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Investigation of Secondary School Students' Scientific Research Levels with Social Studies Course Content

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Abstract

Scientific research is an activity in which scientific procedures are used to test and evaluate theories in a systematic manner for specified aims. In this regard, it is critical to ascertain secondary school students' thoughts, attitudes, and scientific research levels regarding scientific research activities. The goal of this study is to determine the scientific research levels of secondary school pupils. Structured interview technique was used in this research, which was conducted with qualitative research method. The study group for this phenomenology-based research consisted of two secondary schools in Diyarbakr during the 2021-2022 academic year. The study group determined by the convenient sampling method is 65 people. In this study, the scientific research level determination form developed by the researchers was used as a data collection tool. The descriptive content analysis was used to examine the data in the research form. According to the study's findings, 5-7th grade students' scientific research levels were pretty near and high. The class with the highest level of scientific research is the seventh grade, while the lowest is the fifth grade. It is advised that secondary school students develop their skills in generating a references, drafting a research report, displaying in-text references, establishing the importance of the research, and testing research hypotheses.

Keywords: Social studies, Scientific research level, Secondary school, Student.

Introduction

Research may be defined as an activity in which scientific procedures are not frequently used and is carried out for a variety of reasons such as gathering information, learning, or investigating any subject. Doing research entails developing a solution to an issue and thinking about a subject in order to comprehend it. In other terms, research is the endeavour made by the researcher to gather knowledge when he/she feels the need for information on a subject (Usta, 2011). According to the Turkish Language Association's Contemporary Turkish Dictionary (TDK, 2023), research is "methodical study and research on science and art." In this sense, research is a tool or approach that individuals often utilise to get knowledge and comprehend the truth (Çalışkan, 2008).

Scientific research would be more accurately defined as a field of competence in which scientific procedures are applied systematically and ideas are tested and assessed for specific reasons. Although the term research is most commonly associated with scientific study, the idea of scientific research has been articulated in a variety of ways across the literature (Beisenbayeva, 2017). Scientific research, for example, is defined by Bahadır and Tuncer (2017) and Özdamar (2003) as the intentional application of scientific procedures to a subject; Sever, Öncül, and Ersoy (2019) defined it as a talent that evolves methodically and necessitates experience. Similarly, the term science is viewed differently and extensively in our day and age (Lamanauskas & Augiene, 2011). In this context, it is generally accepted that scientific research is conducted not only in the disciplines of science, medicine, and mathematics, but also in a wide range of social sciences.

Scientific research is as significant in the Social Studies Curriculum (SSC) as it is in the science and mathematics curriculums. In reality, scientific research activities were included into the learning domains, course material, and acquisitions of SSC. Children are offered numerous scientific research challenges and their inquisitive, scientific, and exploratory qualities are developed in this manner. In this regard, there are various research processes that youngsters must take when conducting research in social studies classes. It is essential to follow the scientific research processes and respond accordingly (Sakallı, 2022). It's been interesting to see how far secondary school pupils can take scientific research stages (Erdal, 2020). As a result, using inquiry-based education in social studies courses not only allows students to face challenges, but also gives them the opportunity to address these problems. Students must make an effort not just to study existing material, but also to search for and find it (Taş, 2014). Indeed, when experiencing science or devising a solution to a problem, children observe and make predictions, engage in collaborative dialogues with their instructors and classmates, and think flexibly while planning and doing research to answer their concerns (Bustamante et al., 2018). In this regard, students should be provided opportunities to learn through participating in scientific research (Edelson et al., 1999). Based on these explanations, it is vital to correctly express and educate students what scientific research is before teaching how to perform scientific research in the social studies course.

Scientific research is defined as "the examination, collection, evaluation, interpretation, and reaching of all kinds of information for the solution of problems determined by curiosity, research, and learning desire" (Dilbaz et al., 2012). In this regard, scientific research may be defined as a research activity in which particular hypotheses are investigated and assessed using certain criteria. It can be claimed that scientific research and research abilities are valued in SSC; the value of being scientific is represented in the textbooks When SSC was examined, it was seen that

steps, subjects and achievements related to scientific research were included in the 4th-7th grades. "Research, communication, and observation" have been identified as SSC's fundamental competencies. There are also suggestions for acquiring "research" skills under the unit headings of SSC (Ministry of National Education (MNE) SSC, 2018). As a matter of fact, the skills of "observation, drawing and interpreting tables, graphs and diagrams, and communication" included in the 2018 SSC are among the scientific process skills (Yeany et al., 1986; Germann et al., 1996). According to Turan (2019), scientific research activities that examine research steps and principles are used in some learning areas of SSC. In this respect, it can be said that it is very important for secondary school students to use scientific research steps with social studies course content in terms of scientific process skills and practices. Scientific process capabilities and scientific applications are significant instruments for creating and organising knowledge about our surroundings (Ongowo, 2017). According to Barr (1997), in an effective social studies instruction, pupils should not only be engaged in learning facts, but should also gather and digest factual knowledge as necessary. The crucial component here is to select and perform scientific research that is appropriate for the children's age, development, grade level, and readiness level, and that will catch the students' interest and engage their sense of curiosity. Teachers, as curriculum implementers, have key responsibilities in developing children's scientific research abilities and levels.

One of the most essential tasks of teachers should be to teach pupils about the nature of scientific research, regardless of the sort of study. As a result, rather than only the sort of study, the student's features and levels should be taken into account. Forcing a low-level student to conduct high-level study may lead to the student developing unfavourable attitudes towards scientific inquiry. As a result, when students are required to do scientific study, research themes appropriate for their level should be identified (Erdoğan, 2018). It is required to conduct some studies and activities for the development of scientific research abilities in children from an early age in order to achieve this. All children should be given the opportunity to participate in and benefit from a variety of experiences, as differences in children's development and learning process are significant in the early years (Miller at al., 2006).

Although people who conduct scientific research should be knowledgeable and have some superior qualifications (Kurnaz et al., 2021), children are not an empty vessel; they want to create their own thoughts and ideas; our responsibility is to develop children's existing skills and understandings, as well as their attitudes and skills, and to offer new opportunities that are interesting to them (Duffy, 2006). Because children are naturally creative and interested, practises and activities that foster children's scientific creativity should be incorporated into the educational process beginning with pre-school education (Siew et al., 2017). In this way, teachers should provide students with an environment that will reveal and develop their scientific creativity (Aruan et al., 2016; Hadzigeorgiou et al., 2012). In this respect, one of the most important aims of education should be to raise scientifically literate individuals from the lowest level of primary education, and to make all individuals of the society reach a level that can adapt to scientific and technological developments (Tunç-Şahin & Say, 2010). Therefore, within the scope of 21st century skills, the important element for students is not knowledge, but the fact that students are active while using this information and can find solutions to real-life problems (Çiftçi at al., 2021). Students' scientific research develops many high-level thinking skills such as inquiry, research, critical thinking, problem solving and decision making (Erdal, 2020). In this regard, it is critical to provide students with problems based on scientific research steps in social studies lessons, as well as to carry out some practises and activities that will improve their scientific research level and skills, beginning at a young age.

The primary objective of this research is to determine the scientific research levels of secondary school students by using the social studies course content and scientific research steps developed by researchers in accordance with the literature. Researchers initially evaluated several scientific research techniques publications in the literature while producing the scientific research level determination form (Balcı, 2009; Büyüköztürk et al., 2011; Creswell, 2003; Çepni, 2007; Ekiz, 2003; Karasar, 2017). Using these sources, the researchers determined the information about what should be considered in scientific research. Later, the researchers examined the learning area, achievement and course content related to scientific research in SSC (2018) and 5th-7th grade social studies textbooksThe study's goal is to determine the students' scientific research levels using scientific research stages coupled with social studies course material. Secondary school students' talents such as questioning, research, critical thinking, problem solving, and decision making may be measured by determining their scientific research levels. As a result, this research is critical in identifying pupils' higher-order thinking skills. Because someone who will conduct scientific research must be able to think critically, scientifically, and creatively, make logical inferences, and solve problems (Balcı, 2009; Çepni, 2007; Karasar, 2017; Büyüköztürk et al., 2011).

In order to develop students' perceptions of science, their ideas about scientific research activities should be learned and their application skills should be developed (Lederman & Lederman, 2005). Scientific and Technological Research Council of Turkey (TÜBİTAK) organizes scientific research projects competitions in our country every year in order to realize the scientific research skills of secondary and high school students. Thanks to these competitions, students have the opportunity to develop their scientific research skills. Therefore, applications and activities that encourage children's scientific creativity should be included starting from pre-school education (Siew et al., 2017). As a matter of fact, scientific applications are important tools to produce and organize information about the world around us (Ongowo, 2017). Studies covering this research in the literature (Elbay, 2020) are quite limited. Therefore, this research can make important contributions to the field of social studies education. Based on the results of this study, by determining the scientific research level of the social studies course content of the secondary school students, some arrangements, changes and updates regarding the scientific research steps can be made, and it can be ensured that the students conduct more qualified scientific research. In this respect, it is possible to say that this study is a very original research in the field of social studies education. In this direction, answers to the following research questions were sought within the scope of this research.

- What is the scientific research level of 5th, 6th and 7th grade secondary school students in line with scientific research steps?
- What is the comparative level of scientific research of 5th, 6th and 7th grade secondary school students in line with scientific research steps?

Methodology

Research Design

This study was carried out with the qualitative research method. In studies conducted with qualitative research methods, there is an effort to reach an in-depth understanding of the subject examined (Karataş, 2015). Therefore, this study was carried out as a qualitative research. In this study, a structured interview was conducted with the participants. In this respect, this research is in the pattern of phenomenology. Interview is the activity of expressing the feelings and thoughts of

the participants on a certain subject (Yıldırım & Şimşek, 2008). In order to determine the scientific research levels of the participants in detail, the structured interview technique was applied in this study. The structured interview was conducted by one of the researchers in the classroom environment of the participants during one class hour (40 minutes). With the interview technique, it is aimed to reach various unobservable data such as the attitudes, experiences, intentions, thoughts, comments, mental perceptions and reactions of the individual regarding the researched subject (Sönmez & G. Alacapınar, 2020).

This research was carried out in the second semester of the 2021-2022 academic year. It was done right after the "science, technology and society" unit was taught in 5th grade social studies lesson. Although, in SSC, only the 6th grade “SB.6.4.3. It conducts research using scientific research steps.” When the 5th grade social studies textbooks are examined, the subject "scientific research steps" is directly addressed in this unit. Although it was not a direct subject of scientific research steps in the seventh grades, various subjects such as "scientific knowledge, the adventure of knowledge, scientists, scientific developments" were covered in the field of science, technology and society learning in the 7th grade. Additionally, the subject of scientific research steps was discussed in the 5th and 6th grades of the seventh graders. Therefore, since 7th grade students have some knoledge about scientific research steps, they were also included in this study. However, since there is no social studies course in 8th grade, students at this grade were excluded in the research. After science, technology and society units were taught, one of the researchers reminded students the scientific research steps in their classrooms in a class hour and completed the interview by giving information to the students about how to fill in the scientific research level determination form developed by the researchers.

Participating Groups

Participating group in this study was determined as two secondary schools, in the official education institution (Secondary School) where one of the researchers worked in the 2021-2022 academic year, and in another secondary school in the same province. The research group consisted of 320 students studying in these secondary schools. They were informed about this research, but 120 students accepted this research on a voluntary basis. However, since only 65 parents signed the consent form, this study was conducted on 65 students. The study group of this research was determined by convenient sampling method. Some of the participants (30 people) were in an official secondary school where one of the researchers worked, and the other part of the participants (35 people) was held in a public secondary school in the same district where the same researcher worked. The gender, grade levels and total number of the participants in this study are shown in Table 1.

Table 1

Distribution of participants by grade and gender

Class level	Gender		Total
	Female	Male	
5th grade	12	11	23
6th grade	12	10	22
7th grade	10	10	20
Total	34	31	65

As seen in Table 1, the participating group of the research consists of 5th-7th grade secondary school students, 35 of whom are female and 30 are male. 23 of the participants are 5th grade, 22 6th grade and 20 7th grade secondary school students. Participants in this study were coded as K1, K2, K3,....., K63, K64, K65.

Data Collection Tool

As a data collection tool in this research, the scientific research level determination form developed by the researchers in line with the literature (Balcı, 2009; Büyüköztürk et al., 2011; Creswell, 2003; Çepni, 2007; Ekiz, 2003; Karasar, 2017; SSC, 2018) and expert opinions. used. In this passpectve, in order to determine the scientific research levels of the students, the researchers first conducted a literature review in some databases (ERIC, Google academic, Researchgate, Turcademy, Web of Science, YÖK thesis). In the literature review; Publications on the concepts of "social studies, scientific research, scientific research level, scientific research steps, secondary school" were examined. Then, the researchers examined the 2018 SSC and social studies textbooks. The researchers decided that the "Science, Technology and Society" learning area in the 2018 SSC was suitable for this research. Because in this learning area, subjects such as "scientific research steps, scientific knowledge, scientists and scientific thought" are given more place. Then researchers examined the subjects related to scientific research in the "Science, Technology and Society" unit in the 5-7th grade social studies textbooks and determined the scientific research steps that were thought to be appropriate for the students and these steps were transformed into an application form. This form consists of three parts (directive, characteristics of participants, scientific research steps). In this direction, this form developed by the researchers was sent to two associate professors who are experts in social studies education for their evaluation. The scientific research level determination form developed by the researchers was arranged in line with the opinions and suggestions of the field experts and the form was finalized. Necessary information about the form developed to determine the scientific research levels of secondary school students is shown in Table 2.

Table 2

Scientific research level determination form

Scientific Research Level Determination Form
Dear student, the purpose of this research is to determine the scientific research level of secondary school students in social studies course. In this respect, we would like you to do a short research using the following research steps that you learned in the social studies class. The time to fill out this form in accordance with the beginning of the research is 30 days. Information on scientific research steps is given below. We wish you success.
Class : ( ) 5th grade ( ) 6th grade ( ) 7th grade Gender : ( )Female ( )Male
Scientific Research Steps
1. Research Question-Problem: (As in the example, write any research question linked to your scientific research. For instance, how does the weather affect economic activity?
2. Hypothesis: (Create at least one hypothesis that is connected to your study issue. It is possible to write more than one hypothesis-hypothesis. For example, climate has a good impact on people's economic activity.)
3. Research Purpose: (In this part, write the goals of your research. You may have many research objectives. For instance, the goal of this study is to assess the impacts of climate on economic activity.)

4. Importance of Research: (In this part, explain why your research is important. For example, climate is one of the most important elements influencing agriculture, animal husbandry, and other industries. The sort of economic activity that may be carried out is influenced by the weather. This research is significant in terms of determining the impacts of climate on economic activity.)

5. Hypothesis Test: (In this part, please state if your research hypotheses are valid. For example, climate has a good or negative impact on people's economic activity.)

6. Research Report: (In this part, write a research report based on articles, encyclopaedias, books, journals, dissertations, or the internet that are relevant to your research topic and assumptions-hypotheses. Write the research findings you discover, together with in-text citations.)

7. References: (In this section, write your sources as you see in the course where or from whom you got the information you wrote in your research report).

One of the researchers explained this form, which was developed by the researchers in line with the literature and expert opinions, to the participants in a class hour. Answers were given to the questions of the students about this form and what to do during the application process was explained. The participants were advised that only they should fill out this form at the stage of filling out the scientific research level determination form. In this process, it was reminded that researchers can ask questions by reaching their e-mail addresses or phones when they encounter any problems. All students who accepted the application process were given an informed consent form to be signed by their parents. This research was conducted with 65 students who filled out the voluntary consent form. In addition, it was stated that the necessary information can be given to the participants who want additional explanations or have questions about this form, via e-mail or telephone. Students are given a maximum of 30 days to fill out this form in accordance with the scientific research steps. 65 participants who filled out the form sent this form to the researchers' e-mail address or phone within 30 days.

Validity and Reliability

In order to ensure that the information used in the scientific research level determination form applied to the participants in this study is reliable and valid, the researchers first collect the literature on SSC (Balcı, 2009; Büyüköztürk et al., 2011; Creswell, 2003; Çepni, 2007; Ekiz, 2003; Karasar, 2017; MNE, 2018). In the literature review; Publications on the concepts of "social studies, scientific research, scientific research level, scientific research steps, secondary school" were examined. Researchers then examined the content of scientific research steps included in social studies textbooks. Then, the researchers developed the scientific research level determination form in line with the relevant literature. In order for the scientific research level determination form developed by the researchers to be valid, the opinions of two field experts who are associate professors in the field of social studies education were consulted. After the opinions and suggestions of the field experts, the necessary arrangements were made and the scientific research level determination form was completed. Therefore, the researchers prepared a three-point Likert-type scale with the content validity of the form provided by the experts as “appropriate, partially appropriate and not appropriate”. In this respect, in order to provide evidence for the validity and reliability of this form, a literature review was conducted by taking expert opinion. Then, the scientific research level determination form developed by the researchers in line with expert opinions was used. With the decision dated 08.04.2022 and numbered 101, the researchers got the necessary ethics committee permission from the Social and Human Sciences Ethics Committee of

Dicle University and entered the implementation phase. In this direction, only those whose parents filled in the informed consent form on a voluntary basis were included in the study.

Data Analysis

Two forms of analysis are performed on qualitative research data (content and descriptive) (Yıldırım & Şimşek, 2008). The data in the scientific research level determination form generated by the researchers and filled out by the participants were analysed using descriptive content analysis within the scope of this study. The researchers analysed the forms filled out by the participants separately and classified the amount of conformity of the studies with the scientific research stages as "appropriate, partially appropriate, and not appropriate" using a triple Likert type scale. The researchers operated in line with the findings of the analyses of the suitability of the scientific research steps completed by the participants. The researchers finished their examination by reaching an agreement on the issues where they differed. Furthermore, verbatim quotations were used to include material written by participants in the scientific study processes. Descriptive content analysis is the in-depth assessment and arranging of research conducted independently of one another in a certain field or subject (Ültay et al., 2021). In this regard, the research data were analysed using descriptive content analysis in order to make this research data more intelligible and to gain access to more in-depth information in this study.

Findings

Findings related to scientific research levels of 5th grade students

23 people from 5th grade students participated in this research. In this context, information on the suitability of the research conducted by the students with the scientific research steps is given in Table 3.

Table 3

Level of application of scientific research steps of 5th grade students

Scientific Research Steps	Suitable Frequency	Partially Suitable Frequency	Not Suitable Frequency	Total Frequency
Determining the research question-problem	23	-	-	23
Determination of Assumptions-Hypotheses	18	2	3	23
Determining the purpose of the research	17	4	2	23
Determining the importance of the research	11	4	8	23
Testing Assumptions-Hypotheses	18	3	2	23
Writing the research report	20	1	2	23
Giving the references	23	-	-	23

According to Table 3, all of the participants (23 persons) wrote the research question-problem correctly. It was decided that 18 of the 23 individuals were appropriate to determine the study assumptions, two people were somewhat appropriate, and three participants were not. It was concluded that 17 of the 23 participants were appropriate for identifying the goal of the research, four were somewhat eligible, and two were not. It was concluded that 11 out of 23 individuals were appropriate to assess the significance of the research, four persons were marginally acceptable, and

eight participants were not. It was determined that testing the assumptions of 18 out of 23 participants was appropriate, three participants were partially suitable, and two participants were not. Twenty-three out of 23 participants wrote their research reports appropriately. It was determined that one participant's research report was partially appropriate and two participants were not. However, when the research reports prepared by the participants were examined in detail, it was determined that all of the participants wrote the information they received from the general network as well as in the research reports. All of the participants included references in their research. However, when the bibliographies of the participants were examined, it was determined that they included a limited number of sources (1-4 sources). One of the participants included one source in their research, four of them, three of two, two of five and 15 of them. Almost all of the resources given (22 out of 23) are from public network addresses. The way the references are presented is generally appropriate (22 out of 23).

In the scientific research level determination form of some of fifth grade students; The information they express about the research question, the assumptions-hypotheses of the research, its purpose, importance and the testing of the assumptions-hypotheses are given below with direct quotations.

Regarding research question-problem: K1: "What are the effects of sun rays on our skin and body.", K10: "What are the effects of global warming on people?" formulated research questions. Regarding the determination of the assumptions-hypotheses of the research: K1: "Sun rays cause diseases on human skin.", K10: "Global warming adversely affects the life of living things." determined the research hypotheses. Regarding the purpose of the research: K1: “The purpose of this research is to determine the benefits and harms of sun rays on our body.” K10: “The purpose of this research is to determine the effects of global warming on people.” determined the aims of his research. Regarding the importance of the research: K1: “The sun is a source of life for all living things. Therefore, this research is very important in terms of determining the effects of sun rays on our body.”, K10: “Global warming is threatening our world day by day. That's why this research is so important in determining the effects of global warming on humans." identified the importance of his research. Regarding the testing of the assumptions-hypotheses of the research: K1: “Staying in the sun for a long time causes skin diseases. Therefore, sun rays cause diseases on human skin.”, K10: “Global warming causes the death of living things in the poles by melting the glaciers. Therefore, global warming negatively affects the life of living things.” They tested the hypotheses of the research.

Findings related to scientific research levels of 6th grade students

This study included 22 sixth-grade pupils. Table 4 provides information on the appropriateness of the students' research with scientific research stages in this regard.

Table 4

Level of application of 6th grade students in scientific research steps

Scientific Research Steps	Suitable Frequency	Partially Suitable Frequency	Not Suitable Frequency	Total Frequency
Determining the research question-problem	22	-	-	22
Determination of Assumptions-Hypotheses	19	2	1	22
Determining the purpose of the research	16	3	3	22
Determining the importance of the research	8	10	4	22
Testing Assumptions-Hypotheses	18	2	2	22
Writing the research report	20	2	-	22
Giving the references	22	-	-	22

According to the data in Table 4, all of the participants (22 persons) wrote the research question-problem correctly. It was established that 19 of the 22 individuals were appropriate for determining the study assumptions, two were somewhat suitable, and one person was not. It was concluded that 16 of the 22 participants were appropriate for identifying the goal of the research, three people were somewhat eligible, and three persons were not. It was concluded that 8 out of 22 individuals were appropriate to assess the significance of the research, 10 people were moderately acceptable, and four participants were not. It was decided that assessing the assumptions of 18 of the 22 participants was appropriate, two were somewhat appropriate, and two were not. Twenty-two of the 22 participants completed their study papers correctly, with two writing them somewhat correctly. When the students' research reports were investigated in depth, it was discovered that virtually all of the students wrote the information they acquired from the general network as well as in their reports. In their study, all of the participants provided a references. However, when the participants' bibliographies were analysed, it was discovered that they only listed a small number of sources (1-4). Two of the participants included four sources, two of them two, one of nine, and three of nine participants in their research. All of the resources given (22) are taken from public network addresses. The way the references are presented is generally appropriate.

In the scientific research level determination form of some of the sixth grade students; The information they express about the research question, the assumptions-hypotheses of the research, its purpose, importance and the testing of the assumptions-hypotheses are given below with direct quotations.

Regarding the research question-problem: K24: "What are the effects of the earthquake on people?", K30: "What are the effects of mathematics on people?" formulated research questions. Regarding the determination of the assumptions-hypotheses of the research: K24: "Earthquakes affect people's lives negatively.", K30: "If we had less knowledge about mathematics, people's lives would be negatively affected." determined the research hypotheses. Regarding the purpose of the research: K24: "The purpose of this research is to determine the effects of the earthquake on people.", K30: "The purpose of this research is to determine the effects of mathematics on people." determined the aims of his research. Regarding the significance of the research, K24 states, "This research is important in terms of determining the effects of earthquake, which is a widespread natural disaster that has devastating effects on people throughout the world and in our country." K30

states, "Mathematics is a science that is present in almost every aspect of our lives." This research is significant in terms of determining the impact of mathematics on humans." underlined the value of their research In terms of testing the study assumptions-hypotheses: "Earthquakes have a very negative impact on people's lives because they are devastating," says K24., K30: "Mathematics facilitates many aspects of our daily lives." For example, if we didn't have mathematics, we would have a lot of trouble purchasing goods. That is why mathematics plays such a significant role in people's lives."

Findings related to scientific research levels of 7th grade students

This study included 20 pupils from 7th grade. Table 5 provides information on the appropriateness of the participants' research with the scientific research stages in this context.

Table 5

Level of application of scientific research steps of 7th grade students

Scientific Research Steps	Suitable	Partially Suitable	Not suitable	Total
	Frequency	Frequency	Frequency	Frequency
Determining the research question-problem	18	-	2	20
Determination of Assumptions-Hypotheses	18	-	2	20
Determining the purpose of the research	18	-	2	20
Determining the importance of the research	15	3	2	20
Testing Assumptions-Hypotheses	14	3	3	20
Writing the research report	13	5	2	20
Giving the references	18	-	2	20

According to the data in Table 5, 18 out of 20 participants wrote the research question-problem appropriately, but two out of 20 did not write it appropriately. It was determined that 18 out of 20 participants were appropriate to determine the assumptions of the research, and 2 out of 20 were not. It was determined that 18 out of 20 participants were appropriate to determine the purpose of the research, and 2 out of 20 were not. It was determined that 15 out of 20 participants were appropriate to determine the importance of the research, 3 out of 20 were partially appropriate, and 2 out of 20 were not. It was determined that testing the assumptions of 14 out of 20 participants was appropriate, 3 out of 20 were partially appropriate and 3 out of 20 were not. It has been determined that 13 out of 20 participants are suitable for research reports, 5 out of 20 are partially appropriate and 2 out of 20 are not. However, when the research reports prepared by the students were examined in detail, it was determined that almost all of the students wrote the information they received from the general network as well as in the research reports. While 18 out of 20 participants included references in their research, 2 out of 20 did not. However, when the bibliographies of the participants were examined, it was determined that they included a limited number of sources (1-4 sources). Two of the participants included five, eight people one, three people two and five people included three sources in their research, while two of them did not include any sources. All of the resources given (20) are taken from public network addresses. The way bibliographies are presented is generally appropriate.

In the scientific research level determination form of some of the seventh grade students; The information they express about the research question, the assumptions-hypotheses of the research, its purpose, importance and the testing of the assumptions-hypotheses are given below with direct quotations.

Regarding the research question-problem: K50: "What are the effects of landforms on people?", K60: "What are the effects of the Covid-19 pandemic on people's social lives? formulated research questions. Regarding the determination of the assumptions-hypotheses of the research: K50: "Earth forms affect the economic activities of people. Landforms affect people's psychology, transportation and nutrition.", K60: "The Covid-19 pandemic has negative effects on people's social lives." expressed the research hypotheses. Regarding the purpose of the research: K50: "The purpose of this research is to determine the various effects of landforms on people. The purpose of this research is to determine the effects of landforms on economic activities, human psychology, transportation and people's nutrition.", K60: "My main purpose in conducting this research is to determine the effects of the Covid-19 pandemic on people's social lives." determined the aims of his research. Regarding the importance of the research: K50: "Earth forms are a natural factor that affects climate, vegetation and living things in various ways. In this respect, it can be said that this research is important in terms of determining the various effects of landforms on people's lives.", K60: "The Covid-19 pandemic is a very important epidemic disease that affects the whole world. Unfortunately, millions of people and living things have been adversely affected by this epidemic. In this respect, I can say that this research is important in terms of determining the effects of the Covid-19 pandemic on people." expressed the importance of their research. Regarding the test of the assumptions-hypotheses of the research: K50: "The landforms have various effects on people's economic activities, psychology, transportation activities and eating habits.", K60: "As millions of people cannot leave their homes due to the Covid-19 pandemic, this situation negatively affects people's social life. affected." He wrote statements to test his research hypotheses.

Findings on the scientific research levels of fifth, sixth, and seventh grade students

In Table 6, findings related to the level of application of scientific research steps by 5th-7th grade students are given.

Table 6

Comparative level of application of scientific research steps by secondary school students from 5th to 7th grades

Scientific Research Steps	5th grade Suitability	6th grade Suitability	7th grade Suitability	Average Suitability
Determining the research question-problem	%100	%100	%90	%97
Determination of Assumptions-Hypotheses	%78	%86	%90	%85
Determining the purpose of the research	%74	%73	%90	%79
Determining the importance of the research	%48	%36	%75	%53
Testing Assumptions-Hypotheses	%78	%82	%70	%77
Writing the research report	%87	%91	%65	%81
Giving the references	%100	%100	%90	%97
General Overage	%80.71	%81.14	%81.42	%81.09

According to the data in Table 6,It was determined that the level of scientific research of primary school students was at a high level of about 81.09% (overall average). It has also been determined that the scientific research levels of the 6th grade students are very close to each other. The class with the highest level of scientific research is seventh grade (81.42%) and the lowest level is the fifth grade (80.71%). The highest rate (100%) in determining the research question-problem belongs to the 5th and 6th grades. The highest rate (90%) in determining the assumptions-hypotheses and the purpose of the research belongs to the 7th grades. In determining the importance of the research, the highest rate (75%) belongs to the 7th grades. The highest rate (82%) in testing assumptions-hypotheses belongs to 6th graders. While the highest rate of writing the research report (91%) belongs to the 6th grades, the highest rate (100%) of including the references in the research belongs to the 5th and 6th grades. According to the averages of all participants, the steps performed at the lowest level among the scientific research steps are the importance of research (53%) and testing hypotheses (77%). According to the average of all participants, the sections that the participants performed at the highest level from the scientific research steps were to determine the research question (97%) and to include the references (97%). In addition, when the research reports of all participants were examined, none of the participants made in-text references in the research report they prepared.

Conclusion, Discussion and Recommendations

Scientific research levels of 5th, 6th and 7th grade students, whose scientific research levels are quite close to each other, are high. The class with the highest level of scientific research is the seventh grade, while the lowest is the fifth grade. While the level of determination of the research question-problem is the highest in the fifth and sixth grades, the level of determining the assumptions-hypotheses, the purpose and importance of the research is the seventh graders. They are the sixth graders with the highest level of testing the assumptions-hypotheses and writing the research report. According to the presentation of the research reports, almost all of the students wrote the information they received from the general network in their reports. The fifth and sixth grades have the highest level of references in the research. While the steps that the participants perform at the lowest level among the scientific research steps are the importance of the research and testing the hypotheses, the steps they perform at the highest level are determining the research question and giving place to the references. In addition, none of the participants can display in-text references in research reports.

According to the results of this research, 5-7th grade students' scientific research levels are high and very close to each other. This result may be due to the fact that the students learned this subject well in the social studies course. As a matter of fact, according to Erdoğan (2018), when the studies on science and social sciences are examined, there is an increase in the scientific research skills of students every year. In addition, according to Piaget, the subject of scientific research steps should be taught to secondary school students due to the development of logical thinking, concrete and abstract thinking, and problem solving skills in secondary school students (Sakallı, 2022). In this respect, one of the reasons for the high scientific research levels of secondary school students may be related to the developmental stages of the students. As a matter of fact, children at this age may have a high level of curiosity, desire to explore and questioning skills. One of the reasons why students' scientific research levels are high may be that students have fun and enjoy themselves while doing their research in line with the principle of 'learning by doing and experiencing'. As a matter of fact, according to Akay (2013), the principle of learning by doing and living, which is one of the important principles of learning,

helps students to enjoy learning and to take responsibility for learning. If a student uses more sense organs in terms of learning in social studies course, his/her success on the subject increases. For example, if a student finds out where these riches are used and where they are extracted from, and shows them with a map he/she has drawn, and can explain their ratio in the country's economy in the graphics he/she prepares, the learning activity will be more meaningful and permanent (Ata & Bağcı, 2007). Conducting research that reflects children's perspectives is a liberating and transformative approach for researchers, educators and children (Siry & Lang, 2017). In this direction, according to Çalışkan and Turan (2010); If the research steps applied in research-based teaching in social studies lesson are taken into consideration and models suitable for research problems are selected and planned, learning activity in social studies lesson turns into a more enjoyable one.

According to the results of this study, the participants showed the importance of the research and performed the testing steps of the hypotheses at a low level. This result may be due to the fact that students did not learn enough about the importance of research and testing hypotheses from scientific research steps, or they did not have enough knowledge about these concepts. As a matter of fact, according to Erdal and Sarı (2020), since the main goal of education is to prepare students for life, students should be taught scientific process skills. In addition, according to the results of the study by Sakallı et al. (2022), in which TÜBİTAK secondary school students (2204-B) examined the geography research projects in line with the scientific research steps, scientific research steps were not mentioned much in the methodology of the projects in the field of geography participating in the research projects competition.

In addition, there are methodological deficiencies even in the projects that participated in the Turkey final, since scientific research steps are not included in these studies.

In this study, the scientific research step performed by the students at the highest rate is the research question-problem determination stage. Subject selection in scientific research to be conducted is the first step of the research (Dönmez, 2016; Sakallı, 2022; Usta, 2019). In this study, the fact that almost all of the participants (97%) determined the research problem-questions appropriately may have been due to the fact that the students learned the first step of the scientific research steps well, their intrinsic motivation and the developmental stage of the children. As a matter of fact, if students have intrinsic motivation and their motivation is supported, their cognitive processes such as activating their prior knowledge and asking questions turn into a more fluent form (Taboada et al., 2009). According to Çalışkan and Turan (2010), if students research, think, decide and produce solutions like scientists in the research process by applying scientific research methods, learning becomes more meaningful and permanent. In this respect, according to Hu and Adey (2002), scientific creativity of people is also developed depending on their scientific knowledge and skills. For this reason, it is necessary to develop scientific literacy in people in order to increase people's trust in science and the work of scientists (Ploj-Virtic, 2022). In order to develop students' perceptions about science, their ideas about scientific research activities should be learned and their application skills should be developed (Lederman & Lederman, 2005). In this respect, applications and activities that encourage children's scientific creativity should be included in the teaching process starting from pre-school education (Siew et al., 2017). Scientific practices and activities are important tools to produce and organize information about the world around us (Ongowo, 2017). In the light of these explanations, the high rate of scientific research question-problem determination by the students in this study may be due to the fact that they learned this subject well in the course. In this respect,

this result is important in terms of developing students' scientific literacy and scientific process skills.

According to the findings, all of the participants included no in-text resources and just reported the material they acquired from the broader network in their study reports. This result has a high degree of overlap with Elbay's (2020) research. In fact, Elbay (2020) discovered in his study of seventh-grade social studies students' scientific research that the students consider scientific research as a general online search and replicate the sources as they are without challenging them. Elbay's (2020) research found that 7th grade pupils were unable to perform scientific research in conformity with scientific concepts and standards. These findings might be attributed to secondary school pupils failing to master the reporting stage from scientific research stages or failing to internalise this subject. As a result, Sönmez (2011) believes that students should be taught scientific research procedures through practising and living in educational contexts with example issues.

Based on the findings of this study, it is suggested that researchers undertake more thorough investigations (such as action research) to increase the scientific research levels of secondary school students. Furthermore, recommendations to curriculum practitioners to strengthen secondary school students' skills in compiling a references, writing a research report, referencing in-text references, identifying the value of the study, and verifying the research hypotheses.

References

Akay, C. (2013). Ortaokul öğrencilerinin yaparak-yaşayarak öğrenme temelli TÜBİTAK 4004 bilim okulu projesi sonrası bilim kavramına yönelik görüşleri. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, *9*(2), 326-338. https://dergipark.org.tr/en/download/article-file/160909

Aruan, S. A., Okere, M. I., & Wachanga, S. (2016). Influence of culture and gender on secondary school students' scientific creativity in biology education in Turkana County, Kenya. *Journal of Education and Practice, 7*(35), 25-35. https://files.eric.ed.gov/fulltext/EJ1126506.pdf

Ata, B., & Bağcı, İ. (2007). *Sosyal bilgiler eğitimi açısından eğitim klasikleri incelemeleri* (1. baskı). Ankara: Pegem Akademi Yayıncılık.

Bahadır, F., & Tuncer, M. (2017). Öğretmen adaylarının bilimsel araştırma öz yeterlikleri ve öğretmenlik mesleğine yönelik tutumları açısından değerlendirilmesi. *Turkish Studies, 12*(17), 55-72. https://doi.org/10.7827/TurkishStudies.11938

Balcı, A. (2009). *Sosyal bilimlerde araştırma: Yöntem, teknik ve ilkeler*. Ankara: Pegem Akademi Yayıncılık.

Barr, H. (1997). Defining social studies. *Teachers and curriculum*, *1*, 6-12. https://scholar.google.com/scholar?hl=tr&as_sdt=0%2C5&q=social+studies&btnG=

Beisenbayeva, L. (2017). *Türkiye ve Kazakistan'da eğitim bilimleri ve alan eğitimi konusunda lisansüstü eğitimi yapan öğrencilerin bilimsel araştırma yeterliklerinin incelenmesi* (Yayımlanmamış doktora tezi). Gazi Üniversitesi.

Bustamante, A. S., Greenfield, D. B., & Nayfeld I. (2018). Early childhood science and engineering: engaging platforms for fostering domain-general learning skills. *Education Sciences*, *8*(3), 2-13. https://doi.org/10.3390/educsci8030144

Büyüköztürk, Ş., Kılıç-Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2011). *Bilimsel araştırma yöntemleri* (9. baskı). Ankara: Pegem Akademi Yayıncılık.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches.* Sage Publications.

Çalışkan, H. (2008). *İlköğretim 7. sınıf sosyal bilgiler dersinde araştırmaya dayalı öğrenme yaklaşımının derse yönelik tutuma, akademik başarıya ve kalıcılık düzeyine etkisi* (Yayımlanmamış doktora tezi). Gazi Üniversitesi.

Çalışkan, H., & Turan, R. (2010). Sosyal bilgiler dersinde araştırmaya dayalı öğrenme yaklaşımının derse yönelik tutuma etkisi. *İlköğretim Online, 9*(3), 1238-1250. https://dergipark.org.tr/tr/pub/ilkonline/issue/8594/106907

Çepni, S. (2007). *Araştırma ve proje çalışmalarına giriş* (3. baskı). Trabzon: Celepler Matbaacılık.

Çiftçi, S., Yayla, A., & Sağlam, A. (2021). 21. yüzyıl becerileri bağlamında öğrenci, öğretmen ve eğitim ortamları. *RumeliDE Dil ve Edebiyat Araştırmaları Dergisi, (24)*, 718-734. https://doi.org/10.29000/rumelide.995863

Dilbaz, G. A., Özgelen, S., & Yelken, T.Y. (2012). Araştırma becerileri testinin (ABT) geliştirilmesi. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 12*(2), 305- 332. https://dergipark.org.tr/tr/pub/aibuefd/issue/1489/18002

Dönmez, L. (2021). Map literacy skill in social sciences curriculum in Turkey: The gap between theory and practice. *Review of International Geographical Education (RIGEO), 11*(2), 449-460. https://doi.org/10.33403/rigeo.899631

Duffy, B. (2006). Creative and imaginative experiences, J. Devereux and L. Miller (Eds.). *Working with children in the early years* (pp. 161-178, 6th ed.). The Open University.

Edelson, D.C., Gordin, D.N. & Pea, R.D. (1999). Addressing the challenges of inquiry-based learning through technology and curriculum design. *Journal of the Learning Sciences, 8*(3-4), 391-450. https://doi.org/10.1080/10508406.1999.9672075

Ekiz, D. (2003). *Eğitimde araştırma yöntem ve metotlarına giriş: Nitel, nicel ve eleştirel kuram metodolojileri.* Ankara: Anı Yayıncılık.

Elbay, S. (2020). Sosyal bilgiler dersinde 7. sınıf öğrencilerinin bilimsel araştırmalarına yönelik bir çalışma. *Türk Eğitim Bilimleri Dergisi, 18*(1), 85-106. https://doi.org/10.37217/tebd.657298

Erdal, C. (2020). *TÜBİTAK bilim fuarlarının ortaokul öğrencilerinin bilimsel süreç becerilerine etkisi* (Yayımlanmamış yüksek lisans tezi). Necmettin Erbakan Üniversitesi.

Erdal, C. & Sarı, U. (2020). Bilim fuarlarının ortaokul öğrencilerinin bilimsel süreç becerilerine etkisi. *Eskişehir Osmangazi Üniversitesi Türk Dünyası Uygulama ve Araştırma Merkezi Eğitim Dergisi, 5*(2), 37-54. https://dergipark.org.tr/tr/pub/estudamegitim/issue/57511/740774

Erdoğan, İ. (2018). *Üstün yetenekli öğrencilerin bilimsel araştırma becerilerinin öğrencilerin yaptığı araştırmalara dayalı olarak incelenmesi* (Yayımlanmamış yüksek lisans tezi). Kırıkkale Üniversitesi.

Germann, J. P., Aram, R., & Burke, G. (1996). Identifying patterns and relationships among the responses of seventh grade students to the science process skills of designing experiments. *Journal of Research in Science Teaching, 33*(1), 79–99. https://doi.org/10.1002/(SICI)1098-2736(199601)33:1<79::AID-TEA5>3.0.CO;2-M

Hadzigeorgiou, Y., Fokialis, P., & Kabouropoulou, M. (2012). Thinking about creativity in science education. *Creative Education, 3,* 603-611. https://doi.org/10.4236/ce.2012.35089

Hu, W., & Adey, P. (2002) A scientific creativity test for secondary school students. *International Journal of Science Education, 24*(4), 389-403. https://doi.org/10.1080/09500690110098912

Karasar, N. (2017). *Bilimsel araştırma yöntemleri* (32. baskı). Ankara: Nobel Yayıncılık.

Karataş, Z. (2015). Sosyal bilimlerde nitel araştırma yöntemleri. *Manevi Temelli Sosyal Hizmet Araştırmaları Dergisi, 1*(1),62-80. https://www.academia.edu/33009261/Sosyal_Hizmet_E_Dergi_SOSYAL_B%C4%
B0L%C4%B0MLERDE_N%C4%B0TEL_ARA%C5%9ETIRMA_Y%C3%96NTEMLER%C4%B0

Kurnaz, A., Erdoğan, İ., & Atbaşı, Z. (2021). Öğrencilerin bilimsel araştırma yapma ve makale yazma becerilerini değerlendirme ölçeğinin geliştirilmesi. *Milli Eğitim Özel Eğitim ve Rehberlik Dergisi, 1*(1), 127-159. https://dergipark.org.tr/en/pub/ozelegitimrehberlikdergisi/issue/65815/1031681

Lamanauskas, V., & Augiene, D. (2011). Scientific research activity evaluation: Lithuanian upper secondary school students' position. *Journal of Baltic Science Education, 10*(3), 195-208. https://www.researchgate.net/profile/Vincentas-Lamanauskas/publication/ 289737824

Lederman, J. S., & Lederman, N. G. (2005). Nature of science is… *Science and Children, 43*(2), 53-54. https://eric.ed.gov/?id=EJ721624

Miller, L., Hughes, J., Roberts, A., Paterson, L. & Staggs, L. (2006). Curricular guidance and frameworks fort he early years: UK perspectives. J. Devereux and L. Miller (Eds.). *Working with Children in the Early Years* (pp.103-111, 6th ed.). The Open University.

Ministry of National Education (MNE). (2018). Sosyal Bilgiler Dersi Öğretim Programı. Ankara.
http://mufredat.meb.gov.tr/Dosyalar/201812103847686SOSYAL%20B%C4%B0LG%C4%B0LER%20% C3
%96%C4%9ERET%C4%B0M%20PROGRAMI%20.pdf

Ongowo, R. O. (2017). Secondary school students' mastery of integrated science process skills in Siaya County, Kenya. *Creative Education,* 8, 1941-1956. https://doi.org/10.4236/ce.2017.812132

Özdamar, K. (2003). *Modern bilimsel araştırma yöntemleri.* Eskişehir: Kaan Kitabevi.

Ploj-Virtic, M. (2022). Teaching science & technology: Components of scientific literacy and insight into the steps of research. *International Journal of Science Education, 44*(12), 1916-
1931. http://dx.doi.org/10.1080/09500693.2022.2105414

Sakallı, M., Artvinli, E., & Dönmez, L. (2022). TÜBİTAK ortaokul öğrencileri (2204-b) coğrafya araştırma projelerinin bilimsel araştırma basamakları açısından analizi. *International Journal of Geography and Geography Education (IGGE)*, 47, 1-19. http://dx.doi.org/10.32003/igge.1134017

Sakallı, M. (2022). *TÜBİTAK ortaokul öğrencileri (2204-B) coğrafya araştırma projelerinin bilimsel araştırma basamakları açısından analizi* (Yayımlanmamış yüksek lisans tezi). Eskişehir Osmangazi Üniversitesi.

Sever, İ., Öncül, B., & Ersoy, A., (2019). Using flipped learning to improve scientific research skills of teacher candidates. *Universal Journal of Educational Research, 7*(2), 521-535. http://dx.doi.org/10.13189/ujer.2019.070225

Siew, N. M., Chin, M. K., & Sombuling, A. (2017). The effects of problem based learning with cooperative learning on preschoolers' scientific creativity. *Journal of Baltic Science Education, 16*(1), 100-112. http://dx.doi.org/10.33225/jbse/17.16.100

Siry, C. A., & Lang, D. E. (2017). Creating participatory discourse for teaching and research in early childhood science. *Journal of Science Teacher Education, 21*(2), 149-160. https://doi.org/10.1007/s10972-009-9162-7

Sönmez, V. (2011). Bilimsel araştırma süreci ve erişi. *International Journal of Curriculum and Instructional Studies*, *1*(1). 49-59. https://www.acarindex.com/dosyalar/makale/acarindex-1423936087.pdf

Sönmez, V., & G. Alacapınar, F. (2020). *Örneklendirilmiş bilimsel araştırma yöntemleri (4. baskı).* Ankara: Anı Yayıncılık.

Taboada, A., Tonks, S. M., Wigfield, A. & Guthrie, J. T. (2009). Effects of motivational and cognitive variables on reading comprehension. *Reading and Writing, 22*(1), 85-106. https://link.springer.com/article/10.1007/s11145-008-9133-y

Taş, M. Y. (2014). *İlköğretim yedinci sınıf sosyal bilgiler dersinde araştırma-inceleme yoluyla öğretim ve geleneksel öğretimin akademik başarıya etkisi* (Yayımlanmamış yüksek lisans tezi). Celal Bayar Üniversitesi.

Tunç-Şahin, C., & Say, Ö. (2010). İlköğretim öğrencilerinin bilimsel okuryazarlık düzeylerinin incelenmesi. *Uluslararası Yönetim İktisat ve İşletme Dergisi, 6*(11), 223-240. https://dergipark.org.tr/en/pub/ijmeb/issue/54828/750565

Turan, S. (2019). 2018 Sosyal bilgiler öğretim programının disiplinlerarası yapısının incelenmesi. *Journal of Innovative Research in Social Studies, 2*(2), 166-190. https://dergipark.org.tr/tr/pub/jirss/issue/50816/629426

Türk Dil Kurumu (TDK). (2023). Güncel Türkçe Sözlüğü. http://www.tdk.gov.tr/index.php?option=com_gts&arama=gts&guid=TDK.GTS59a1af12ce24.64394949

Usta, A. (2011). Bilimsel araştırmalarda problematik: Projelendirme ve raporlaştırma. *Akademik Yaklaşımlar Dergisi, 2*(2), 176-197. https://dergipark.org.tr/tr/pub/ayd/issue/3326/46160

Usta, A. (2019). Evreleri ile bilimsel araştırma süreci ve raporlaştırılması. *ASSAM Uluslararası Hakemli Dergi, 6*(13), 85-101. https://dergipark.org.tr/tr/pub/assam/issue/44925/55930

Ültay, E., Akyurt, H., & Ültay, N. (2021). Sosyal bilimlerde betimsel içerik analizi. *IBAD Sosyal Bilimler Dergisi*, (10), 188-201. https://doi.org/10.21733/ibad.871703

Yeany, R. H., Yap, K. C., & Padilla, M.J. (1986). Analyzing hierarchical relationship among modes of cognitive reasoning and integrated science process skills. *Journal of research in Science Teaching, 23*(4), 277-291. https://doi.org/10.1002/tea.3660230403

Yıldırım, A., & Şimşek, H. (2008). *Sosyal bilimlerde nitel araştırma yöntemleri* (7. baskı). İstanbul: Seçkin Yayıncılık.