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Examining 8th Grade Science Textbook Evaluation Questions through the Lens of Revised Bloom's Taxonomy[1]

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Abstract

The aim of this study is to analyze the end-of-unit evaluation questions in the 8th Grade Science textbook used in primary education, using the framework of the Revised Bloom's Taxonomy (RBT). The study employed document analysis to evaluate 306 end-of-unit questions from the 8th Grade Science Textbook (SSFBDK), which has been approved by Board of Education and Discipline (TTKB). This analysis considered both the knowledge and cognitive process dimensions as outlined in RBT. The questions were categorized based on criteria outlined in the book "A Taxonomy for Learning, Teaching, and Assessing," translated into Turkish by Anderson et al. Findings were presented in terms of percentages and frequencies. When evaluating the FASFBC unit questions according to the cognitive process dimension of RBT, it was found that 157 out of 306 questions were primarily concerned with the "remembering" process. Similarly, when categorized by the knowledge dimension, 157 out of 306 questions were based on factual knowledge. In a broader assessment of the 8th grade units, the majority of questions were found to focus on lower levels of cognitive processes. Likewise, when considering the knowledge dimension of RBT, most questions were geared towards factual knowledge. Based on these findings, it is recommended that future end-of-unit evaluation questions in the SSFBDK be formulated to engage higher cognitive processes, specifically those within the metacognitive domain of the Revised Bloom's Taxonomy.

Keywords: Science Curriculum, Revised Bloom's Taxonomy, 8th grade, Textbook evaluation

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Introduction

Almost everything we encounter in daily life is intrinsically related to science. Science courses aim to equip students with skills such as research, curiosity, questioning, productive and creative thinking, and problem-solving, emulating the mindset of a scientist (Kuşakçı Ekim, 2007). In the realm of science education, teachers do more than just impart knowledge; they instruct students in research methods, critical thinking, and problem-solving. They also help students interpret research findings and seek solutions to complex problems. Additionally, teachers serve as role models who inspire confidence, are open to innovation, and demonstrate excitement and enthusiasm for the subject matter (Aktepe & Aktepe, 2009).

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CURRICULUM DEVELOPMENT STUDIES IN TURKEY

In both the global context and in Turkey, the advancement of developmental and learning psychology prior to 1950 and the introduction of Bloom's Taxonomy have had a significant impact on teaching methodologies, techniques, and assessment practices. Following 1950, the focus in Turkey shifted from a curriculum education approach to a curriculum-programmed education approach (Ayvacı & Türkdoğan, 2010). At the dawn of the Turkish Republic, John Dewey was invited by Atatürk to Turkey to submit a report advocating for the establishment of a laboratory-based school for children aged 4-14. The report emphasized the principle of "learning by doing and experiencing" to enhance the longevity of learning. Consequently, it was recommended that primary education programs in Turkey needed development (Demirel, 2004). The Dimension of Cognitive Taxonomy, an important guide for curriculum development in Türkiye, was subsequently translated into Turkish. This work has garnered considerable attention in academic circles through various applied studies (Özçelik, 1989; Ertürk, 1995; Sönmez, 1995; Bademci, 1998; Tan, 1999; Senemoğlu, 1997; Yılmaz & Sünbül, 2000; Erginer, 2004). Over time, it has laid the foundation for curricula developed by the Turkish Ministry of National Education (Bülmen, 2006).

In the realm of science education, the goal is to cultivate scientifically literate individuals who may not become scientists but can navigate life more effectively and satisfy their curiosity (Aktepe & Aktepe, 2009). The focus has shifted from the content of scientific disciplines to the methods of application. Scientific facts, owing to the evolving nature of science, should not be presented as static; rather, they should be conveyed to students as the most current and comprehensive explanations available. Aligned with the constructivist approach, the teacher should act not as a mere transmitter of information but as a facilitator guiding students to discover knowledge themselves (Baysari, 2007). Given that no two students are alike in their physical, mental, and emotional attributes, various methods and techniques should be employed in the learning environment to make learning more enduring. The shift from traditional to contemporary educational paradigms necessitates that assessment and evaluation in science teaching be carried out in alternative ways. Students' levels of thinking are influenced by the types of questions posed by their teachers (Guven and Aydın, 2014). Consequently, when formulating questions, it is essential for teachers to have a thorough understanding of both the knowledge and cognitive dimensions of Bloom's Taxonomy.

For teaching to be effective, it's crucial that the questions posed are also impactful. To craft effective questions, educators must recognize that questions have diverse characteristics, serve different functions, and engage various levels of thinking. Some questions are designed to elicit recall of scientific information, while others require students to engage mental processes beyond mere recall. While both types of questions have their merits, teachers who rely solely on the first type are unlikely to create an optimally effective learning environment (Baysen, 2006). Consider the example involving John Dewey: when he asked, "If you were to dig a hole in the earth, what would you find?" he received no response from the students. A teacher then informed Dewey that he had not phrased the question properly. When the same teacher posed the question to the class as, "What is at the center of the earth?" the students unanimously responded with "magma." This example, cited by Bloom in 1956, illustrates how many individuals struggle to answer questions when the phrasing deviates from a format that allows for rote repetition of information. As seen in this example featuring John Dewey, many people find it challenging to answer questions that diverge from a format that can be addressed by straightforward recall of facts (Bloom, 1956).

REVISED BLOOM TAXONOMY (RBT)

Bloom's Taxonomy identifies three primary domains aimed to be developed through education and training: cognitive, affective, and psychomotor. The cognitive domain pertains to knowledge and encompasses students' recognition, understanding, and utilization of that knowledge (Doğanay & Sarı, 2017). A significant aspect of the Revised Bloom's Taxonomy is its transformation of the cognitive domain from a one-dimensional framework into a two-dimensional structure (Krathwohl, 2002).

Between 1995 and 1999, a research group led by Anderson and Krathwohl—comprising cognitive psychologists, curriculum developers, and assessment-evaluation experts—revised Bloom's Taxonomy to create a new classification system (Anderson et al., 2014). This updated framework focuses on

learners' abilities to recognize, understand, and utilize information (Doğanay & Sarı, 2017). One of the most notable changes in the revised classification is the transformation of the cognitive domain from a one-dimensional to a two-dimensional structure (Krathwohl, 2002). In this revised taxonomic structure, both nouns and verbs are employed to describe the level of information. For any cognitive action to be effective, the relevant information must be stored in and retrievable from the students' memory. Another difference between the revised and original taxonomies lies in the renaming of the stages "knowledge, comprehension, and synthesis" to "remembering, understanding, and creating." Additionally, the stages of synthesis and evaluation have been swapped in the new taxonomy. By making these changes, the revised taxonomy addressed previous criticisms and eliminated the prerequisites that existed in the original framework (Arı, 2011).

Figure 1. The revised bloom taxonomy, edited by Krathwohl et al. in 2001, consists of knowledge dimension and cognitive process dimensions (Yakalı, 2016).
https://sharemylesson.com/blog/what-no-one-tells-you-about-blooms-taxonomy

Purpose of the research

The objective of this study is to analyze the 8th Grade Science Curriculum, which is grounded in the constructivist approach. This curriculum adheres to the General Objectives and Fundamental Principles of Turkish National Education as outlined in Article 2 of the Basic Law of National Education No. 1739, as mandated by the Ministry of Education's Board of Education and Discipline. Specifically, the study aims to categorize the end-of-unit evaluation questions within this curriculum—approved by the board decision dated April 18, 2019, and listed as item number 8 on line 49 of the attached list, with the reference number 10444088—according to their respective levels in the Revised Bloom's Taxonomy (RBT).

Importance of Research

Educational programs fundamentally consist of four elements: objectives, content, the learning-teaching process, and assessment and evaluation. The evaluation process should be considered in conjunction with the other elements. One of the most widely recognized frameworks for this purpose is Bloom's Taxonomy (1956), which was developed to categorize knowledge and skill levels, thereby making the evaluation process more systematic and consistent (Zorluoğlu et al., 2017). For teachers, understanding the cognitive process level to which questions correspond is crucial for both formative and summative assessments. This knowledge aids in making subject matter more comprehensible during lesson implementation. Some questions in the curriculum serve as exemplary models for educators. Therefore, it is of utmost importance to identify the cognitive levels at which the questions in the curriculum are situated.

Method

Model of the research

This study aims to examine the end-of-unit evaluation questions in 8th-grade science textbooks based on the Cognitive Domain Levels of the Revised Bloom's Taxonomy. It employs a descriptive research approach. Data for this research were collected through document analysis, one of the qualitative research methods. Document analysis involves the scrutiny of written materials that contain information about the subject or subjects under investigation (Yıldırım & Şimşek, 2013). Bowen (2009) defines document analysis as the systematic process of examining data obtained by reviewing and evaluating both electronic and printed materials. In this study, 306 end-of-unit evaluation questions from 8th-grade science textbooks—approved as educational tools by the Ministry of National Education's Board of Education and Discipline (TTK) via a letter dated 2018-2019 and numbered 76198665—were scrutinized using the document analysis method. Content analysis is used within the document analysis framework to enumerate specific features of a given text or document (Karasar, 2005). As described by Foster, the document review method used for data collection involves the following steps:

- Accessing the documents,
- Verifying their originality,
- Understanding the documents,
- Analyzing the data, and
- Utilizing the data

(cited in Yıldırım and Şimşek, 2008, p. 193).

Data Collection Tools and Analysis

In this study, the focus is on the 8th-grade science textbook that was approved for use over an 8-year period by the Ministry of National Education's Board of Education and Discipline. The approval was based on a board decision dated April 18, 2019, numbered 8, and listed in the 49th row of the attached list, accompanied by the reference letter 10444088. This textbook is part of the science course curriculum for the 2020-2021 academic year and contains 306 end-of-unit evaluation questions. These questions were categorized based on the dimensions of knowledge and cognitive processes, using the criteria outlined in the RBT. Two experts in curriculum development were consulted to validate the classification, and their feedback was incorporated to finalize the categorization. The findings were quantified in terms of percentages and frequencies, and tables were generated to present these data. The collected information was analyzed using the Statistical Package for Social Sciences (SPSS) version 2.0 software.

Results

When Table 1 is examined in terms of the cognitive process dimension, it is observed that the evaluation questions in Unit 1 of the 8th Grade Science Textbook predominantly consist of 25 questions (55.6%) focused on the 'remembering' step, and 18 questions (40%) on the 'understanding' step.

In terms of the knowledge dimension, the majority of questions fall under the categories of 'Factual Knowledge' with 25 questions (55.6%), and 'Conceptual Knowledge' with 18 questions (40%). When the evaluation questions for Unit 1 of the 8th Grade Science course are considered collectively, 25 questions (55.6%) pertain to 'recall-factual,' 18 questions (40%) relate to 'comprehension-conceptual,' one question (2.2%) corresponds to the 'application-procedural' category, and one question (2.2%) falls under the 'analysis-metacognitive' knowledge dimension.

Table 1. Analysis of Questions in Unit 1 (Seasons and Climate) of the 8th Grade Science Textbook Based on the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension													
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**	
	f	%	f	%	f	%	f	%	f	%	f	%	f	**%**
Factual Knowledge	25	55,6											25	55,6
Conceptual Knowledge			18	40									18	40
Procedural Knowledge					1	2,2							1	2,2
Metacognitive Knowledge							1	2,2					1	2,2
Total (%)	25	55,6	18	40	1	2,2	1	2,2					45	100

Table 2. Analysis of Unit 2 (Dna and Genetic Code) Questions in the 8th Grade Science Textbook Based on the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension													
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**	
	f	%	f	%	f	%	f	%	f	%	f	%	f	**%**
Factual Knowledge	26	60,5											26	60,5
Conceptual Knowledge			13	30,2									13	30,2
Procedural Knowledge					4	9,3							4	9,3
Metacognitive Knowledge														
Total (%)	26	60,5	13	30,2	4	9,3							43	100

When Table 2 is analyzed in terms of the cognitive process dimension, the majority of evaluation questions in Unit 2 of the 8th Grade Science Textbook are categorized under the "remembering" step, accounting for 60.5%, followed by the "understanding" step at 30.2%.

In terms of the knowledge dimension, the majority of questions are within the realm of factual knowledge, also at 60.5%, and conceptual knowledge follows at 30.2%. Overall, when evaluating the questions for Unit 2 of the 8th Grade Science textbook, 60.5% fall under the category of remembering-factual, 30.2% are in the understanding-conceptual category, and 9.3% are categorized under application-operational knowledge.

When Table 3 is examined in terms of the cognitive process dimension, the majority of evaluation questions in Unit 3 of the 8th Grade Science Textbook fall under the "remembering" level, accounting

for 48.6%. This is followed by the "understanding" step at 28.6% and the "application" step at 22.9%. In the knowledge dimension, the majority of questions are categorized as factual knowledge, also making up 48.6% of the questions. Conceptual knowledge accounts for 28.6%, and operational knowledge for 22.9%. Overall, when examining the questions in Unit 3 of the 8th Grade Science textbook, 48.6% fall under the category of remembering-factual, 28.6% are in the understanding-conceptual category, and 22.9% are in the application-operational knowledge category.

Table 3. Analysis of Unit 3 (Pressure) Questions in the 8th Grade Science Textbook Based on the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension													
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**	
	f	%	f	%	f	%	f	%	f	%	f	%	f	**%**
Factual Knowledge	17	48,6											17	48,6
Conceptual Knowledge			10	28,6									10	28,6
Procedural Knowledge					8	22,9							8	22,9
Metacognitive Knowledge														
Total (%)	17	48,6	10	28,6	8	22,9							35	100

When Table 4 is analyzed in terms of the cognitive process dimension, the majority of evaluation questions in Unit 4 of the 8th Grade Science Textbook fall under the "remembering" level, accounting for 48.2%, followed closely by the "understanding" step at 42.9%. In the knowledge dimension, factual knowledge represents the largest category, making up 48.2% of the questions, followed by conceptual knowledge at 42.9%. Procedural knowledge accounts for 7.1%, and metacognitive knowledge constitutes 1.8% of the questions. Overall, when examining the evaluation questions in Unit 4, 48.2% fall under the category of remembering-factual, 42.9% under understanding-conceptual, 7.1% under application-procedural, and 1.8% under analysis-metacognitive.

Table 4. Analysis of Unit 4 (Substance and Industry) Questions in the 8th Grade Science Textbook According to the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension												
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**
	f	%	f	%	f	%	f	%	f	%	f	%	f **%**
Factual Knowledge	27	48,2											27 48,2
Conceptual Knowledge			24	42,9									24 42,9
Procedural Knowledge					4	7,1							4 7,1
Metacognitive Knowledge							1	1,8					1 1,8
Total (%)	27	48,2	24	42,9	4	7,1	1	1,8					56 100

Table 5. Analysis of Unit 5 (Simple Machines) Questions in the 8th Grade Science Textbook According to the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension												
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**
	f	%	f	%	f	%	f	%	f	%	f	%	f **%**
Factual Knowledge	13	32,5											13 32,5
Conceptual Knowledge			21	52,5									21 52,5
Procedural Knowledge					6	15							6 15
Metacognitive Knowledge													
Total (%)	13	32,5	21	52,5	6	15							40 100

When Table 5 is evaluated in terms of the cognitive process dimension, the majority of evaluation questions in Unit 5 of the 8th Grade Science Textbook are at the comprehension level, comprising 52.5%, followed by the "remembering" step at 32.5%. In terms of the knowledge dimension, questions in the "conceptual knowledge" category make up 52.5%, while those in the "factual knowledge" category account for 32.5%. Overall, when examining the evaluation questions for Unit 5, 52.5% fall under the understanding-conceptual dimension, 32.5% under the remembering-factual dimension, and 15% under the application-operational knowledge dimension.

When Table 6 is analyzed in terms of the cognitive process dimension, the majority of evaluation questions in Unit 6 of the 8th Grade Science Textbook fall under the understanding category at

54.2%, followed by the "remembering" category at 35.4%, and the "application" category at 4.2%. In terms of the knowledge dimension, 35.4% of the questions pertain to factual knowledge, while 54.2% focus on conceptual knowledge. When examining the evaluation questions for Unit 6 as a whole, 35.4% fall under the remembering-factual dimension, 54.2% under the understanding-conceptual dimension, 4.2% under the application-procedural knowledge dimension, and 6.3% are in the analysis-evaluation-metacognitive information dimension.

Table 6. Analysis of Unit 6 (Energy Conversions and Environmental Science) Questions in the 8th Grade Science Textbook According to the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension												
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**
	f	%	f	%	f	%	f	%	f	%	f	%	f **%**
Factual Knowledge	17	35,4											17 35,4
Conceptual Knowledge			26	54,2									26 54,2
Procedural Knowledge					2	4,2							2 4,2
Metacognitive Knowledge							2	4,2	1	2,1			3 6,3
Total (%)	17	35,4	26	54,2	2	4,2	2	4,2	1	2,1			48 100

When Table 7 is analyzed according to the cognitive process dimension, the evaluation questions for Unit 7 of the 8th Grade Science Textbook are primarily composed of the remembering step at 38.5%, followed by the understanding step at 51.3%, and the application step at 7.7%. In terms of the knowledge dimension, 38.5% of the questions focus on factual knowledge, 51.3% on conceptual knowledge, and 7.7% on procedural knowledge. However, when evaluating the 8th Grade Science lesson's Unit 7 questions as a whole, 70% of the questions fall under the remembering-factual dimension, 26% under the understanding-conceptual dimension, and 4% under the application-procedural knowledge dimension.

Table 7. Analysis of Questions in Unit 7 (Electrical Loads and Electrical Energy) of the 8th Grade Science Textbook Based on the Knowledge and Cognitive Process Dimensions of the RBT

	Cognitive Process Dimension												
Knowledge Dimension	**Remembering**		**Understanding**		**Applying**		**Analyzing**		**Evaluating**		**Creating**		**Total (%)**
	f	%	f	%	f	%	f	%	f	%	f	%	f **%**
Factual Knowledge	15	38,5											15 38,5
Conceptual Knowledge			20	51,3									20 51,3
Procedural Knowledge					3	7,7							3 7,7
Metacognitive Knowledge									1	3			1 3
Total (%)	15	38,5	20	51,3	3	7,7			1	3			39 100

Discussion, Conclusion and Suggestions

Upon examining the end-of-unit evaluation questions for Unit 1, "Seasons and Climate," of the 8th Grade Science Textbook according to the Revised Bloom's Taxonomy (RBT), it was found that the majority of the questions were at the remembering-factual level with 25 questions (55.6%) and at the understanding-conceptual level with 18 questions (40%). Similarly, for Unit 2, "DNA and Genetic Code," an evaluation according to RBT revealed that 26 questions (60.5%) were at the recall-factual level and 13 questions (30.2%) were at the understanding-conceptual level. In Unit 3, which focuses on "Pressure," the most prevalent categories were recall-factual with 17 questions (48.6%) and understanding-conceptual with 10 questions (28.6%). For Unit 4, "Substance and Industry," the most frequent categories were recall-factual with 27 questions (48.2%) and understanding-conceptual with 24 questions (42.9%). For Unit 5, "Simple Machines," the evaluation revealed that the most common categories were understanding-conceptual with 21 questions (52.5%) and recall-factual with 13 questions (32.5%). When evaluating the end-of-unit questions for Unit 6, "Energy Conversions and Environmental Science," according to the Revised Bloom's Taxonomy (RBT), the majority of questions fell into the categories of remembering-factual with 17 questions (35.4%) and understanding-conceptual with 26 questions (54.2%). Similarly, for Unit 7, "Electrical Loads and Electrical Energy," the evaluation based on RBT indicated that 15 questions (38.5%) were at the remembering-factual level and 20 questions (51.3%) were at the application-operational level. As a result, it was observed that units covering topics primarily related to physics, such as Unit 3 on "Pressure," showed an increase in questions at the application level. This is understandable given that the foundations of Physics, Chemistry, and Biology courses are included in the Science Discipline. Upon classifying the questions in the 8th Grade Science Curriculum according to the cognitive process dimension of RBT, it was found that there was a higher number of questions relating to lower-level cognitive domains compared to those in the higher-level cognitive domains. In the context of the 8th Grade Science Curriculum, the majority of questions are found in the "remembering" step, which falls under the lower-level cognitive domain. Conversely, the fewest number of questions are in the "application" step. While there are more questions that engage with "analysis" from the higher cognitive domain, questions related to "creation" are notably rare. The distribution of questions across cognitive levels varies between units. In Units 1, 2, 3, 4, 5, and 7, a high proportion of questions target lower-level

cognitive skills. In contrast, Unit 6 features a higher percentage of questions aimed at higher-level cognitive domains. On examining the knowledge dimension, most questions focus on factual knowledge, while the least number address metacognitive aspects. Several studies support these findings. According to Bloom's Taxonomy, questions asked by science teachers generally target lower-level cognitive skills (Ayvacı & Şahin, 2009; Koray & Yaman, 2002; Baysen, 2006), primarily at the knowledge and application levels (Özcan & Oluk, 2007). Balta (2006) emphasized that if assessments measure only knowledge-level abilities, students' feedback and growth would be limited to that level, hindering development in higher-order skills like analysis, synthesis, and evaluation. Similarly, low scores in international exams that focus on cognitive development or in national selection and placement tests have been attributed to poorly designed assessments that don't promote cognitive growth in primary schools. Dindar and Demir (2006) found comparable results when analyzing 5th-grade science exam questions according to Bloom's Taxonomy. Both studies determined that the majority of questions focused on knowledge level. Likewise, Ayvacı and Türkdoğan (2009) concluded that questions examined by science teachers according to RBT were primarily designed to assess lower-level cognitive skills. Gündüz (2009) analyzed 6th, 7th, and 8th-grade science and technology exam questions based on Bloom's Taxonomy and revealed that an overwhelming majority (92.19%) were at a lower cognitive level, with only 7.79% aimed at measuring higher-order thinking skills. These findings suggest that the tendency for teachers to focus on lower-level cognitive questions could be influenced by the Science and Technology Curriculum itself, which appears to be more aligned with lower-level cognitive skills. In Yılmaz's 2020 study titled "Examination of the Questions Asked at the Secondary School Level According to the Cognitive Process Dimension of RBT," it was found that 67% of the questions on secondary school exams measured low-level cognitive skills, while only 33% targeted high-level skills. These findings align with the current study, suggesting that science questions in the transition to secondary education are insufficient for assessing high-level cognitive abilities. Güven and Aydın (2014) explored this trend further by categorizing questions from 6th, 7th, and 8th-grade Science and Technology textbooks according to RBT. They found that most questions focused on the "remembering" step, a lower-level cognitive domain. After examining the content validity and distribution of these questions according to RBT, they concluded that the questions were insufficiently designed to assess higher-level cognitive skills. Similarly, Ayvacı and Türkdoğan (2010) classified exam questions used by science teachers according to RBT and found that 55% of them were designed to assess the "remembering" and "understanding" steps. Their study also revealed that teachers tended to avoid asking questions that engage with "analysis" and "creation," with questions in the "creation" step accounting for a meager 0.5% of the total.

Tolan (2011) analyzed the similarity of the questions asked in the SBS exam regarding the science curriculum and the Bloom's Taxonomy. When the SBS questions are examined in terms of Bloom's Taxonomy, it can be said that the questions are mostly in the sub-cognitive steps of knowledge and comprehension. It is seen that questions are asked less frequently in the higher-level cognitive stages. It is thought that this situation is caused by the inadequacy of the questions in measuring the upper level steps. There is a similarity between Tolan's study and this study, and it is seen that questions are prepared in the sub-cognitive domain steps. Güven and Aydın (2017), "7. The results of the findings obtained from the classification of 185 questions included in the activities as suggestions in the curriculum in accordance with the cognitive process dimension of the Revised Bloom's taxonomy in the study titled 'Analysis of 5th Grade Science Curriculum Questions According to RBT' suggest that the goal of raising high-level thinking students is not being met. Aydin et al. (2017) study, it can be said that it is similar to the results of this research in terms of frequently including low-level questions and asking information-process-oriented questions. Sadikov (2021), Nizami, Andijan State University and Tashkent State Pedagogical University named after Jizzakh State Pedagogical Institute, in his work "The use of B. Bloom's taxonomy of educational purposes in the formation of Linguo-Methodic competences of future primary school teachers" presents the results. The experiment was carried out within the framework of B. Bloom's thesis research on "Methodology for the formation of linguistic competences of future primary school teachers", in which the taxonomy of Educational objectives was chosen as a diagnostic and corrective tool. The purpose of experimental training is to test the effectiveness of the training developed. Methodological approach to the formation of language-methodical competence of future primary school teachers, developed content of teaching methodology for teaching the mother tongue, selected methods (case studies, problem method,

business game), tools (textbooks and multimedia applications to them), activity-type technologies (critical thinking) technologies, problem learning, productive technology, meaningful reading and assessment technology). The data obtained during the formative experiment largely fulfill the high-level tasks of Bloom's taxonomy, which corresponds to a high and innovative (innovative) level of development of methodological thinking. The reason why this study and our study are not similar is thought to increase the readiness of the teachers since the textbooks give more place to the metacognitive domain steps of the materials.

Tolan (2011) analyzed the similarities between the questions asked in the SBS exam and those aligned with Bloom's Taxonomy. Upon examining the SBS questions in terms of Bloom's Taxonomy, it becomes evident that most questions fall under the lower cognitive levels of knowledge and comprehension. Higher-level cognitive questions are less frequent. This scarcity is likely due to the inadequacy of the questions in measuring upper-level cognitive steps. Tolan's study and the present research both find that questions are primarily crafted within these lower cognitive domains. Güven and Aydın (2017) discovered similar trends in their study titled "Analysis of 5th Grade Science Curriculum Questions According to RBT." They concluded that the aim of fostering high-level thinking in students is not being met. Similarly, Aydin et al. (2017) also showed frequent inclusion of low-level questions, focusing mainly on information processing. Sadikov (2021), in collaboration with Nizami, Andijan State University, and Tashkent State Pedagogical University, conducted research on "The use of B. Bloom's taxonomy of educational purposes in the formation of Linguo-Methodic competences of future primary school teachers." The study utilized Bloom's taxonomy as both a diagnostic and corrective tool. The goal was to test the efficacy of a methodological approach to language instruction for future primary school teachers, employing a variety of teaching methods and tools such as case studies, problem-solving methods, business games, and multimedia applications. The data obtained largely fulfilled the high-level objectives of Bloom's Taxonomy, indicating a high and innovative level of methodological thinking development. The dissimilarity between this study and ours is thought to stem from the textbooks' greater focus on the metacognitive aspects of the materials, which potentially increases teachers' preparedness.

Suggestions

- One of the goals of today's modern educational models is to foster high-level thinking skills. However, in the 8th Grade Science Curriculum, it was observed that questions from the lower cognitive domains are far more prevalent than those from higher cognitive domains. It is recommended that questions be more balanced and sufficiently incorporate higher cognitive domain questions. Doing so may contribute to the development of students' higher-order thinking skills.

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