigorous application of all seven stages significantly improved elementary students' critical thinking in both face-to-face and online settings. Similarly, Hosseinpour et al. (2022) documented enhanced analytical reasoning and problem-solving among Iranian sixth-graders, while Zhang and Liu (2023) found comparable large effect sizes ($\eta^2 \approx 0.65$–0.70) when the 7E model was delivered via web-based platforms. The present study extends these findings by confirming the model's effectiveness specifically within the Iranian "Thinking and Research" curriculum using local platforms (Shad & Skyroom).

This positive effect can be explained through the distinct contribution of each 7E phase. The Elicit and Engage phases activated prior knowledge and aroused curiosity, thereby reducing misconceptions and increasing motivation. The Explore and Explain phases facilitated active knowledge construction via inquiry, discussion, and peer feedback. The Elaborate and Extend phases promoted transfer to novel contexts, while the Evaluate phase encouraged metacognitive reflection and self-assessment of reasoning processes. Together, these mechanisms created repeated opportunities for analysis, evaluation, and application — the core components of critical thinking disposition — transforming students from passive recipients into active, self-regulated learners.However, the findings of the current research appear to be inconsistent with some studies that have not reported a uniform effect of this model across all age groups or diverse subjects. For instance, Rahimi et al. (2018) have noted that the effectiveness of instructional models is contingent upon specific educational contexts and the characteristics of the learners. This discrepancy may be attributed to the limitations of the present study, such as its exclusive focus on sixth-grade elementary students and the examination of only one variable (critical thinking). It appears necessary to investigate this model in other grade levels and by considering a wider array of variables, such as academic engagement or emotional skills, to achieve a more comprehensive understanding. Furthermore, the rapid transformations in educational environments, particularly following the COVID-19 pandemic which led to the proliferation of online learning (Moradi et al., 2024), underscore the necessity of adapting this

model to novel technologies. While the present research did not directly examine this aspect, it suggests that the integration of the seven-stage learning model with digital tools could enhance its capacity to address the complex needs of the contemporary era.

From a practical standpoint, the success of this model in enhancing critical thinking underscores the importance of revising traditional curricula. The educational system should evolve towards viewing students not merely as passive recipients of information but as active agents in the construction of their knowledge. Given the necessity of strengthening critical thinking to address the challenges of the contemporary world, it appears that schools and educators should transition towards the utilization of innovative and creative instructional approaches. The implementation of digital educational games, problem-based projects, the creation of discussion and dialogue forums, the integration of augmented and virtual reality technologies, the design of thinking-based educational programs, interactive educational podcasts and videos, and learning-focused social networks can provide engaging and effective learning environments for the cultivation of students' critical thinking. These measures not only assist students in developing their critical thinking skills but also transform them into active and creative learners capable of succeeding in today's complex and dynamic world. This necessitates that educators acquire the requisite skills for the implementation of such pedagogical strategies and that educational planners consider the feasibility of assessing the effectiveness of this model across diverse subjects and gender groups. Nevertheless, limitations such as unequal access to educational resources or variations in teachers' preparedness for utilizing this method may present challenges to its widespread adoption. In this regard, it is suggested that future research endeavors undertake a more in-depth examination of these obstacles and seek solutions for more effective integration of this model with the diverse needs of students and varying educational contexts.

In conclusion, this research indicates that the seven-stage learning cycle can serve as a potent instrument in cultivating students with critical thinking abilities who are adaptable to the challenges of the twenty-first century. The application of this strategy, coupled with flexibility in addressing existing limitations and leveraging the potential of technology and innovative approaches, opens new horizons for the nation's educational system and can contribute to the realization of the goal of fostering creative and responsible citizens.

Educational policymakers and curriculum designers must consider the seven-stage learning model as an efficacious approach within educational programs and teacher training courses. This necessitates the design of instructional content and learning activities based on the stages of the seven-stage learning model. Furthermore, educators should receive the requisite training in the design and implementation of learning activities grounded in the seven-stage learning model within web-based learning environments. At the classroom level, instructors should employ the seven-stage learning model in the teaching of various subjects, particularly those requiring critical thinking and problem-solving skills. Learning activities ought to be structured in a manner that ensures the active participation of students in all phases of the seven-stage learning model. Finally, the utilization of digital tools and innovative educational technologies is recommended to enrich learning environments predicated on the seven-stage learning model.

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