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Examining the Learning Outcomes Included in Science and Art Centers' Summer School Support and Development Course of Thinking Education Workshop Program According to Bloom's Taxonomy

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Abstract

The purpose of the research is to examine the learning outcomes included in Science and Art Centers' summer school support and development course of thinking education workshop program according to Bloom's taxonomy. The research was designed as a qualitative study, utilizing the document analysis technique and benefiting from descriptive analysis. The reliability coefficient for the research was 0.87. The results suggested that 91 of the primary, secondary, and high school learning outcomes in the workshop program were related to the cognitive domain of Bloom's taxonomy, and five of them were related to the affective domain. An examination of cognitive learning outcomes indicated that learning outcomes at the primary, secondary, and high school levels were at the lower levels of the taxonomy, namely remembering, understanding, and applying. However, there was little emphasis on learning outcomes for higher-order thinking skills, which include analyzing, evaluating, and creating. The same situation was observed in examinations carried out at the primary, secondary, and high school levels. Regarding the affective domain, one of the five learning outcomes was at the receiving level, while the other four were at the responding level.

Keywords: thinking education, curriculum, Bloom's taxonomy.

1. Introduction

Knowledge alone is insufficient in the twenty-first century education. This century requires the integration of knowledge with thinking for its effective utilization. Thinking is a lifelong ongoing process. In this lifelong process, students need to be equipped with fundamental knowledge and skills, along with abilities like critical thinking, analytical thinking, creative thinking, problem-solving, and collaborative teamwork. Thinking is the term used for the goal-oriented organized mental process carried out to understand the current situation (Cüceloğlu, 1999). Thinking is one of the significant skills which fosters individuals' language, cognitive, and social development, shaping their learning and guiding their future. Furthermore, thinking is the most crucial component of the process of acquiring knowledge, understanding, and learning, and lies at the heart of mental processes (Güneş, 2012). Thinking forms the foundation for questioning, evaluating, and generating new information, requiring mental images (Arnheim, 2007).

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Individuals concretize real-life events and objects through mental images (Yıldız, 2020). Therefore, it is evident that thinking guides not only individuals' development in various areas but also their learning and future. In addition, people need healthy thinking in every aspect of life.

Thinking education, on the other hand, enables the processing of knowledge, the culture of life, the development of culture, democratization, self-learning, understanding oneself, others, and the universe, and facilitates reasoning (Doğanay, 2012). Furthermore, thinking education increases people's quality of life. It not only enhances success in real-life situations but also improves academic achievement, contributes to skill development, and fosters positive attitudes (Güven & Kürüm, 2006; Tokmak, Yılmaz & Şeker, 2019). Various thinking styles are important in education and the business sector, and individuals with good thinking skills have more job opportunities (Ay, 2005). The fundamental processes of thinking styles are problem-solving, decision-making, and critical thinking (Presseisen, 1991, as cited in Doğanay, 2012). In the thinking process, various operations such as analysis, synthesis, comparison, generalization, and abstraction are commonly performed (Nickerson, 1988). One of the significant goals of education is to enhance students' skills in creativity, problem-solving, critical thinking, and higher-order thinking. In this process, thinking operations, processes, and skills are given special emphasis, and efforts are made to develop thinking operations, processes, and skills through specially designed programs and classifications (Güneş, 2012).

One of the important classifications that play a significant role in developing thinking operations, processes, and skills is Bloom's taxonomy. The taxonomy developed by Bloom is related to different thinking skills. Teachers believe that the higher-order thinking skills found in the analysis, evaluation, and creation levels of the taxonomy are necessary for all classes. Students who can utilize skills such as identifying, classifying, analyzing, synthesizing, and evaluating are considered successful (Demirkaya, 2015). In Bloom's taxonomy, the levels of analyzing, evaluating, and creating are considered higher-order thinking levels (Ay, 2005; Karakaş-Yıldırım, 2020; Anderson & Krathwohl, 2010; Uğurlu, 2023; Ulum, 2017). However, levels of remembering, understanding, and applying are also necessary for higher-order thinking. This is because lower-order thinking skills transform into increasingly higher-order skills (Biçer, 2019). In Bloom's taxonomy, each level is related to one another and not entirely independent. Cognitive domain skills are arranged from simple to complex. According to Ünalmış (2023), thinking skills are also interconnected, just like in Bloom's taxonomy. In this context, it could be stated that there should be learning outcomes related to each level of Bloom's taxonomy in the thinking workshop program. However, it could be argued that there should be more learning outcomes focused on developing higher-order thinking skills in particular.

In recent years, thinking skills education has become a significant problem in countries, and there have been significant challenges in providing thinking skills education, and the practices in this field have been inadequate (Baysal, Çarıkçı & Yaşar, 2016; Biçer, 2019; Güneş, 2012). Thinking is innate and can be developed through appropriate education (Costa, 2016). An educational program that places particular emphasis on thinking can be highly effective in developing thinking skills (İpşiroğlu, 2015). In this educational program, it is crucial to determine the learning outcomes appropriately. The Science and Art Centers (SAC) Summer School Support and Development Course of Thinking Education Workshop Program is an important practice in terms of thinking skills education. Therefore, it is considered important to examine the learning outcomes in this workshop program according to Bloom's taxonomy.

There are two important international practices related to students' higher-order thinking skills. One of these practices is the Program for International Student Assessment (PISA). PISA measures students' knowledge and skills in mathematics, science, and reading, assessing their ability to apply these skills to overcome real-life challenges. Another practice is the Trends in International Mathematics and Science Study (TIMSS). TIMSS aims to assess students' knowledge and skills in mathematics and science and contribute to their development in these

areas (IEA, 2023). These two practices are based on higher-order thinking skills (IEA, 2023; OECD, 2023; Yılmaz, 2019). One of the similar practices is the Academic Skills Monitoring and Evaluation (ABİDE) project implemented in Turkey. The ABİDE project aims to determine the extent to which students possess higher-order thinking skills through various types of questions. Accordingly, the ABİDE project aims to assess the higher-order mental skills of 8th grade students in Turkish language, mathematics, science, and social studies (MEB, 2023). Examining the learning outcomes included in the Science and Art Centers' summer school support and development course program and facilitating the acquisition of critical thinking skills will also increase success in national and international exams.

Workshops for SAC summer school programs were first introduced in the summer of 2022. The workshop programs are implemented separately for primary school, secondary school, and high school levels, and all students from grades 2-12 can participate in the workshops. One of these programs is the Thinking Education Workshop. The objectives of the Thinking Education Workshop are to enable students to utilize 21st century skills and higher-order thinking skills, establish their own thinking systems, establish a connection between language and thinking, analyze events and phenomena, express themselves effectively, respect different perspectives, think in a multifaceted manner, and support collaborative problem-solving (MEB, 2022). The general objective of the workshop is to encourage students to think about thinking, establish their own thinking systems, recognize that thinking is a skill that can be developed, consider national and universal values while thinking, respect different perspectives, become aware of what they know and do not know, realize the importance of meeting the thinking demands of the 21st century, and enable them to express themselves effectively through effective communication (Ersoy, Kefeli, Parmaksız, Karaman & Duran, 2022). Therefore, the thinking education workshop has an important function. It is also considered essential to examine the learning outcomes included in this workshop. In the context of thinking education, Sönmez (2016) conducted research on the impact of the 6th-grade elective Critical Thinking Education course on primary school students' critical and creative thinking skills. There were also many research studies in the literature examining the learning outcomes included in the curriculum in line with Bloom's Taxonomy (Büyükalan Filiz & Yıldırım, 2019; Çerçi, 2018; Karagöl, 2020; Lee, Kim & Yoon, 2015). In addition, numerous studies have examined the questions asked in lessons and exams (Eke, 2015; Çintaş-Yıldız, 2015; Demir, 2015; Gökulu, 2015; Güleryüz, 2016; Kana & Güney, 2020; Kanık-Uysal, 2022; Şanlı & Pınar, 2017; Yıldız, 2015; Zhang, Wong, Giacaman & Luxton-Reilly, 2021), and activities according to Bloom's Taxonomy (Bayrak-Özmutlu & Kanık-Uysal, 2021; Crompton, Burke & Lin, 2018; Durukan & Demir, 2017; Eroğlu, 2013; Gültekin, 2019; Karakaş-Yıldırım, 2020; Pujawan, Rediani, Antara, Putri & Bayu, 2022; Ulum, 2017). However, no research could be found regarding the examination of the learning outcomes given in the Thinking Education Workshop within the scope of SAC summer school programs.

As the Thinking Education Workshop delivered within the scope of SAC summer school programs is the first in its kind and no study has examined the workshop learning outcomes in the literature, investigating the distribution of primary school, secondary school, and high school learning outcomes included in the summer school thinking education workshop program according to Bloom's taxonomy levels is considered a worthwhile subject for research.

This research examines the learning outcomes in the "Thinking Education Workshop" program, which is part of the SAC Summer School Support and Development Course Program prepared by the Ministry of National Education (MoNE). In this context, the research aims to examine the learning outcomes of the summer school Thinking Education Workshop program according to Bloom's taxonomy. Therefore, answers were sought to the following questions:

1. What is the distribution of *primary school* learning outcomes in the Summer School Thinking Education Workshop Program according to Bloom's taxonomy process levels?

2. What is the distribution of *secondary school* learning outcomes in the Summer School Thinking Education Workshop Program according to Bloom's taxonomy process levels?

3. What is the distribution of *high school* learning outcomes in the Summer School Thinking Education Workshop Program according to Bloom's taxonomy process levels?

4. What is the distribution of *all* learning outcomes in the Summer School Thinking Education Workshop Program according to Bloom's taxonomy process levels?

2. Method

This study employed a qualitative research design using document analyses. Document analysis is the examination of written documents concerning a specific phenomenon or event intended to be explored (Yıldırım & Şimşek, 2016). In qualitative studies, documents are an important source of data and can include both private and official documents (Creswell, 2017). The document analysis method, which focuses on how the researched subject is reflected in documents, is commonly used in educational research. Document materials can include public records, textbooks, letters, films, cassettes, diaries, themes, reports, or other documents (Ary, Jacobs & Sorensen, 2010). In this study, the data source document considered is the 2022 Thinking Education Workshop Summer School Program prepared by the MoNE for SACs under the Summer School Support and Development Course Program.

2.1 *Data analysis*

In this study, descriptive analysis was used to examine the learning outcomes of focus. In this analysis method, the data obtained from the document are examined and interpreted according to pre-determined categories, themes, or dimensions. This examination process is carried out in four steps. In step 1, a framework is established to determine under which themes or concepts the data will be organized. In step 2, within the specified thematic framework, the document is read, and the data are organized and processed. In step 3, the findings organized according to this framework are supported with quotations. In the final step, the findings are explained, related to each other, and interpreted to make them more meaningful (Yıldırım & Şimşek, 2016).

In this respect, first, a framework was established for analyzing the data based on the cognitive process dimensions of Bloom's taxonomy. Then, the following steps were followed. In the first stage of document analysis, the learning outcomes included in the SAC Summer School Thinking Education Workshop Program, one of the 2022 SAC Summer School Workshop Programs published by the General Directorate of Special Education and Guidance Services, were examined according to primary, secondary, and high school levels, and their frequencies were extracted. As a result of this examination, a total of 96 learning outcomes were examined in this research, with 34 learning outcomes at the primary school level, 30 at the secondary school level, and 32 at the high school level. Then, action statements corresponding to the cognitive process levels of the revised Bloom's taxonomy were determined, and the learning outcomes were examined according to the revised Bloom's taxonomy. Ninety-six learning outcomes were separately coded by the researcher and an expert with a Ph.D. degree in educational sciences. The reliability between the two coders was determined using Miles and Huberman's (2015) reliability formula (Reliability = Consensus/Consensus + Disagreement). According to this formula, the reliability concerning the learning outcomes in the cognitive process dimension was 0.87. When

examining the learning outcomes, the cognitive process represented by the action word at the end of each learning outcome statement was determined. For example, in the learning outcome, "2.19. Realizes that there are various problems in daily life", the action word is "realizes." This statement emphasizes a cognitive process at the level of remembering. The learning outcome "1.12. Conducts practices related to reasoning" is examined as the application level in terms of the cognitive process dimension.

3. Findings

This study examined the distribution of *primary*, *secondary*, and *high school* learning outcomes included in the SAC Summer School Thinking Education Workshop Program according to the cognitive dimensions of Bloom's taxonomy.

3.1 *Findings regarding the cognitive process dimensions of primary school learning outcomes included in the thinking education workshop program*

In the analysis conducted regarding the first research question, it was determined that the 33 primary school learning outcomes included in the SAC Summer School Thinking Education Workshop Program were related to the cognitive domain, and one was related to the affective domain at the receiving level. Findings regarding the cognitive dimensions of learning outcomes are presented in Figure 1.

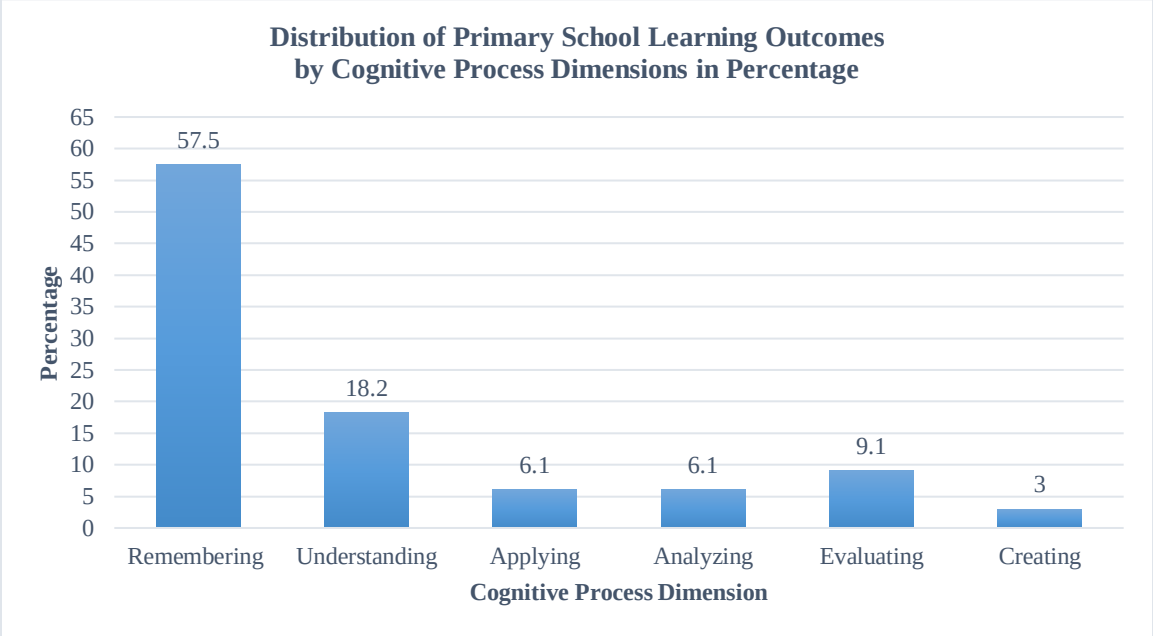

Figure 1. Findings regarding the cognitive process dimensions of primary school learning outcomes

As examined in Figure 1, out of the 33 primary school learning outcomes related to the cognitive domain, 19 (57.5%) were at the remembering level, 6 (18.2%) at the understanding level, 2 (6.1%) at the applying level, 2 (6.1%) at the analyzing level, 3 (9.1%) at the evaluating level, and 1 (3%) at the creating level. The fact that 81.8% of the primary school learning outcomes were at the remembering, understanding, and applying levels indicates that the thinking education program provides students with lower-order skills according to Bloom's taxonomy. The program

had little emphasis on higher-order thinking skills of analyzing, evaluating, and creating levels (18.2%).

3.2 *Findings regarding the cognitive process dimensions of secondary school learning outcomes included in the thinking education workshop program*

In the analysis conducted regarding the second research question, it was determined that 29 of the secondary school learning outcomes included in the SAC Summer School Thinking Education Workshop Program were related to the cognitive domain, and one was related to the affective domain at the receiving level. Findings regarding the cognitive dimensions of learning outcomes are presented in Figure 2.

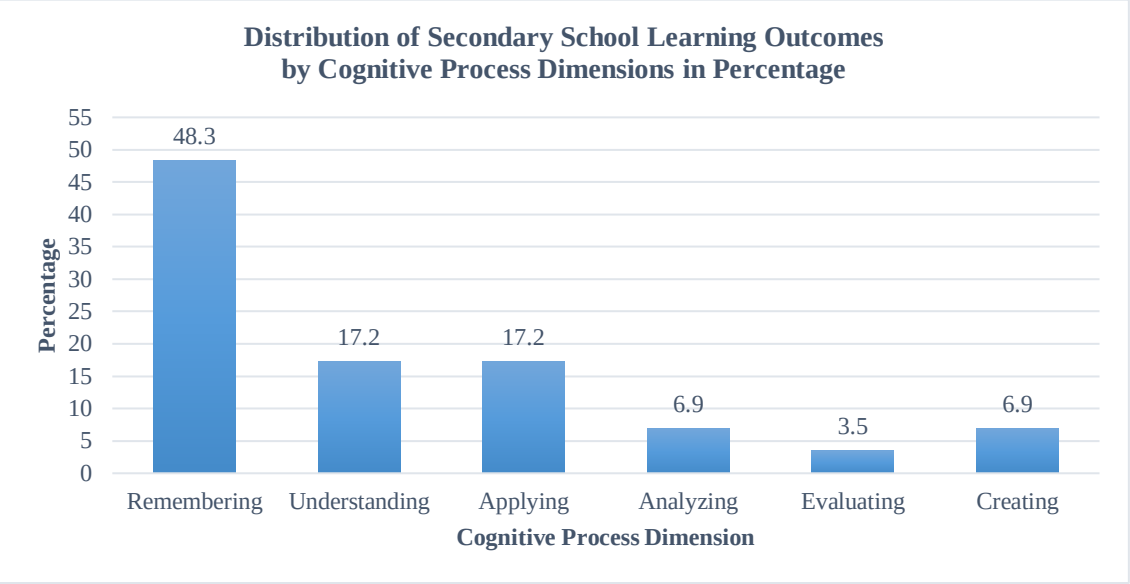

Figure 2. Findings regarding the cognitive process dimensions of secondary school learning outcomes

As seen in Figure 2, out of the 29 secondary school learning outcomes related to the cognitive domain, 14 (48.3%) were at the remembering level, 5 (17.2%) at the understanding level, 5 (17.2%) at the applying level, 2 (6.9%) at the analyzing level, 1 (3.5%) at the evaluating level, and 2 (6.9%) at the creating level. The fact that 87.2% of the secondary school learning outcomes were at the remembering, understanding, and applying levels indicates that the thinking education program provides students with lower-order skills according to Bloom's taxonomy. The program had little emphasis on higher-order thinking skills of analyzing, evaluating, and creating levels (17.3%).

3.3 *Findings regarding the cognitive process dimensions of high school learning outcomes included in the thinking education workshop program*

In the analysis conducted regarding the third research question, it was determined that 29 of the high school learning outcomes included in the SAC Summer School Thinking Education Workshop Program were related to the cognitive domain, and three were related to the affective domain. Findings regarding the cognitive dimensions of learning outcomes are presented in Figure 3.

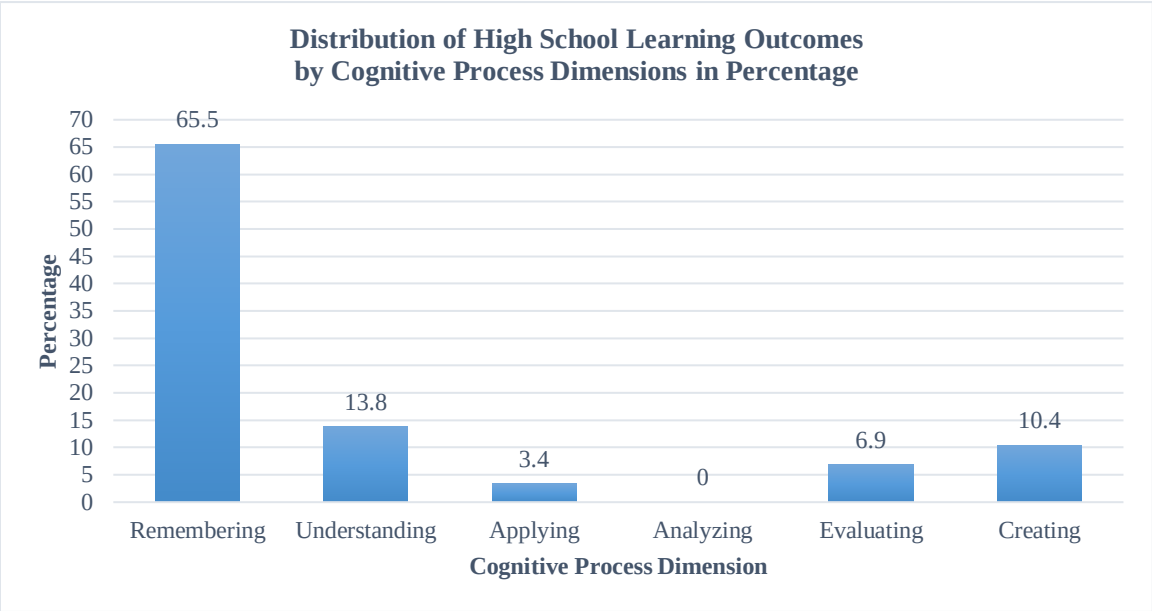

Figure 3. Findings regarding the cognitive process dimensions of high school learning outcomes

As illustrated in Figure 3, out of the 29 high school learning outcomes related to the cognitive domain, 29 (65.5%) were at the remembering level, 4 (13.2%) at the understanding level, 1 (3.4%) at the applying level, 2 (6.9%) at the evaluating level, and 3 (10.4%) at the creating level. The fact that 82.7% of the high school learning outcomes were at the remembering, understanding, and applying levels indicates that the thinking education program provides students with lower-order skills according to Bloom's taxonomy. The program included no learning outcome concerning the higher-order thinking skill of the analysis level, while it had included very few learning outcomes at the analyzing, evaluating, and creating levels (17.3%).

3.4 *Findings regarding the cognitive process dimensions of all learning outcomes included in the thinking education workshop program*

In the analysis conducted regarding the fourth research question, it was determined that out of the 96 learning outcomes included in the SAC Summer School Thinking Education Workshop Program, 91 were related to the cognitive domain and five were related to the affective domain. Findings regarding the levels that these learning outcomes were related to are presented in Table 1.

Table 1. Findings regarding the cognitive process dimensions of the workshop program learning outcomes

Learning Domain	Levels	Number of Learning Outcomes	%
Cognitive domain	Remembering	52	54.16
	Understanding	15	15.62
	Applying	8	8.33
	Analyzing	4	4.16
	Evaluating	6	6.25
	Synthesizing	6	6.25
Affective domain	Receiving	1	1.04
	Responding	4	4.16
Total		96	100

According to Table 1, 52 (54.16%) learning outcomes in the cognitive domain were at the remembering level, 15 (15.62%) at the understanding level, 8 (8.33%) at the applying level, 4 (4.16%) at the analyzing level, 6 (6.25%) at the evaluating level, and 6 (6.25%) at the synthesizing level. In total, there were 75 (78.11%) learning outcomes at remembering, understanding, and applying levels. There were 16 (16.66%) learning outcomes related to the higher-order skills of analyzing, evaluating, and creating. Of five learning outcomes in the affective domain, one was at the receiving level and the other four were at the responding level, making up 5.2% of all learning outcomes.

4. Discussion, conclusion, and recommendations

The study concluded that 91 primary, secondary, and high school learning outcomes in the SAC Summer School Thinking Education Workshop Program were related to the cognitive domain of Bloom's taxonomy and five were related to the affective domain. Of the five affective learning outcomes, one was at the receiving level and four were at the responding level. According to Dewey (1993), affective characteristics such as personal interest, sincerity, open-mindedness, and taking on responsibility are influential in the thinking process. According to Piaget (2004), affective characteristics such as love, interest, values, and impressions of harmony are important in the thinking process. According to Costa (2016), empathy and emotions are also influential factors in our thinking. The act of thinking cannot be independent of emotions, and thus equal attention should be given both to the affective and cognitive domains (Ornestein & Hunkins, 2016). However, only five learning outcomes were related to the affective domain, indicating that affective learning outcomes are insufficient in the workshop program. Therefore, the number of affective learning outcomes should be increased in new programs designed for thinking education.

The research found that most of the primary, secondary, and high school learning outcomes were at the lower levels of Bloom's taxonomy, namely remembering, understanding, and applying. There was very little emphasis on learning outcomes related to higher-order thinking skills like analyzing, evaluating, and creating. However, in the State of Georgia's list of thinking skills, there are four learning outcomes at the level of remembering, five at the level of understanding, six at the level of applying, eight at the level of analyzing, six at the level of evaluating, and five at the level of creating. This list is presented as an example of a comprehensive thinking education program by Oliva and Gordon (2018). According to Bloom (1956), complex behaviors encompass simpler behaviors. As the levels progress in the taxonomy, there will be more complex behaviors and thinking processes. Therefore, higher-order thinking skills encompass the learning outcomes at the levels of analyzing, evaluating, and creating in Bloom's taxonomy (Akkuş-Çakır & Senemoğlu, 2016; Akyol & Kılıç, 2021; Ay, 2005; Anderson & Krathwohl 2010; Berger, 2018; Karakaş-Yıldırım, 2020; Stayanchi, 2017; Uğurlu, 2023; Ulum, 2017). This situation indicates the learning outcomes in the thinking education workshop are insufficient for developing higher-order thinking skills. Therefore, the new programs to be prepared for thinking education should include more learning outcomes related to higher-order thinking skills such as analyzing, evaluating, and creating.

Since the SAC Summer School Support and Development Course of Thinking Education Workshop Program was first published in 2022, no research was found in the literature regarding the learning outcomes of the workshop program. However, similar studies examining the learning outcomes of different subjects' curricula according to Bloom's taxonomy are available in the literature. These studies examining the curricula of Turkish, social studies, science, history, geography, physics, chemistry, and biology subjects indicate that the learning outcomes consist of the levels of remembering, understanding, and applying according to Bloom's taxonomy (Aktan, 2020; Avşar & Mete, 2018; Büken & Artvinli, 2021; Büyükalan Filiz & Baysal, 2019; Büyükalan Filiz & Yıldırım, 2019; Çelik, Kul & Çalık-Uzun, 2018; Çerçi, 2018; Doğan & Burak, 2018; Durukan

& Demir, 2017; Eroğlu, 2013; Güldüren & Cangüven, 2020; Gültekin & Burak, 2019; Karagöl, 2020; İlhan & Gülersoy, 2019; Karakaş-Yıldırım, 2020; Önlen, Tatan & İbret, 2020; Özdemir, Altiok & Baki, 2015; Sözcü & Aydınözü, 2019; Ünveren-Kapanadzade, 2019; Zorluoğlu, Şahintürk, & Bağrıyanık, 2017). These findings are similar to the results of this research. Contrary to these research findings, Gezer, Şahin, Sünkür and Meral (2014) concluded that the learning outcomes of the Turkish Republic History of Revolution and Kemalism Course curriculum mostly consisted of higher cognitive levels. The researchers suggest that thinking education programs should be prepared by incorporating higher-level learning outcomes, and the impact of these programs should be investigated.

The study showed that approximately 82% of the primary school learning outcomes consisted of lower-order learning outcomes, while 18% were higher-order learning outcomes. On the other hand, around 83% of secondary and high school learning outcomes consisted of lower-order learning outcomes, while 17% were higher-order learning outcomes. These results show that the learning outcomes at the primary, secondary, and high school levels are similar in terms of lower and higher-order learning outcomes. Indeed, as one progresses from lower to higher grades, the level of learning outcomes should increase (Anderson & Krathwohl, 2010). This indicates that student characteristics and the principle of progressivity were not adequately taken into account in formulating the learning outcomes included in the workshop program. However, in programs designed for thinking education, student characteristics should be taken into consideration, and the learning outcomes should be included progressively.

The present-day world necessitates individuals to possess some thinking skills. Individuals with higher-order thinking skills are advantageous over those who can only directly acquire the transmitted information. Especially in developed societies, the primary purpose of education is to raise individuals who are sensitive to problems, capable of problem-solving, and possess higher-order thinking skills (Bapoğlu, 2010). Therefore, educational programs, especially the thinking education workshop program, should aim to raise individuals who can access information, think critically, and produce. However, it could be stated that the current state of the Thinking Education Workshop program is not sufficiently serving the purpose of raising the expected individuals.

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