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Evaluation 7thGrade Science Textbook in terms of Learning and Innovation Skills According to Teachers' Opinions[1]

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Abstract

Students, who are the designers of the future, need the forward-looking skills of the 21st-century to adapt to the changes occurring in our age and to be ready for the next educational institution or business life. 21st-century skills need to be integrated into the education system for individuals to gain them most effectively. Textbooks, which are frequently used by teachers and students within the scope of the education and training process, are of great importance in acquiring these skills. The aim of this study is to evaluate the secondary school 7th-grade Science textbook in terms of 21st-century learning and innovation skills in line with teachers' opinions. The study group consists of 30 Science teachers working in secondary schools affiliated with Gaziantep province in the 2021-2022 academic year and using 7th-grade Science textbooks. In the research, phenomenological design and qualitative research methods were adopted, and the data were collected with a semi-structured interview form consisting of 9 questions prepared by the researcher. The data were analyzed using content and descriptive analysis method. The study, in line with the opinions of Science teachers, was concluded that 7th-grade Science textbook does not fully develop 21st-century learning and innovation skills, insufficient, skills are distributed irregularly in the textbook.

Keywords: 21st-century skills, Science textbook, teacher opinions

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Introduction

The changes occurring in the current age bring great information explosions and rapid technological development. As a result of improvements in technology and science, some business areas will disappear, some will grow, and business areas that do not exist today will emerge (Gray, 2016). Individuals cannot succeed in business life with basic skills and manual labor because these activities are now performed by technology. To succeed in business, individuals need to communicate effectively, solve complex problems, adapt to change and use technology effectively (Assessment and Teaching of 21st-Century Skills [ATCS], 2010). If examples were to be given for the previous sentences, the vast majority of qualified companies in the US are experiencing a shortage of workers because too few individuals who have skills that satisfy the needs of employers (Drysielski, 2015). To meet the expectations of qualified companies that form the basis of business life, the skills that individuals should possess started to be considered as 21st-century skills (Kivunja, 2014). Individuals need 21st-century skills not just in business but also in self-actualization, citizenship duties and daily life (Ananiadou & Claro, 2009; Dede, 2009). We encounter 21st-century skills at every point in life, for example, we require skills such as communication and critical thinking in daily life, as well as collaboration, creativity, problem-solving, innovation, and productivity in business life. 21st-century skills are the basic set of skills that prepare today's students for the world of the future (Work, 2014). Realizing the importance of 21st-century skills, many countries, non-governmental organizations, business world and educators have come together and started to define 21st-century skills and examine them within a certain framework. Ekici et al. (2017), who analyzed the frameworks related to 21st-century skills, identified 63 different skills and stated that the most emphasized skills among these skills were critical thinking, problem-solving, communication, collaboration, creativity and innovation skills. These skills are called learning and innovation skills in the Partnership for 21st-Century Learning (P21) framework, which is the most comprehensive of the frameworks addressing 21st-century skills (Dede, 2009). Learning and innovation skills are the basic skills that are at the headquarters of the lifelong learning process and the key to success in life (Bedir, 2019; Trilling & Fadel, 2009; Jacobson-Lundeberg, 2016). It also ensures a basis for the acquisition of other 21st-century skills, for example, individuals who cannot think critically and are not creative cannot be productive (Beers, 2011; Yalman, 2020). Learning and innovation skills are the key skills that differentiate individuals who are ready or not ready for increasingly complex life and career processes in our age (P21, 2009).

The 21st-century skills necessary for individuals who answer to the needs of our age and strengthen their societies can only be acquired through education (Boyacı & Özer, 2019). Supporting this idea, Partnership for 21st-century Learning (2009) emphasized that a country would raise individuals who are ready for the future in today's economy and life if it integrates 21st-century skills into its education program along with certain competencies and makes assessments for skill measurement. Gaining of 21st-century skills in primary and secondary school enables individuals to develop these skills at an advanced level (Louis, 2012). The 21st-century skills that enable individuals to overcome with global challenges are best acquired through science education in secondary school (Kartikasari etal., 2018). The reason for this is that the Science course enables learners to easily transfer the information and skills they have learned to their lives through experiments, activities, discoveries, and experiences. To provide 21st-century skills to learners within scope of science education, quality methods and materials need be used in the training process (Karslı, 2013; Uyar & Çiçek, 2021).

Textbooks are one of the materials at the center of the learning-teaching process, guiding teachers and students and bridging the gap between the purpose of education and school activities (Bouzid, 2016; Drakopoulou et al., 2005). It was thought that written materials would disappear in the digital age, but in many countries and in our country, textbooks are the basic building block of education (Çalışkan & Toyran, 2020). Textbooks enable students to come to class prepared, to make sense of scientific knowledge in their minds, to acquire the skills required by the age with the activities and questions it contains, and to learn knowledge in a permanent way by providing experiences from life (Kristanto & Santoso, 2020; Sefa, 2009; Sun & Li, 2021). Teachers, on the other hand, use textbooks to make decisions about which subject to teach and how to arrangement the teaching and learning process, to supplement their missing scientific knowledge, and to assess students' subject and pedagogical knowledge (Bouzid, 2016; Fan & Kaeley, 2000; Mcdonald, 2015; Oates, 2014). Textbooks guide teachers and students and enable the shaping of the educational process. Therefore, textbooks are of big matter for individuals to gain 21st-century skills within the extent of science education and should be widely used. The frequency of use of textbooks in the education process depends on the education system's perspective on textbooks. The more the education system supports the textbook, the more often the it is used.

Education system is compass of the future, so the common problem of many countries is that education remains unchanged despite changes in business life (Chalkiadaki, 2018). Factors affecting success are now determined in line with the necessities of the age. Today, success of individuals is measured by how creative they are, their communication and cooperation skills, and how they adapt to new situations (Bouzid, 2016). Because in international exams (PISA and TIMMS), the skill levels of individuals are measured as well as their basic knowledge. For example, Singapore, which has high academic achievement in international exams, is one of the countries that has been very successful in bringing its education system up to date (Trilling & Fadel, 2009). In order to be successful in these exams, students must have the 21st-century skills required by their age (Çepni, 2017; cited in MEB, 2018). In addition to 21st-century skills, the use and quality of textbooks is one of the elements that has an impact on the results of international exams (Akçay, Kapici & Akçay, 2020). In support of this idea, Sothayapetch and others (2013) emphasized in their study that they examined the science textbooks in Finland and Thailand that the reason why the PISA scores of the students in Finland were higher than the students in Thailand was that the textbooks in Finland were more qualified. In addition, with the disappearance of the use of textbooks in England, South Africa and the USA countries, a decrease was observed in both national and international exam success of students, and as a result, studies for the dissemination of textbooks began (Çalışkan & Toyran, 2020; Swanepoel, 2010).

In order for countries to reach a high level of success in international exams that reflect their success in global competition, they need to integrate 21st-century learning and innovation skills into every point and level of education and make textbooks, which are often used in the education process, age-appropriate and high quality. Efforts to improve the quality of textbooks should be by considering the levels and needs of students (Kartikasari et al., 2018). Because students' perspectives on textbooks and their frequency of use are directly proportional to the quality of textbooks. In order for educational activities to be of high quality, textbooks should be evaluated continuously from different perspectives (Bouzid, 2016). In evaluations of 21st-century skills acquisition and textbook development, teachers who extensively rely on textbooks should be given utmost importance, particularly in acquiring 21st-century skills essential for effectively guiding students throughout the learning and teaching process

(Organisation for Economic Co-operation and Development [OECD], 2012). In the literature, studies were found in which textbooks were examined in terms of 21st-century skills through document analysis (Akçay, 2019; Bal, 2018; Bouzid, 2016; Rakhmawati & Priyana, 2019; Rinekso, 2021; Uluhan, 2019). Moreover, student perspectives have been gathered concerning the appropriateness of these textbooks in fostering 21st- century skills (Kristanto & Santoso, 2020). However, there is no study evaluating the Science textbook in terms of creativity, innovation, critical thinking, problem-solving, communication and collaboration (Learning and Innovation Skills), which are included in the vast majority of frameworks related to 21st-century skills and form the basis for the acquisition of other skills. Therefore, this study is expected to contribute the current literature concerning the incorporation of 21st-century skills within the Science course and textbook, aiming to better equip learners with these skills.

Problem Statement

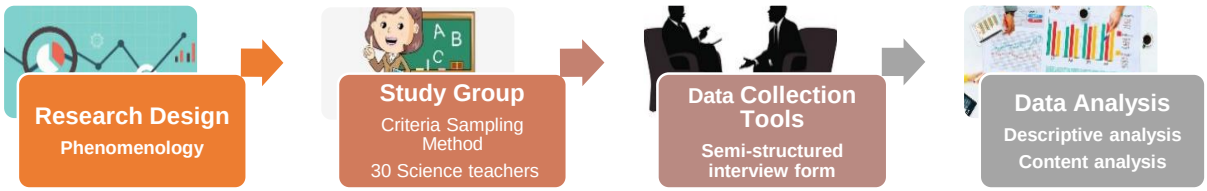
The problem of the study is that, what are the opinions of the science teachers about the suitability of the secondary school 7th-grade Science textbook used in the 2021-2022 academic year of the Ministry of National Education Publishing House with the learning and innovation skills?

Method

In this section, the research design, study group, data collection tools, data collection process, data analysis, validity and reliability and ethical issues will be discussed in line with the purpose of the research.

Figure 1

Research Process



Research Desing

Since the aim of the study was to reveal science teachers' opinions about the textbook, the phenomenology design, one of the qualitative research approach designs, was adopted. Phenomenology is an interpretation of the phenomenon within the scope of the research by supporting it with direct quotations within the framework of notions and themes based on the experiences of individuals (Onat-Kocabıyık, 2016). The main aim of the phenomenology design is to appraise the phenomena examined in the research with the help of the subjective experiences of the individuals. In this design, definite results are not obtained, but the textbook examined within theextent of the research is evaluated from different perspectives thanks to the examples and explanations of the teachers in line with their experiences (Yıldırım & Şimşek, 2021). Since the phenomenology design focuses on subjective experiences, the

individuals forming the sample are individuals who have experience with the phenomenon under investigation (Büyüköztürk et al., 2020).

Study Group

Study group in the research was identified by the most preferred criterion sampling method in studies in which the phenomenology pattern was adopted. Criterion sampling method, the individuals who create the study group are individuals who meet the criteria designated in appropriately with the purpose of the research (Yıldırım & Şimşek, 2021). Since it is desired to uncover the teachers' opinions about the 7th-grade Science textbook, the main criterion in the study is the teachers who use the 7th-grade Science textbook. For this reason, the study group of the research composed of 30 Science teachers working in secondary schools affiliated in the central districts of Gaziantep province in the 2021-2022 academic year, using the 7th-grade Science textbook.

Table 1

Demographic Characteristics of the Study Group

Variables		f	Percentage (%)	Total
Gender	Female	17	56,7	
	Male	13	43,3	30
Professional Seniority	1-5 year	6	20	
	6-10 year	10	33,4	
	11-15 year	6	20	30
	16-20 year	4	13,3	
	21 year and above	4	13,3	
Graduation	Undergraduate	27	90	
	Master	3	10	30

When Table 1 is analyzed, the most of the study group in the research (56.7%) were female. The professional seniority of the teachers varies between 1 or 36 years. The majority of teachers (90%) have a undergraduate, while 10% have a master's degree. All of the teachers participating in the study (100%) graduated from the faculty of education and work in public secondary schools. In addition, teachers generally have knowledge about 21st-century skills.

Data Collection Tools

Since the research aim was to uncover teachers' opinions on the 7th-grade science textbook, a semi-structured interview form was used in the data collection process. The interview method reveals the perspectives of individuals who create the study group by accessing their inner worlds (Baltacı, 2019). The semi-structured interview allows researcher to acquire detailed information on the subject being researched, to recover the interview that goes beyond the aim of the research with additional questions, and to control the negativities

that occur in the interview (Çepni, 2018). The semi-structured interview form used in the research process consists of 9 questions and was prepared by researcher. The questions were organized by taking expert views and were designed touncover the opinions of science teachers on the learning and innovation skills of the 7th-grade science textbook. The first three questions are questions about getting to know teachers (professional experience, graduation degree and textbook usage level). The next six questions are to reveal views on 21st-century learning and innovation skills (creativity, innovation, critical thinking, problem-solving, communication, collaboration).For example "*Is the7th-grade science textbook suitable for 21st-century communication skills?"* In addition to the 9 questions mentioned above, probing questions were asked to elicit teachers' views in depth and to maintain the focus of the study. For example, "*Are creativity skills supported in the activities in the 7th-grade science textbook, or are the questions in the textbook appropriate for measuring critical thinking skills, and if so, is the number of questions sufficient?"*

Data Collection Process

First, the essential permissions were acquired from the Ministry of National Education; then, secondary schools at various socio-economic levels in the central districts of Gaziantep province were visited and science teachers using the 7th-grade science textbook were identified. Teachers were told about the scope and aim of the research, that the interview process was recorded, that personal data would remain latent and that the data would only be used within the extent of the study. The date and time of the interview with the volunteer teachers was determined and an interview plan was created. According to the interview schedule, the interviews that took place for a maximum of 30 minutes. Science teachers who used the 7th-grade Science textbook were audio recorded.

Data Analysis

The data acquired from the interviews with teachers in the research are first processed as in qualitative research, the processed data are visualized and the findings are interpreted (Çelik et al., 2020). Data acquired within the extent of the research were analyzed through content analysis and descriptive analysis. Descriptive analysis is the interpretation of data within the framework of themes; content analysis is the organization and interpretation of similar data under certain themes in a manner appropriate to the level of the reader (Yıldırım & Şimşek, 2018). The data outlined by descriptive analysis are examined in more detail through content analysis and more comprehensive findings are revealed by discovering unnoticed data (Çepni, 2018).

Validity and Reliability

Validity and reliability in qualitative research cannot be analyzed as clearly as in quantitative research, but it is possible to ensure validity and reliability if some precautions are taken. In order to ensure validity, consistency should be ensured in the data collection, data analysis, and interpretation process. Therefore, in the research, the interview records were coded at least twice at different times for each teacher, and the obtained codes were compared and the findings were supported with direct excerpts (Yıldırım & Şimşek, 2021). In order to

ensure reliability, all interview records (100%) were independently coded by a researcher working in science education and the codes obtained were compared and a concurrence was reached by exchanging ideas on different codes (Yıldırım & Şimşek, 2021). Reliability among encoders was measured using Miles and Huberman's (1994) reliability formula.

Reliability: $\frac{Consensus}{(\ Consensus + Difference\ of\ opinion)} \times 100$

In a reliable study, the inter-coder reliability coefficient is needs to be at least 70% or 80% (Patton, 2002; as cited in Baltacı, 2017; Miles & Huberman, 1994).

Table 2

Findings Regarding the Reliability of the Data

Main Theme		Total Value	Reliability Percentage
Teachers' Opinions on the Compliance of the 7th Grade Science Textbook with 21st-century Learning and Innovation Skills	Consensus	895	82,79%
	Difference of opinion	186	

When Table 2 is analyzed, it is possible to say that the reliability coefficient between coders was calculated as 82.79% therefore it is possible to say that the study is reliable.

Ethical Issues

During the research process, ethics committee approval was first obtained on 12.10.2021 and then data collection started by obtaining application permission from Gaziantep Provincial Directorate of National Education on 20.01.2022. Before conducting semi-structured interviews with science teachers, information about research was shared with a consent form, and volunteer teachers were interviewed. In the research, rules of publication ethics were taken into account sensitively, the identity of the participants was kept confidential in the data acquired as a result of the interviews with the teachers, and the data were used only within the scope of the research.

Findings

In this section of the study, the findings acquired from the analysis of the interview data with science teachers will be presented. When the teachers' opinions on the conformity of the 7th-grade science textbook for 21st-century learning and innovation skills were analyzed, a total of 7 themes were obtained.

In the research, teachers' use of textbooks was first examined. The findings related to the theme of science teachers' textbook use are presented in Table 3.

Table 3

Textbook Use Theme Sub-themes, Codes, Frequencies and Percentages

Theme	Sub-theme	Codes	f	Percentage
Textbook Usage	Use and Non-use status	I use	13	%43,3
		I do not use it much	0	%33,3
		I am using additional resource	7	%23,3
		I use additional materials (Smart board etc.)	4	%13,3
	Reason for use/non-use	I use it to follow the curriculum	12	%40
		Insufficient	10	%33,3
		I use unit evaluation questions	6	%20
		I use it for homework	3	%10
		Not all topics are treated at the same level	3	%10
		I use it in the chapters that need to be read	3	%10
		I use it in experiments	2	%6,66
		Alone is insufficient	2	%6,66
		Not at the level of learners' perception	1	%3,33
		Information overload	1	%3,33
		Sufficient	1	%3,33
		Bores the student	1	%3,33
	Frequency of Use	I rarely use it	16	%53,3
		Frequency of use depends on the topic	3	%10
		I use it often	2	%6,66

When Table 3 is examined, teachers' opinions on textbook use are discussed in three sub-themes. These sub-themes are; Use and non-use status, Reason for use/non-use, Frequency of use. In the sub-theme related to teachers' use and non use status of textbooks, 4 codes were obtained. While the most of the teachers (43.3%) stated that they used the textbook, 33.3% stated that they didn't use the textbook much. Few teachers (13.3%) said that they used additional materials. Some teachers' opinions on the sub-theme of use and non use status sing a textbook are as follows;

T7: "*I use the textbook very little, I usually use materials that I prepared myself in accordance with the curriculum.*"

T15: "*I use the textbook, I also use EBA and MEB's questions because the textbook alone is not enough.*"

In the sub-theme related to teachers' reasons for use/non-use textbooks, 12 codes were obtained. Teachers' reasons for using textbooks are discussed in 6 codes. Teachers stated that they used the textbook to follow the curriculum (40%), to use unit evaluation questions (20%), to give homework (10%), to follow the chapters to be read (10%), to conduct experiments (6.66%) and because it was sufficient (%3.33). Teachers' reasons for not using

the textbook were also discussed in 6 codes. Teachers stated that they did not use the textbook because it was insufficient (33.3%), it did not cover all subjects at the same level (10%), it was insufficient on its own (6.66%), it was not at the level of students' perception (3.33%), it was information overload (3.33%) and it bored students (3.33%). The opinions of some teachers on the sub-theme of the reason for use/non-use textbooks are as follows;

T16: "*I usually use the textbook for daily planning. I also use the textbook to give homework to the children, to make them solve the activities or questions at the end of the unit.*"

T25: "*I do not use the textbook in every subject because the textbook alone is not enough. Students need additional resources because of the inadequacies in the textbook.*"

In the sub-theme relevant to the frequency of teachers' textbook use, 3codes were obtained. Most of the teachers (53.3%) stated that they rarely used the textbook. 10% of the teachers stated that the frequency of textbook use depends according to the topic. Few of the teachers (6.66%) emphasized that they use the textbook frequently. Some teachers' opinions on the frequency of use of textbooks are as follows;

T14: "*My process of using the textbook differs according to the subject; this is because the textbook does not explain all subjects in the same way.*"

T24: "*The textbook is suitable for the curriculum, and the end-of-unit evaluations are good because it adapts to the questions in the exams, I often use the textbook.*"

Findings related to the theme of science teachers' opinions on the suitability of the 7th-grade science textbook for 21st-century creativity skillsare presented in Table 4.

Table 4

Codes, Frequencies and Percentages of the Theme of Opinions Regarding the Suitability of the Textbook to Creativity Skills

Theme	Codes	f	Percentage
Opinions on the Appropriateness of the Textbook for Creativity Skills	Does not develop creativity	20	%66,6
	There are deficiencies	15	%50
	Questions only measure information	9	%30
	Questions are not enough	7	%23,3
	Knowledge oriented	6	%20
	Some activities are suitable	6	%20
	Activities are not enough	6	%20
	New generation questions are not enough	6	%20
	Questions at the beginning of the topic are appropriate	5	%16,6
	There are activities with low applicability	4	%13,3
	Not fit for 21st-century innovations	4	%13,3
	The load is on the teacher	3	%10
	No learning by doing, living	3	%10
	Leads to rote	2	%6,66
	Suitable for creativity	2	%6,66

When Table 4 is examined, 15 codes were obtainedfrom the theme of teachers' opinions on the suitability of the textbook for creativity skills. Most of the teachers (66.6%) stated that the textbook didn't develop creativity skills, while 50% stated that the textbook had deficiencies. Very few teachers (6.66%) stated that the textbook was suitable for creativity. The opinions of some teachers on the suitability of the 7th-grade Science textbook for creativity skills are as follows;

T2: "*The textbook at least supports creativity with experiments and research questions. In addition, there are questions at the beginning of the subject that lead the learners to think.*"

T19: "*There are well-intentioned questions and activities aimed at strengthening creativity skills, but there is a problem in their applicability.*"

T24: "*The textbook has a memorization-oriented logic, it is not suitable for the classroom environment where children can produce new things.*"

T30: "*It is definitely not suitable for creativity skills. The textbook does not encourage creativity to children in any way and does not contain elements related to creativity. Therefore, it is not enough.*"

Findings related to the theme of science teachers' opinions on the suitability of the 7th-grade science textbook for 21st-century innovation skills are presented in Table 5.

Table 5

Codes, Frequencies and Percentages for the Theme of Opinions on the Appropriateness of the Textbook for Innovation Skills

Theme	Codes	f	Percentage
Opinions on the Appropriateness of the Textbook for Innovation Skills	Not fully up to date	11	%36,6
	Insufficient	11	%36,6
	Uneven distribution of current information	6	%20
	No information on innovation	4	%13,3
	Not suitable	4	%13,3
	The book is constantly updated	3	%10
	Enough	3	%10
	Information is outdated	3	%10
	No innovative questions	2	%6,66
	Examples are old	2	%6,66
	Current items in the form of questions	1	%3,33
	21st-century adapts to innovations	1	%3,33
	The load is on the teacher	1	%3,33

When Table 5 is examined, 13 codes were obtained in the theme of teachers' opinions on the suitability of the textbook for innovation skills. Most of the teachers (36.6%) stated that the textbook wasn't fully up-to-date andwas insufficient. Few of the teachers (3.33%) emphasized that current items in the textbook are presented as questions, that the textbook

adapts to the innovations of the 21st-century, and that the burden is on the teacher in terms of innovation skills. Some teachers' opinions on the suitability of the 7th-grade Science textbook for innovation skills areas follows;

T3: "*There is not much new content. Students do not see new things in the book.*"

T8: "*It contains current information. I can say that the textbook adapts to 21st-century innovations.*"

T22: "*In the textbook, current elements are not included in every unit, there are current elements only in some units.*"

T26: "*There may be topics that are current, that is, sometimes updates are made. But these updates are not enough.*"

Findings related to the theme of science teachers' opinions on the suitability of the 7th-grade science textbook for 21st-century critical thinking skillsare presented in Table 6.

Table 6

Codes, Frequencies and Percentages for the Theme of Opinions on the Appropriateness of the Textbook for Critical Thinking Skills

Theme	Codes	f	Percentage
Opinions on the Appropriateness of the Textbook for Critical Thinking Skills	Does not develop critical thinking	16	%53,3
	Questions only measure knowledge	11	%36,6
	Insufficient	10	%33,3
	Questions are not suitable for thinking skills	10	%33,3
	Offers direct information	8	%26,6
	Does not lead to critical thinking	6	%20
	Questions are not enough	6	%20
	Activities are not enough	5	%16,6
	The load is on the teacher	5	%16,6
	Activities are appropriate	5	%16,6
	Questions are appropriate	4	%13,3
	Appropriate for critical thinking skills	4	%13,3
	Preparation questions appropriate	4	%13,3
	The book makes students passive	1	%3,33
	Thought-provoking quality varies from topic to topic	1	%3,33

When Table 6 is examined, 15 codes were obtained in the theme of teachers' opinions on the suitability of the textbook for critical thinking skills. Most of teachers (53.3%) stated that the textbook didn't develop critical thinking. Very few of the teachers (3.33%) expressed that the textbook made the students passive, and thought-provoking quality varied from topic to

topic. Some teachers' opinions on the suitability of the 7th-grade Science textbook for critical thinking skills are as follows;

T2: "*Textbooks contribute to students in terms of critical thinking. Because the questions at the end of the unit or at the beginning of the topic direct students to think continuously.*"

T7: "*The activities in the textbook are classical experiments of science. There are no activities that require critical and analytical thinking.*"

T13: "*The textbook is not suitable for critical thinking skills. The textbook gives certain stereotypical information to children, it does not allow learners to think about the topics.*"

T19: "*The textbook has studies on this subject, the activities are aimed at making students think critically. The questions, on the other hand, do not make them think critically, they only measure the knowledge about the acquisition.*"

Findings related to the theme of science teachers' opinions on the suitability of the7th-grade science textbook for 21st-century problem-solving skills are presented in Table 7.

Table 7

Codes, Frequencies and Percentages of the Opinions on the Appropriateness of the Textbook for Problem-Solving Skills

Theme	Codes	f	Percentage
Opinions on the Appropriateness of the Textbook for Problem-Solving Skills	Insufficient	15	%50
	Does not develop problem-solving skills	11	%36,6
	There is a straight narrative logic	8	%26,6
	Partially suitable	7	%23,3
	They have daily life problems	5	%16,6
	The load is on the teacher	5	%16,6
	No problem-solving skills in every subjects	5	%16,6
	No daily life problems	5	%16,6
	Appropriate problem-solving skills	3	%10
	Questions are not appropriate	3	%10
	Activities are appropriate	2	%6,66
	There are questions for problem-solving	2	%6,66
	Activities do not encourage	1	%3,33
	Examples from daily life are always the same	1	%3,33

When Table 7 is examined, 14 codes were obtained in the theme of teachers' opinions on the suitability of the textbook for problem-solving skills. Most of the teachers (50%) expressed that the textbook was insufficient in terms of problem-solving skills, while 36.6% stated that the textbook didn't develop problem-solving skills. Very few teachers (3.33%) expressed that the activities in the textbook weren't encourage for problem-solving skills,and

that the daily life examples in the textbook were always the same. Some teachers' opinions on the suitability of the 7th-grade Science textbook for problem-solving skills are as follows;

T5: "*Unfortunately, there is no daily life problem in the textbook. The textbook explains the subjects at a very simple level, so it is not enough.*"

T18: "*Students cannot see daily life problems in the textbook, it is insufficient in many contexts. There is stereotypical information in the book, but this is not the new philosophy of life.*"

T22: "*The textbook improves problem-solving skills. Students can see what to do and how to produce solutions when they encounter any problem.*"

T30: "*Not in every subject but in some subjects students can use problem-solving skills.*"

Findings related to the theme of science teachers' opinions on the suitability of the 7th-grade science textbook for 21st-century communication skills are presented in Table 8.

Table 8

Codes, Frequencies and Percentages for the Theme of Opinions on the Appropriateness of the Textbook for Communication Skills

Theme	Codes	f	Percentage
Opinions on the Appropriateness of the Textbook for Communication Skills	Does not encourage communication skills	9	%30
	Insufficient	9	%30
	Activities are appropriate	8	%26,6
	Questions at the beginning of the topic are appropriate	6	%20
	The load is on the teacher	6	%20
	Appropriate communication skills	6	%20
	Does not provide an environment for discussion	6	%20
	There are questions that encourage discussion	4	%13,3
	There is communication on some issues	4	%13,3
	Information overload	3	%10
	Assessment and evaluation questions are not suitable	3	%10
	Allows students to communicate	3	%10
	“Let's research and present” section is appropriate	1	%3,33
	No communication technique	1	%3,33

When Table 8 is examined, 14 codes were obtained in the theme of teachers' opinions on the suitability of the textbook for communication skills. Most of the teachers (30%) stated that the textbook didn’t encourage communication skills, and that the textbook was not enough in terms of communication skills. Few of the teachers (3.33%) emphasized that the "Let's research and present" section in the textbook is appropeiate for communication skills, and that

there is no communion technique in the textbook. Some teachers' opinions on the suitability of the 7th-grade Science textbook for communication skills are as follows;

T1: "*There are statements such as discuss at the beginning of the topics, discuss over the question, but we try to provide the communication ourselves because if I go into the book, I cannot get out.*"

T10: "*Thanks to the textbook, students can communicate. However, the textbook provides communication only during activities.*"

T18: "*There are some small activities in the textbook that will enable students to communicate, but they are not enough.*"

T24: "*The textbook is not suitable for communication skills because it is very superficial. It does not enable students to communicate. The questions in the book are not suitable for communication skills because they contain short-sentence answers.*"

Findings related to the theme of science teachers' opinions on the suitability of the 7th-grade science textbook for 21st-century collaboration skills are presented in Table 9.

Table 9

Codes, Frequencies and Percentages for the Theme of Opinions on the Appropriateness of the Textbook for Collaboration Skills

Theme	Codes	f	Percentage
Opinions on the Appropriateness of the Textbook for Collaboration Skills	Activities enable collaboration	13	%43,3
	Insufficient	12	%40
	Develops collaboration skills	11	%36,6
	Not suitable for cooperation	5	%16,6
	No cooperation on everything	4	%13,3
	Group activities are few	4	%13,3
	No collaborative activities	4	%13,3
	Partially appropriate	3	%10
	The load is on the teacher	3	%10
	There are activities with low applicability	3	%10
	Project work is appropriate	3	%10
	Group activities are always the same	1	%3,33
	Book is enough	1	%3,33

When Table 9 is examined, 13 codes were obtained in the theme of teachers' opinions on the suitability of the textbook for collaboration skills. Most of the teachers (43.3%) stated that the activities in the textbook enable collaboration, and 40% stated that the textbook is inadequate in terms of collaboration skills. Very few teachers (3.33%) expressed that the group activities in the textbook were always the same, and that the textbook was enough in terms of collaboration skills. Some teachers' opinions on the suitability of the 7th-grade Science textbook for collaboration skillsare as follows;

T7: "*There are some group activities, all students do various activities in cooperation, but not at a sufficient level.*"

T12: "*The activities in the textbook make possible collaboration. In addition to the activities, there are project-style assignments in the last part of the unit where students can work with groups.*"

T17: "*There is no team work in the textbook. Previous years' textbooks included more group work.*"

T28: "*The textbook is not suitable for collaboration skills. We can only provide collaboration with our own efforts, there is no guiding part of the book. Textbook is insufficient.*"

Conclusion, Discussion, and Implications

The main goal of contemporary education and training is to help learners become problem-solving, knowledge-producing, creative and innovative individuals who communicate and collaborate effectively (Hançer et al., 2003). Therefore, in order to raise individuals who can easily adapt to alteration and contribute to the development of the society in which they live, it is of great importance to gain 21st-century learning and innovation skills in education. Gaining 21st-century skills in secondary schools contributes to students learning these skills in a more permanent way (Louis, 2012). In the secondary school, 21st-century skills are best gained with the Science course, because the Science course allows students to convey the skills they have learned through the activities within the extent of the course and examples from life to their daily lives. P21(2009) emphasized the need for equal access to quality teaching tools and resources in the process of acquiring 21st-century skills. One of the materials at the very center of the teaching process is textbooks (Bouzid, 2016). In order for the science course to be of high quality, the textbooks, which are often used in the learning and teaching process and which can easily accessed by every student and teacher, should be qualified, and individuals should be able to gain the skills they need by adapting to the era. Therefore in the study, the secondary school 7th-grade Science textbook was evaluated with respect to learning and innovation skills that form the basis of 21st-century skills in line with teacher opinions.

First, in the study science teachers' use of textbooks was examined. It was concluded that science teachers use textbooks, but rarely, and that they resort to additional resources and materials due to inadequacies in the textbook. In addition, teachers generally use the textbook to follow the curriculum, solve unit assessment questions and assign homework. In Uzuntiryaki and Boz's (2006) study, it was emphasized that most of the prospective teachers did not use the textbooks in their practice lessons because they did not find them sufficient, and that they generally used the textbooks to obtain information about the curriculum and to prepare lesson plans. This opinion of the prospective teachers align with the views of the participating teachers in this study. Tor and Erden (2004) found in their study that students primarily used the textbook when doing homework. This aligns with the study’s finding that teachers use the textbook for homework assignments. In the literature, there are some studies that are consistent with the research results concerning teachers' tendency to use additional resources and materials due toshortcomings of the textbook (Ayvacı & Er-Nas, 2009; Çolak, 2018; Özdemir, 2020; Yıldırım, 2010). At the same time, some studies contradict the findings of this research, indicating instances where teachers perceive science textbooks as adequate

(Bakar et al., 2009; Güneş et al., 2008; McDonald, 2015; Nwafor & Umoke, 2016). It is possible to say that the difference of opinion between the results of the research is due to the fact that textbooks in different grade levels and countries meet the needs of both teachers and students at a better level and have a higher quality. Based on the different findings to the textbook in the literature, it is feasible to say that teachers' use of textbooks and their orientation to other materials and resources are directly proportional to the quality of the textbook. As the quality of the textbook increases, the frequency of teachers' use of textbooks increases.

In the study, in line with science teachers' opinions, it was concluded that the 7th-grade science textbook doesn't develop 21st-century creativity skills and that the textbook is inadequate in terms of developing creativity skills. Supporting the results of the research, Dündar (2019) concluded that there were no achievements related to creativity skills in his study in which he investigated achievements of the 2013 Science curriculum. In cases where the objectives in the curriculum do not support creativity skills, textbooks cannot be expected to support creativity skills because textbooks reflect the curriculum.In addition, studies that are in parallel with the results of the research emphasizing that the unit evaluation questions (Dündar, 2019) and activities (Arslan, 2019) in Science textbooks of different grade levels are insufficient in terms of creativity skills were found. Teachers participating in the research stated that the shortcomings of the textbook in terms of creativity skills are that the questions in the book only measure knowledge, the applicability of the activities is low, and the activities and questions are insufficient. If the questions in the textbook only measure knowledge, students' creativity skills cannot be expected to develop. Because creativity skills can be acquired by individuals in learning environments that allow questioning (Trilling and Fadel, 2009). At the same time, the lack of materials and applications in the activities in the textbooks prevents the development of creativity skills. Teachers participating in Kaçar's (2020) study support this idea by stating that lack of time and materials prevent the application of learning and innovation skills to the teaching process. Therefore, results of similar studies and results obtained in the research, it is possible to say that creativity skills cannot be gained effectively within the scope of Science course, creativity skills should be emphasized in the curriculum in order for the textbook to be suitable for creativity skills, and the activities and questions in the textbook should support creativity skills.

In the study, in line with the opinions of science teachers, it was concluded that the 7th-grade science textbook is not fully suitable for innovation skills, the textbook contains up-to-date elements, but the book is incomplete and the distribution of up-to-date information is unbalanced.In the study of Kara-Kılıç (2019), which reached similar results with the research results, most of teachers stated that the fifth grade Science textbook developed students' innovative thinking skills but was not sufficient. In Yıldırım's (2010) study, some teachers stated that Science and Technology textbooks should contain current examples and should be constantly updated. In line with these suggestions, it is possible to say that teachers found the book lacking in terms of currency. The majority of the science teachers in the sample of the study explained the innovation skills only with the concept of timeliness. Teachers did not express any opinion that innovation skills are related to creativity skills; therefore, it is possible to say that teachers do not have a full command of innovation skills and that they lack knowledge about innovation skills. Based on the results of similar studies in the literature and the results acquired in this research, it is possible to say that science textbooks are not updated continuously and do not support innovation skills sufficiently.

In the study, in line with science teachers' opinions, it was concluded that the 7th-grade science textbook doesn't develop critical thinking skills, is insufficient in terms of critical thinking skills and questions and activities in the book aren't suitable for critical thinking skills. In support of the results obtained in the study, studies emphasizing that Science textbooks of different grade levels are not at an adequate level in terms of critical thinking have been found (Aybek et al., 2014; Güneş et al., 2008). In addition, similar to the research results of the study, there are also studies emphasizing that there are no questions for critical thinking in science textbooks (AlJaafil & Şahin, 2019; B. Akçay, H. Akçay & Kahramanoğlu, 2017; Dündar, 2019; Kaya, 2016; Pektaş et al., 2015) and that the activities do not provide high-level thinking skills (Güneş et al., 2018). However, some of the teachers participating in the study stated that the activities, questions and preparatory questions were appropriate for critical thinking skills. It is possible to say that the differences in opinions among the teachers stem from the fact that critical thinking skills are not addressed in every subject and that the textbook is inadequate. Based on the results of similar studies in the literature and the results obtained within extent of the research, it is possible to say that science textbooks do not develop critical thinking skills, critical thinking skills can be supported with activities and questions, but questions and activities in the textbooks are not enough.

In the study, in line with science teachers' opinions, it was concluded that the 7th-grade science textbook is not fully suitable for problem-solving skills and that this skill is not emphasized in every subject, so the textbook is insufficient.Similar to the results obtained in the research, there are studies that state that science textbooks at different grade levels are insufficient in terms of developing problem-solving skills (Kaya, 2016) and that activities in science textbooks are not geared towards developing problem-solving skills (Güneş et al., 2018). In his study, Irmak (2017) suggested that 7th-grade science textbooks should include questions and projects that will enable students to recognize environmental problems and produce solutions. These suggestions support the findings of the study and show that there are deficiencies in terms of problem-solving skills in the textbook. However, unlike the results acquired in the research, Kartikasari et al., (2018) in their studies, they stated that the renewed Science textbook enabled students to examine the problems that exist in daily life. It is feasible to say that the inconsistency between the results is because it is Science textbooks in Turkey have not been renewed sufficiently and problem-solving skills cannot be integrated into every subject in the textbooks.

In the study, in line with science teachers' opinions, it was concluded that the 7th-grade science textbook is not fully suitable for communication skills, there are inadequacies and the burden is on the teacher to gain communication skills. In parallel with the results of the research, there are studies indicating that communication skills is given less in Science textbooks at different grade levels (Dökme, 2005) and that there are fewer activities in the textbooks where students can discuss the results obtained in the learning-teaching process (Yıldız & Tatar, 2012). The insufficient number of discussion activities shows that the textbook's rate of supporting communication skills is low.Contrary to the findings obtained in this study, there are studies emphasizing that science textbooks at different grade levels support communication skills (Arslan, 2019; Kalemkuş, 2021). In addition, some of the teachers participating in the study stated that the textbook is suitable for communication skills and that there are activities and questions that enable communication skills. There is a difference of opinion among teachers about the suitability of the textbook for communication skills, and it is possible to say that this difference of opinion is due to some deficiencies in the textbook. According to the results of the studies in the literature and the results of this study, science

textbooks have deficiencies in terms of communication skills is that there are no activities to develop communication skills in every subject. Science textbooks should support communication skills. Because when the textbook does not provide the necessary guidance for learners to communicate, the burden will be on the teacher and the efficiency of teachers in the process will decrease.

In the study, in line with science teachers' opinions, it was concluded that the 7th-grade science textbook is suitable for collaboration skills, but there are insufficiency in some points and collaboration skills is not supported in every subject. Supporting the results of the research, there are studies emphasize that Science curriculum and textbook at different grade levels support collaboration skill (Arslan, 2019), that the activities in the textbook support social environments such as group work (Küçüközer et al., 2008), and that the Science textbook pays attention to the collaborative learning approach (Nacaroğlu & Bektaş, 2018). However, the teachers participating in the study differed in their opinions on the suitability of the textbook for collaboration skills. While some of the teachers stated that the activities supported collaboration but were not sufficient, some teachers emphasized that there were no activities for collaboration and that the textbook was not suitable for collaboration skills. It is possible to say that this difference of opinion among the teachers constituting the sample of the study stems from the deficiencies in the textbook and the fact that cooperation skills are not addressed in every subject.Supporting this idea, Yıldız and Tatar (2012) stated in their study that 6th, 7th and 8th-grade Science and Technology textbooks are limited in terms of creating learning environments based on group work.When the results acquired in the research and the results of similar studies are investigated, it is possible to say that Science textbooks are suitable for collaboration skills, collaboration skills is supported with activities and projects, but there are deficiencies in some subjects.

In summary, the teachers who joined in the study stated negative opinions mostly in terms of creativity (66.6%) and critical thinking (53.3%) skills. In terms of problem-solving, innovation and communication skills, most of the teachers expressed negative opinions while some of them expressed positive opinions.Teachers found the textbook most suitable for collaboration skills. When the study results are analyzed, it is possible to say that the 7th-grade Science textbook shows an irregular distribution with respect to 21st-century learning and innovation skills, skills are not addressed in every subject in the textbook and there are deficiencies in the textbook. Supporting the results obtained in the literature, Kalemkuş (2021) stated in his study that the achievements in the third and fourth grade Science curriculum are not distributed evenly to 21st-century skill groups and that this unbalanced distribution may also be in the textbooks. In addition, the dispersion of 21st-century skills in textbooks belonging to different courses is uneven (Ahmed & Taha, 2021; Akçay, 2019; Bal, 2018; Barası, 2020; Kayhan et al., 2019) and that the textbook is not enough in terms of supporting skill development (Barası, 2020; Özkan-Elgün, 2021) studies have been found in parallel with the research results.

The recommendations determined in parallel with the results obtained in the research are as follows: The seventh grade Science textbook and curriculum shouldmade suitable for the acquisition of learning and innovation skillsand these skills should be included in every topic.Events in the 7th-grade Science textbook should improve students' learning and innovation skills, and should be done with easily accessible tools. The questions in the 7th-grade Science textbook should measure students' learning and innovation skills such as critical thinking and problem-solving skills. In addition, new generation questions, peer and self-

assessment activities should also be included.Technological integration should be made in the textbook, QR codes should be added to experiments and questions, and support should be provided with videos. Necessary revisions should be made in the seventh grade Science textbook, taking into account the views of the teachers who joining in the research. In the study, the 7th-grade Science textbook was evaluated with respect to learning and innovation skills. Similar studies can be done in textbooks belonging to different grade levels or different courses. The research was limited to Gaziantep province and 30 science teachers; similar studies can be conducted in different cities with larger sample groups.

Contribution Rate of the Researchers

This study is a master's thesis completed by the corresponding author under the surveillance of the second author. Both authors contributed equally to the research.

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Statement of Conflict of Interest

There are no existing conflicts of interest between the authors.

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