Journal of Educational Studies in Science and Mathematics (JESSM) 2022
Volume 1 (1) Page 56 - 94
https://doi.org/10.29329/jessm.2022.498.4

Middle School Students Perceptions of Research Practices and Skills in Science Lessons: A Case Study*

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Abstract

This research was conducted to determine the research practices and skills of middle school students within the scope of science course. A total of 19 students studying in the 5th, 6th, 7th and 8th-grades of a public middle school in a province in the Aegean region of Turkey participated in the research. A holistic single case study model was adopted in the current study. A semi-structured interview form consisting of 17 questions was used as a data collection tool. The interviews were conducted individually and recorded via a voice recorder. After the interview records were transcribed, inductive content analysis was performed on the data. As a result of the analysis, it was revealed that the students liked the lesson because of the activities, experiments and teacher factor. The findings obtained from the research show that the students' perceptions of the research skills and habits they should have during a research are not at a good level.

Keywords: Research Practices, Research Skills, Science Lessons

Received: 26.11.2022 – **Accepted:** 15.12.2022 – **Published:** 29.12.2022

*This study is an extended version of the oral paper titled "Examination of Middle School Students' Perceptions of Research Habits and Skills in Science Class: A Case Study" presented at the National Science and Mathematics Education Congress in 2018.

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INTRODUCTION

When the Turkish science curriculum is examined, it is seen that the program takes into account the inquiry-based learning strategy. Students are required to have the skills to conduct research as part of the inquiry and to know the ways of accessing information. In addition, within the scope of 21st-century skills, students should be able to think critically and solve the problems they encounter. Students need to have effective and qualified research skills in order to solve the problems they encounter. By examining the literature, it was tried to determine the research skills that a student should have during the research (Büyüköztürk et al., 2008; Fraenkel et al., 2012; Çepni et al., 2006a; Çepni et al., 2006b; MoNE, 2018; Menzi Çetin & Akkoyunlu, 2016; Şerefoğlu Henkoğlu & Mahiroğlu, 2015; Karataş Ateş, 2013; Şerefoğlu Henkoğlu & Mahiroğlu, 2016; Şerefoğlu et al., 2017). 6 acquisitions that students should have during research were determined. These gains are;

1. Begins research by planning the research process.

2. Can determine the research problem or the information he/she needs about the subject he/she is curious about fully and clearly.

3. Determines search strategies.

- Can identify keywords.
- Can search from sources using keywords.
- Can identify the sources related to the subject.
- Can identify reliable sources.
- Can collect information from different sources.
- Takes notes and summarizes by reading the sources.
- Synthesizes information gathered from different sources.

4. Uses the acquired knowledge in solving the research problem.

5. Suggests new research questions according to the results of the research.

6. Knows the importance of specifying the sources used.

In a study conducted with 5th, 6th and 7th-grade students, a curriculum was prepared to develop students' strategies for searching for information on the Internet, and the effect of the program was examined. As a result of the research; in the sub-dimensions of defining the need for information, determining the search strategies, using advanced search features, finding and accessing information, selecting the information source, evaluating the information source, checking the accuracy of the information, and terminating the research process, positive significant differences were found

compared to before and after the application. Accordingly, it is stated in the research results that the program developed has a significant effect on the development of students' information search strategies on the Internet (Şerefoğlu et al., 2016). In another study conducted with 5th and 6th-grade students, students' approaches to the internet as a source of information, their thoughts on the advantages offered by the internet in the process of searching for information, the problems they encounter while searching for information on the internet, and the characteristics of citing references in the process of using the information they obtained were investigated. As a result of the study, the internet was determined as the most preferred resource, where all kinds of information are available quickly, easily, and in the studies of the students. However, it has been concluded that the internet brings with it some problems and the students do not have enough awareness about citing sources (Şerefoğlu Henkoğlu et al., 2015). In another study conducted at the same grade levels (5th and 6th grade), students' online information search strategies were examined according to the attitudes of students' families. In the research, it was concluded that the democratic attitude of the families can support students' online information-seeking strategies both in general and metacognitive ways (Uysal et al., 2017). As a result of the study conducted to determine the status of accessing, evaluating, organizing, and transmitting information of 6th-grade students, it was determined that the students were insufficient in terms of scientific communication skills (Menzi Çetin & Akkoyunlu, 2016). As a result of the study conducted by Ekici and Uçar (2012) with 8th-grade students, it is stated that the students have problems with information literacy, they do not know where and how to search for resources, how to evaluate the resource and how to use it in their homework. It is also among the results of the research that they do not mind using the information they obtained from the internet as it is and they find ready-made homework sites useful. The students think that it is not necessary to cite the source, as citing the source has no effect on the scoring of their assignments. In another study conducted with middle school students in a small school, it was stated that students associated the answers about seeking information with the school. Other results obtained in the study were obtained from interviews with students with intrinsic motivation. Accordingly, students use books, watch movies or TV, listen to the radio, observe naturally occurring events, and ask other people in the process of seeking information. It is stated that they do not use electronic resources due to current conditions. Participating students stated that they used at least two sources in most studies, and they used the most easily accessible source in the first place. The students expressed their opinions about their inner knowledge-seeking experiences, reflective/emotional, interest, and creative activities. In addition, information about the information search process that the students had done before was included in the research (Crow, 2015).

Karataş Ateş (2013) dealt with how to create a digital library for students in his research, which he completed based on the problem of students in Turkey in finding correct and reliable Turkish resources suitable for their level. In addition, as a result of the analysis of the information-seeking

behaviours of the 4th-grade students, it was revealed that there was a need for a digital library consisting of Turkish resources that the students could use according to their level. In the research conducted from the 4th to the 12th grade, the relationship between the duration of doing research and research success was examined. As a result of the research, unsuccessful studies take longer time than successful ones. More effort, mouse clicks, key presses, queries, site visits, and strategy changes occur in failed trials. Also, unsuccessful studies have caused more disappointment and confusion. Hsieh and Wu (2015), in their research with students aged 7 to 12, concluded that the success rate of girls in information-seeking behaviours is higher than boys in text-based and text-based and graphic-based interfaces. In addition, it is among the results of the study that boys tend to use horizontal research methods and girls tend to use vertical research methods.

In the study, in which the criteria used by 9th-grade students while searching the web were investigated, the students could not evaluate the sources, information, and results, the students mentioned many criteria but they did not always use these criteria during the search, the students spent most of their time on searching, they used very little time in organizing the process and information. It is stated that while evaluating the sources, they mostly use titles and summaries, the most attention is paid to the connection of the information with the task in the evaluation of the information, the students who use more criteria are not more successful, they hope to find the answer to the question they are researching on a single site, and they do not search for the author of the site (Walraven et al., 2009). In a study conducted with 9th-grade students, it was found that students prefer computer and internet environments to books, their English level is restrictive in information search, they want more Turkish sites to be widespread, libraries are reliable but time-consuming, students who use purpose-oriented information search strategy are planned and purposeful. It is stated that students who use the data-oriented information search strategy use the superficial information search type (Yalçınalp & Aşkar, 2003).

Studies in the literature show that studies on this subject are internet-based studies. However, although we live in the internet age, there are students who do not have access to the internet yet and have to complete their research from different sources. In addition, literature studies have shown that students do not have sufficient research skills. For this reason, it has been tried to develop programs that will contribute to students' research skills. In this direction, the level of skills of students in accessing information in village schools, where opportunities are more limited than in central schools, should also be investigated.

Within the scope of the science course, students are expected to find solutions to problems from daily life and to do research in solving these problems. For this reason, as in other courses, students are expected to have a good command of research skills within the scope of this course. Considering that the studies in the literature are not carried out within the scope of science courses, the aim of this research is to examine the perceptions of middle school students in village schools towards

research skills and habits in science courses. As a result, the results of this and similar studies will provide insight into the development of measures to be taken to improve students' research skills.

The Purpose of the Study

The aim of this research is to determine the research practices and skills of 5th, 6th, 7th and 8th-grade students studying in a public middle school in a province of the Aegean region of Turkey. For this purpose, the questions to be answered are as follows;

1) What are the students' perceptions about school life and the science course?

What are the students' perceptions of

• school life?

• science course?

2) What are their perceptions of research habits and skills in the Science course?

What are the students' perceptions about

• being able to identify the research problem?

• the ways following to solve the problem faced?

• the resources used to solve the problem faced?

• the "importance of the number of resources" where it is used when looking for a solution to a problem?

• the steps following while researching from a source determined?

• the features that he paid attention to in the sources chosen while doing the research?

• the time spent doing research on a topic?

• who researched the research assignments given in the science course?

• the "adequacy" of the information obtained from the research?

• how do they use the information obtained from the sources?

• sharing the information they obtained as a result of the research?

• references in the research?

• the steps they followed throughout the process in research they completed before?

• the steps they follow for new research?

• reasons and frequencies for doing research?

3) What are their parent's perceptions of their level of interest in students?

METHODOLOGY

In this section, the research design, the study group, the data collection tool, and the analysis of data are presented.

Research Design

In this research, the holistic single case design, which is one of the case study designs of qualitative research methods in which a single analysis unit is examined, was adopted. Yıldırım and Şimşek (2006, p.277) describe the case study as "a method in which it is carried out in a natural environment such as a classroom, a neighbourhood, an organization, aiming at a holistic interpretation of the environment and events that are the subject of the study, and allowing it to be examined in depth". In this study, middle school students' perceptions of research practices and skills were examined by including all students studying in a middle school.

Study Group

The study group consists of a total of 22 students from 5th, 6th, 7th, and 8th-grades studying at a public middle school in a province in the Aegean region of Turkey. Since 3 students did not want to participate in the interview, the interviews were completed with 19 students. Convenience sampling, one of the purposeful sampling methods, was used. The demographic characteristics of the study group are given in Table 1.

Table 1

Demographic Characteristics of Participating Students

Gender	**N**	**Mother's profession**	**N**	
Girl	9	Housewife	16	
Boy	10	Farmer	3	
Grades		Father's profession		
5th-grade	5	Chauffeur	2	
6th-grade	6	Farmer	12	
7th-grade	6	Construction worker	2	
8th-grade	2	Grocer	1	
Number of siblings		Employee	1	
2 siblings	6	Having computer/internet	Yes	No
3 siblings	7	Computer	8	11
4 siblings	4	Internet	11	8
5 siblings	2			

Data Collection Tool

Semi-structured interview questions were used as data collection tools in the research. While preparing the interview questions, a literature review was conducted, the resources on how to do the literature review were examined, and six acquisitions that students should have were created by taking into account what should be done in the process of accessing information. Interview questions were prepared within the scope of these achievements. Interview questions were examined by a science educator who is an expert in primary education science teaching, an expert educator from the department of educational sciences, two science teachers with doctoral degrees, and a Turkish teacher in terms of grammar rules and meaning. Adjustments were made in line with the suggestions made as a result of the examinations. A total of 17 questions were formed, including demographic information of students and investigating how students access information. A pilot interview was conducted with a 7th-grade student, the recording of the interview was transcribed and it was decided that the questions were working and there was no need to make any changes. There are 17 main questions and 29 explanatory questions in the interview form. With the semi-structured interview questions completed in this form, the data collection phase was started.

Data Analysis

Face-to-face interviews with each of the 19 students in the school library were recorded using a voice recorder. The interviews were completed in a minimum of 20 and a maximum of 48 minutes. All interviews were transcribed and raw data were generated. In total, 261 pages of raw data were obtained. The analysis of the interview data was made with the inductive content analysis technique. With this analysis method, “the concepts underlying the data and the relationships between these concepts are tried to be revealed through coding” (Yıldırım & Şimşek, 2006, p.227). During the analysis, the answers given to each question were examined, and each meaningful word or structure was underlined. At this stage, open coding was done. By re-reading the raw data and codes, axial (thematic) coding was carried out in the second stage. Categories were obtained from the codes, and themes were obtained from the categories. Findings were written by including examples from student statements.

FINDINGS

The findings of the answers to the questions asked to the study group were analyzed under two sections. The first part is about the perceptions of the students towards the school and the science lesson, and the second part is about the perceptions of the research practices and skills in the science lesson. In addition, in the last section, students' perceptions of their parent’s interest in their children's education are included.

Student Perceptions Towards School and Science Lessons

Students' Perceptions of School Life

Students in the study group were asked to introduce their schools. The expressions used by the students while promoting their schools were tried to be grouped. The groups that emerged in this direction are "physical conditions", "friends", "school activities", "communication with friends and teachers", "training provided", "teachers", "financial opportunities and education", "teacher and education", expressed as “physical condition and education” and “school culture and number of students.” Some student opinions regarding this finding are as follows;

> “I am in 6th-grade at my school. We are 7 people in the class. I get on well with some of my friends. I don't get along well with some of them, nothing else." S2
>
> “…it tells us when there are competitions or something. It also allows us to go on excursions...” S3
>
> “They provide better education. It would be bad if there was a large class, but because there are fewer, our lessons are better, we understand the subject better.” S10
>
> “Our school is good, but its financial situation is bad…” S16
>
> “Good place. Our teachers are very good people. I love all of our teachers very much.” S18
>
> “My school has 3 floors, there are 3 classrooms on each floor. There is a teacher's room, a dining hall and a washroom on the 1st floor in this way.” S6

The students in the study group were asked about the lesson they liked the most. While 2 students said a single course name, 17 students said two or more course names. When the answers of all students were examined, 18 students stated that they enjoyed the science course. Some student opinions regarding this finding are as follows;

> “Mathematics and Science mostly.” S2
>
> “English, Science, Mathematics.” S4
>
> “Science, Turkish and Social.” S8

When 18 students who enjoy the science lesson are asked to explain the reason why they like the lesson, 5 students answer the activities (experiments, scientific activities) in the lesson, 3 students answer the teacher, 5 students answer the lesson according to whether the lesson is fun, 1 student responds according to both the activities in the lesson and the lesson being fun. The student gave answers according to the course topics, the difficulty of the course, his liking for the courses, his interest in the course, and course activities. Some student opinions regarding this finding are as follows;

> “Because we do science experiments, such fun things.” S9
>
> “It seems easy to me.” S11

“Fun.” S14

"I am very interested. This is how we learn everything in science. We learn to do everything.” S18

“Because I love these lessons.” S1

The students in the study group were asked about the lesson they had the most difficulty in learning. While 14 students said the name of a single course, 4 students said the name of more than one course. One student stated that there was no course that he had difficulty with. Only one of the students in the study group stated that they had difficulties in the science lesson. Some student opinions regarding this finding are as follows;

“A little math, science.” S17

The reason for the difficulty of a student who had difficulties in the science lesson was examined. The reason for the student's difficulty in the lesson was determined as not trying to learn the lesson. The student's view on this finding is as follows;

"Because, I don't study." S17

Students' Perceptions Towards Science Lesson

The students who participated in the study were asked what they did in science lessons. The students answered this question as "doing an experiment" (*n*=4), "lecturing" (*n*=6), "doing an activity" (*n*=6), and "doing homework" (*n*=3). Some students answered this question as “using smart board” (*n*=4), “test solving” (*n*=4), “writing” (*n*=2), “homework control” (*n*=2), and “question-answer” (*n*=2). Some students also expressed their views on this question as “project” (*n*=1), “research” (*n*=1), “exam” (*n*=1), and “science-related stuff” (*n*=1). Some student opinions regarding this finding are as follows;

“We do experiments. Our teacher explains the topics.” S1

“He teaches our lesson well. He's taking the test." S4

“We do experiments. When our teacher asks a question, we answer him. Sometimes we ask him.” S6

“We are doing our experiments. We do our events. We do our projects. We do more fun things like this.” S9

“We are learning about science. We are learning other things.” S18

Students like “experimenting” (*n*=12) the most in science class. “Doing research” (*n*=2) and “participating in group work” (*n*=2) are other activities that students enjoy doing. In addition to these, “using a whiteboard” (*n*=11), “doing activities in class” (*n*=1), and “playing games” (*n*=1) are activities that students like in science class. One student stated that he liked everything that was done in the science lesson. Some student opinions regarding this finding are as follows;

"…we played the shadow game. It's about the light." S17

"Experiments." S3

"I love the smart board." S5

"I guess research, then I feel like a scientist." S7

"My most important thing is to do activities together with my friends, to do group work after the experiment." S9

Perceptions of Research Practices and Skills in Science Class

Students' Perceptions of "Defining the Research Problem"

The students in the study group (*n*=19) were asked questions about their ability to identify the problem in case of problem they encountered. While 11 students were able to "determine the problem correctly", it was determined that four students could not "determine the problem". It was observed that some students "recognized the problem but could not express it" (*n*=3). It was determined that one student "recognized the problem but misused science concepts". Some student opinions regarding this finding are as follows;

"He wondered if the ice in Selin's water was floating. How he swam." S1

"She wondered if the ice was floating on the water that it should sink." S3

"It could be that he drank that ice water and didn't drink it because he was sick." S9

"The ice in the water he drinks does not sink, the ice in the water his friend drinks does not sink." S15

Students' Perceptions of the Ways They Follow to Solve the Problem

3 out of 19 students who participated in the study stated that they would start solving a problem by "doing research". One student stated that he would only ask the teacher or his friends for a solution to the problem. While six students said that they would "do research first and then ask the teacher", 2 students on the contrary said that they would "ask the teacher first and then do research". One student stated that he would "ask the teacher first and try the answer". Two students, on the other hand, went "to try the problem they encountered directly". Two students, on the other hand, are thinking of "trying first and then researching on the internet". A student in the study group did not give an answer on this subject. Some student opinions regarding this finding are as follows;

"Well, I would search." S16

"I would ask my teacher or I would look in the notebook. I would get help from books." S15

"I would do research. I would consult my teacher." S12

"I would ask the science teacher and then take his ideas and try them out." S10

As a continuation of the question, when the students were asked how they would start the research, a student stated that he would "first prepare a to-do list for the research process". While five students first "started the research by considering the subject", 10 students stated that they would not start the research by "determining the resources they will use in the research". While two students first start the research by "asking the teacher", a student starts the research by "experimenting with the research topic". Some student opinions regarding this finding are as follows;

> “A to-do list first is always nice.” S7
>
> “I used first dictionaries, encyclopaedias. Then, I would search the internet.” S8
>
> “I would start by asking our teacher.” S15
>
> “How is ice in icy water?” S16

The students were asked whether they would plan for the research process, and if so, what kind of plan they would make. Five students stated that they did not “make a plan” and 14 students stated that they “made a plan”. Among the students who make plans, 2 students consider "writing the information they have reached" as a plan. While 6 students placed "resource review" in the first line of the plan, 3 students placed "understanding the subject to be researched" in the first line. Five students “have their information checked for accuracy”. While two students preferred to "experiment after all", 2 students considered "planning the time" in the first place. Two students are planning to “present” and 1 student is planning to “draw”. Some student opinions regarding this finding are as follows;

> “I will start with such books first, then I will use the internet, then I will find that thing from my teacher.” S18
>
> “First…I would try. If not, I would search again and find it again.” S19
>
> “I would research. I would write it on a piece of paper.” S1
>
> “I would take notes.” S5
>
> “The first step is to determine the location. I do research. I write what I have researched and then summarize the necessary information. I'll tie it to the end." S7

Students' Perceptions of the Resources Used to Solve the Problem

The students in the study group were asked which source or resources they used to solve the problem. It was determined that 17 students preferred to solve the problem by using "multiple sources" and 2 students using "single source". When the answers to the resources used were examined, it was seen that all of the students used the "internet" as a source, 13 students used a "book", 6 students used a "magazine", 4 students used the "encyclopaedia" and 2 students used the "newspapers". While it was stated that two students used the "dictionary" for science subjects, and 3 students "consulted with their families", some students stated that they preferred to "consult their friends", "ask the teacher" or "ask

someone who knows" to solve the problem. Some student opinions regarding this finding are as follows;

> “I want help from my friends because they know what I can't find in books, the internet, or the internet.” S1
>
> “I search from the computer. I won't search elsewhere." S2
>
> “Books, family, internet, nothing else.” S4
>
> “I usually use my books. Because there is more information out there. If I can't find it, I will look it up on the internet." S6
>
> “From the Internet, from books, from magazines, or anything else.” S9

Students who indicated more than one source were asked to rank the sources according to their priority. While six of the students put the internet in first place, 7 students took the books and 3 students took the magazines in the first place. One student, on the other hand, stated the people who knew the subject as the primary source.

While 8 out of 17 students preferred the internet in the last place, 2 students' books, 2 student magazines, 1 student's encyclopaedia, 2 students' consulting their teachers, 1 student's friends, and 1 student's family were the last sources. Some student opinions regarding this finding are as follows;

> “From magazines, books, internet.” S17
>
> “I will search the internet and then the books to see if it is true, then I will write it down on a piece of paper and show it to our teacher.” S14
>
> “First I give priority to my books, then I give priority to the Internet.” S12

The students stated that while listing the sources, they took into account "reaching the right information" (*n*=6) and "making the research difficult or easy" (*n*=3). In addition, some students stated the "reliability" (*n*=4) of the source, "having a lot of information" (*n*=3), "understanding" (*n*=1), and "detailed explanation" (*n*=1). They stated that they made a ranking by taking into account the order of “relevance of information” (*n*=1) and “access to information” (*n*=1). One student, on the other hand, could not provide an explanation for the order he made. Some student opinions regarding this finding are as follows;

> “Where can I get the most information? Which is the least I can reach.” S3
>
> “By choosing what is relevant to the question I am wondering.” S5
>
> “If the features I pay attention to are safe or not, then I go to known sites, that's it, I don't go to the ones I don't know.” S10
>
> “Because there is no correct information on the Internet, I consider books.” S11

The students were asked what features they paid attention to when choosing a web page. 8 students stated that they were "safe", 6 students were "relevant to the subject", and 4 students were "most used" sites. While some students preferred "known sites" (*n*=3), others stated that they should

contain "correct information" (*n*=3). One student stated that there is "a lot of information" on the site, 1 student pays attention to the "special site" and 1 student pays attention to the page he chooses to be organized. A student who considers it to be secure considers the extension of his internet address. Some student opinions regarding this finding are as follows;

> “Most used.” S1
>
> “If the name of my experiment comes up, then I click.” S2
>
> “I enter a site I know.” S4
>
> “I check if it is safe or not.” S6
>
> “Do not give wrong information.” S11

The students in the study group were asked which printed sources they used and where they obtained them. The most used printed sources were “books” (*n*=17) and “journals” (*n*=11). While five students used "encyclopaedia" and 3 students used "newspaper", one student stated that they used "dictionary", "reading books" and "the information they wrote in their notebooks".

10 students “purchase” these resources, 6 students “from the library” and 5 students “from the books at home”. In addition, some students read “textbooks” (*n*=3), “online” (*n*=3), “coffee shop” (*n*=3), “science class” (*n*=2), “school” (*n*=2), "teacher" (*n*=2), "borrowing" (*n*=5) provides the resources he needs. Some student opinions regarding this finding are as follows;

> “I get it from the library at school. Sometimes we get things from elsewhere. I take advantage of what we get when we go on tours.” S18
>
> “From old books and magazines they gave me at school.” S16
>
> “To buy a newspaper from the library, another…coffee. And in magazines, from the kiosk or elsewhere.” S14
>
> “I use the books at home that I have not thrown away.” S12
>
> “There are encyclopaedias in our library, there are journals about science in the science classroom, I can find them in the books there, our teachers allow me here.” S7
>
> “It happens in places where it is sold, sometimes our teachers give it this way.” S6

The students were asked how often they used the library. Six students go to the library to read, 2 students go to the library "to give and receive books", 1 student "when he needs it" and 1 student "because his teacher says he needs to buy a book". Other students, on the other hand, expressed the frequency of using the library by specifying the time. According to this, 3 students visit the library “once a month”, 4 students “twice a week”, 1 student “once a week”, 1 student “twice a day” and 1 student “once every 15 days”. One student stated that they have a separate library for their classes and that they use it “once a week” and from the school library “once every 2-3 weeks”. Other students (*n*=3) expressed their frequency of using the library as occasionally, moderately, and often.

The students were asked what kind of resources they used from the library. 14 students stated that they went to the library to buy “reading books”. It was stated that four students preferred "encyclopaedias", 2 students preferred "journals", 2 students preferred "science-related" and 1 student preferred "informative books". Some student opinions regarding this finding are as follows;

“Reading books.” S13

“I get it from science books in it.” S3

“Encyclopaedia.” S8

“It was like science children's magazines, I bought it.” S10

“I use informants.” S18

Students' Perceptions of the "Importance of the Number of Sources" Used When Searching for a Solution to a Problem

The students who participated in the study were asked whether the number of resources they used while looking for a solution to a problem was important, and their perceptions on this issue were tried to be determined. The findings show that the data are grouped into two categories. While 11 students think that "the number of resources used is important" while looking for a solution to a problem, the other students (*n*=8) think that "the number of resources used is not important".

When the data of the students (*n*=8) who think that the number of resources used is not important; 2 students stated that the aim is not to increase the number of sources, but to reach the conclusion and correct information. While 3 students stated that "the information sought can be found in one source", one source would be sufficient, while one of these students stated that "if he cannot find the information he is looking for in one source, he will switch to another source". Another student, who thought that the number of sources was not important, explained that "we are doing research", while the other student said that information can be found in a single source and "different sources can cause confusion as well as positive". The last student, who thinks that the number of sources is not important, stated that when he chooses a certain number of sources, "the information he seeks may remain within the sources he did not choose", so he cannot reach the information.

When the data of the students (*n*=11) who think that the number of resources used is important; 3 stated that “the student is doing research from different sources because the information sought will not be in the searched source”. Two students stated that "if the information sought is not in the source, they can use different sources, but if they find the information they are looking for in a single source, they will not need the others". Some students (*n*=4) stated that it is necessary to use different sources "to verify the information" and one of these students also stated that it is important to use different sources "in case the wrong source may be selected". One student stated that "for better

learning", and another student stated that the number of resources used was important because "it would not meet the needs of a resource". Some student opinions regarding this finding are as follows;

> "…if it's the wrong source, if it doesn't work, I need to switch to a new source." S5
>
> "Even if there are many, I wouldn't say that one of them is absolutely correct since they are written differently in all of them, but there is completely clear information." S6
>
> "…I think it is very important to verify because sometimes it may not give the right things." S7
>
> "We are investigating, sir. No need the number." S8
>
> "We can learn better information when we use 2-3. We can't learn much when we use 1." S10
>
> "Because it is not how much resources we use, it is important how we reach what information we reach, the right information is important." S12
>
> "I use two. For example, I look at a book, there is information. I'll look at the other book. If the two are different, that information is incorrect. But if both are the same, that information is true." S18

Students' Perceptions of the Steps They Follow While Doing Research From a Source Determined

The students (*n*=19) who participated in the study were asked what steps they followed while examining a source they determined, and their perceptions on this subject were tried to be revealed. The answers given by the students were examined in three categories: "before they started to examine the source", "in the process of examining the source" and "when they finished examining the source".

Before starting to examine the source, it was determined that 2 students did not make any preparations. In addition, one of these students starts the research by writing their own ideas. It was determined that a student made "preparation for taking notes (pen, paper, etc.)" during the research, not about the research itself. When the answers of the other students (*n*=16) were examined, two sub-categories emerged "starting the research by determining the subject first" and "starting the research by determining the source first".

When the answers of the students who first determined the subject and made research were examined, 4 students "firstly determine the subject to be researched and then move on to the selection of the source." While one student "only determines the subject to be researched", 2 students "first try to solve the researched subject on their own", if they cannot solve it, they turn to the source selection. In addition, while both of these students examine the books "using the table of contents", one of them pays attention to the "safety of the internet, its name and the number of accesses".

When the answers of the students who conducted research by identifying the source first were examined, it was determined that 10 students started the research by "firstly identifying the source". In this direction, 3 students stated that they examined the printed sources from the "contents section", 1

student stated that they paid attention to "titles, pictures, and authors", and 2 students started to research by "writing the research topic exactly on the Internet". Some student opinions regarding this finding are as follows;

> “Before I begin, I take out the first pen and paper. After I find it, I write it on paper.” S2
>
> “First of all, there is a subject about what subject, for example, I write my own ideas about that subject and then I look at it.” S6
>
> “First I try to understand the question carefully. Before I look on the internet, I think for a while whether I can solve the question myself. If I can solve it, I can do it myself.” S5
>
> “I look at the contents first. Because the information I am looking for may not be there, because the features of the magazine are changing. First I look at the table of contents, if there is any information I want, I look at its page and read it…” S7
>
> “I do what I research from which source.” S11

In the process of examining the source, it was determined that 7 students "wrote the information about the subject" and 2 students "checked the accuracy after writing the information about the subject". It is seen that three students "read and take notes", one "puts marks on important places", 1 student "just reads", 1 student "reads and looks at the pictures", and one "makes a summary of what he has read". It was determined that one student "takes grades appropriate for his age and from a reliable source", 1 student "reads according to the title, subtitle, and pictures", and lastly, 1 student "does not examine the information he finds and writes it as it is". Some student opinions regarding this finding are as follows;

> “I'm reading that first chapter. After that, I summarize.” S18
>
> “I write the important ones. I'm underlining the important parts; I'm not doing anything else." S4
>
> “First that the site is secure. Then, the sentences written on that site can be for people older than me and sometimes for people younger than me. I choose things of my own caliber.” S9
>
> “First of all, I read the parts about the location. Then I go over it again to see if there's anything I missed." S12
>
> “I read first. I take little notes with them. I mark important places. In this way." S15
>
> "I'm checking if it's safe, I'm checking its name, I'm checking whichever hits it is the most." S2
>
> “Q1: First, I write the information I find on my paper. Then I insert the paper into my file…
>
> Interviewer: How do you get the information there?
>
> Q1: By copying.”
>
> “I take notes on what I research. I try the things I take notes on.” S8

When they finished examining the source, 5 students stated that they “wrote what they found”, 2 students stated that they received “teacher approval for writing”, and 1 student stated that they received “approval from their elders”. Three students “inspect for themselves the accuracy of what

they have written". While four students "read to better understand what they have written", 1 student prefers to "read it only once without giving it to the teacher". Two students pay attention to the fact that their writings look better. When a student finishes examining the source, he/she prefers to "try the result he/she has reached". The purpose of a student in taking notes or making a summary in the process is to be able to answer if the teacher asks a question. In fact, if he feels that the information is insufficient, he seeks research from other sources. Some student opinions regarding this finding are as follows;

"I write it down after I finish it." S1

"I'll check what I've written to see if I'm wrong. If I wrote ugly, I'll clear it. Then, I'll see if it's beautiful." S2

"I can answer any question I want in real life." S5

"I'll ask my elders if it's true." S6

"If I am not satisfied, I look at other sources, but if I say that this information is sufficient for me, I actually gave the answer to this, I take notes because in this research, if it is homework, for example, our teacher can ask questions, why is it like that? My teacher likes it more when you give information from your mind instead of reading it on paper, it's like you've put in the effort, so I write first, write and write, as I said, then I summarize, so that's how I finish it." S7

"I read it several times to keep it in my mind. We present the remaining ones to our friends." S9

"Then I give it to the teacher. He says true if it is true, and says false if false. I'll do it again if it's the wrong book." S18

"With that information, I'll sit down and review again, if it turns out wrong." S19

Students' Perceptions of the Features to Be Considered in the Sources They Will Choose While Doing the Research

When the students were asked about the features they paid attention to in the resources they used while doing research, the answers of the students were grouped under two categories "for general resources" and "for internet resources".

When the characteristics of general sources are examined, 11 students have "relevance of the source", 4 students have "reliability", 1 student has "appropriateness for age", 2 students have "correct information", 1 student has "quality of the source (good content, a lot of information)". and 2 students paid attention to the "authors of the source". Some student opinions regarding this finding are as follows;

"It's about science, I'll look at the science book." S1

"We must be sure that the source will reach the truth…" S5

"First it should be reliable, then it should appeal to me, but to people's age group…" S7

"I look for well-known authors or something in books." S18

"Reliability. The quality of the content must be good. There must be a lot of information." S15

When the features of internet resources are examined; 11 students stated that they pay attention to the “reliability” of the site. Five students prefer the website to be "relevant", 4 students "contain correct information" and 1 student prefers the use of "recommended" sites. It was stated by the students that the website should be suitable for itself (*n*=1), sites that they “know/use constantly” (*n*=1), “most used by others”, and “extension ending with tr” (*n*=1). Some student opinions regarding this finding are as follows;

> “How many people are using it and not using it? Whether there is a foreign site or not.” S1
>
> “…I choose the one that suits me best, I don't really look at the others.” S7
>
> “We have to be careful with the sites. We have to be careful whether they are safe or unsafe.” S10
>
> "According to him, does it give correct information about its correctness or incorrectness?" S12
>
> “…not being irrelevant.” S14
>
> “Is the site recommended by others or recommended by authorized persons…” S3
>
> “If we do research on the Internet, we end up on a page we know, a page we use all the time.” S18

It was determined according to the answers they gave that they could not use "keywords" or "different expressions" of the research subject while searching the internet. While doing research on the internet, eight students do not use keywords or different expressions of the research topic according to the research topic, but only write the research topic as it is. A student does not specify a keyword or different phrase but uses different search phrases at the bottom of the website. Another student, who does not specify keywords and different expressions, can do research by using the "contents" section of the books. While four students are doing research using “keywords or different expressions”, 3 students are doing research using only different expressions. Some student opinions regarding this finding are as follows;

> “I go to the teacher. Sir, I say it didn't turn out like this. He also tells me how to do the right thing. He says maybe you spelled his name wrong. S18
>
> “S17: The search thing was written down there like this. My teacher on the subject is in the books.
>
> Interviewer: There is the table of contents.
>
> S17: Yes, we can look from there.”
>
> “As my teacher said, I am calling directly, here are the predictions below. Using those predictions, I'm just ending it." S12
>
> “…Interviewer: Then, did I understand correctly, when you are given a topic or when you specify a topic, you can determine it yourself, because you define words about that topic and search for those words.
>
> S7: Yes.”

The students were asked how they determined the “reliability of internet resources”. It was determined that four students did not know how to determine the reliability of the site. Four students stated that they made a decision according to the "security warning on the screen", but one of these students would not know whether it was safe if the warning did not come, and another stated that "MoNE put a security barrier". Two students can determine the security of the site by “asking their friends”. Three students said that they looked at "the presence of a secure text/bookmark in the corner of the page", "the presence of correct information" among 3 students, and "the presence of advertisements that are not appropriate for their age". There are students who decide "by looking at the status of being used by everyone" (*n*=1), "using the sites they always use and know" (*n*=1), and "researching the security of the site" (*n*=1). Some student opinions regarding this finding are as follows;

> “Sometimes it gives warnings.” S13
>
> “MoNE barrier or something.” S10
>
> “I go to my friend…I ask if this site is wrong.” S19
>
> “I can tell if it's safe or red in a corner.” S6
>
> “If it reads and writes correct information, we should write it in our notebook, but if we find wrong information, we should go to another site.” S11
>
> “I don't know exactly, but I think there are ads that are not suitable for our age level. I think these should be blocked by whoever is managing those pages.” S7
>
> “I get into what everyone uses the most.” S1
>
> “Because I always do that research from that site.” S15
>
> “Before entering that site, I research more about that site, that is, whether it is harmful…” S5

The students were asked about the accuracy of the information obtained from the sources. 12 students stated that "not all of the information in the sources is correct". While two students stated that "all of the information in the sources is correct", 1 student stated that "the teacher agrees with the correct course", and 1 student stated that "the source is correct depending on whether it is reliable or not". Three students said that they do not know whether the information in the sources is correct or not. Some student opinions regarding this finding are as follows;

> “It is not 100% correct. Because science goes by adding more to it. Because a new theory is always being put forward. There may be such lagging resources. Just because it's on that agenda today, it doesn't have to be on that agenda that day. Again, I think it is necessary to check this from several sources.” S7
>
> “It's pretty much true in general.” S12
>
> “It may be a lot, it may be a little.” S14
>
> "It's all true." S2
>
> “So that's pretty true. If our teacher says it is true, it is true.” S5

"It can be investigated whether it is safe." S15

When asked how they decided the accuracy of the information, 9 students stated that they decided the accuracy of the information "by consulting only one other person". These students decide the accuracy of the information by asking the teacher/elders (family, neighbour)/friends/people know. Three students decide on the accuracy of the information "only by comparing it with other sources". One of the students decided on the accuracy of the information by using more than one method, "by comparing the information learned in the lesson", 1 student "by looking at his interest in the subject he researched", and 1 student "by comparing with other sources besides consulting someone", 1 student "the resources supported by the Ministry of Education or known institutions". " and 1 student decides on the accuracy of the information by "asking people who have used that source before", "comparing it with another source" and "looking at its compatibility with the research topic". Some student opinions regarding this finding are as follows;

"I look for other sources. If it says the same, I say it is true." S3

"We get help from our teachers." S6

"We write the truth because our teacher told it because we know a little bit of it. We don't write mistakes." S1

"A person also read the one in our book, we can ask him what else there is. ..I write if my reader agrees with what I am researching…we should ask our elders." S16

"We can benefit from the information published by the Ministry of National Education. Then that would seem like more accurate information then." S12

"I'm asking the teacher. I'm asking friends. I looked online. I also look at the books to see if that information is correct. It's true if it's the same in the books." S18

The students participating in the study were asked how they decided that the selected sources were relevant to the subject, and it was tried to determine their perceptions on this subject. One student stated that they decided by "asking their elders and friends", and a student "by asking their teacher" that the source was relevant to the subject. Some students (n=3) stated that "the research topic should be included in the content", and some students (n=5) stated that they decided that the source was relevant to the subject by "reading". In addition, one student said that he paid attention to "the source being related to the course". It was determined that a student made a decision by "both reading the source and asking his family". A student, on the other hand, said that he looked for the information he had learned before, but if he did not learn the subject, he decided that the source was relevant by asking his elders, friends, and university students. Some student opinions regarding this finding are as follows;

"S3: According to the information he gave.

Interviewer: Can you explain that to me a little bit?

S3: For example, I did research on the solar system. If there are no planets or anything else in it, it's not relevant."

"I read. If I'm not sure after reading it, I'll delete it if it's not relevant." S5

"…it should choose a source according to its area. In other words, if our teacher gave a science homework, I think we should look at the science journals, the encyclopaedias about that science, or the pages about it if we google it." S7

"We can get help from our elders. We can look at the book in the same way, from the old books of our elders." S9

"I will ask my elders. I'll ask my friends." S1

Students' Perceptions of the Time They Spend While Doing Research on a Subject

When the answers given by the students to the question of how much time do you spend doing research on a subject were examined, two categories were determined: student answers given without considering the characteristics of the subject to be researched and taking into account the characteristics of the subject. In addition, taking into account whether 1 student has "his own time" and 1 student's not specifying time, they stated the features that affect the time they spend doing research on a subject such as "as much as I want".

It has been observed that 10 students who answered the question without considering the characteristics of the subject to be researched gave "specific time periods" without considering the characteristics of the subject.

It was determined that five students gave answers considering the characteristics of the subject. "The subject is easy or difficult" (n=3), "the subject is long or short" (n=2), "the subject is more or less" (n=1), "the study is a project or homework" (n=1) and "good homework" (n=1) were determined to affect the time spent doing the research. One student stated that "the content of the subject, the efficiency of the source found" and "the usefulness of the information he found" affect the time he will spend doing his work. Some student opinions regarding this finding are as follows;

"Half an hour, 1 hour." S1

"I try to do it fast in a tight time. If I have a lot of time, I will do it gradually according to the accuracy." S3

"The easy thing is, I can do it in like 20 minutes. If it's hard, I can do it in an hour or so." S6

"I think it depends on the subject…Actually, the efficiency of the source, its accuracy, or the efficiency on that subject… can be finished in a shorter time. Because to the point where I say it works for me." S7

"If the topic is long, a few hours, if the topic is short and easy, between half an hour and 15 minutes." S9

"I spend as much as I want." S11

“If the text is short, it won't take an hour right away.” S19

While doing the research, it was asked whether the time passed was important and the perceptions of the students about the subject were tried to be determined. While 13 students stated that the time spent doing research "doesn't matter", 5 students stated that the time passed "is important" and 1 student said, "it may change depending on the situation".

While five of the students who stated that the time spent doing research "doesn't matter" take into account the "information they will obtain as a result of the research", 3 students think that "homework done in a long time will be correct, beautiful and neat". While one student took into account that the "homework was completed" as a result, 1 student stated that "the same result will be achieved whether it is for a long time or for a short time". One student, who thinks that the time spent doing research is not important, explains it by "enjoying doing research". While one student states that "if he has no homework other than the course he will research", the time spent doing research will not be important, while 1 student thinks that the time spent doing research is not important because he "respects the teacher".

Two students, who think that the time spent doing research is important, explain their thoughts by saying that if they spend too much time on research, they will not have enough time to complete their other homework. One student stated that there might be "false information in short-term studies", 1 other student stated that she would have "long homework with long research" and 1 student believed that she "must find a topic that she is curious about in a short time".

A student, on the other hand, thinks that if he spends a lot of time, he will reach good information, so time is important, but time is not important because the teacher gave the research.

> “Because you are coming all the way from Denizli for us, you give homework only to us. That's why our house is over there, out of respect." S19
>
> “It will be better and more beautiful if it is longer.” S15
>
> "If we're confident that the result we found is correct, that's okay." S8
>
> “We have other homework, but if we don't have any other homework, we don't.” S1
>
> “We enjoy it when we do research.” S2
>
> "After all, we did our homework, it doesn't matter." S16
>
> “…The sentences of the 5 minutes researcher may be wrong, some of them may be wrong, but if this is 4 hours or more, some of the sentences may be wrong, but some of the sentences may be correct in general.” S9
>
> “When we spend a lot of time, we reach better information. But when we do it for a short time, we may not be able to reach (None)... because our teachers gave (there is). ” S11
>
> “It would not be good for me to learn what I am curious about, for example, after a very long time.” S13

Perceptions of Who Is Researching the Research Assignments Given in Science Classes

When the answers given by the students participating in the study were examined, it was determined that 17 students carried out the research "by themselves". One student stated that "he/she researches in individual studies and in group studies in group studies", while 1 student stated that she "does research, but her family stays with her during the research in case she goes to the wrong site". Some student opinions regarding this finding are as follows;

“The group is with our group mates, and ourselves is ourselves.” S1

“Myself.” S11

"I. Either my father or my brother is standing next to me.” S18

Students' Perceptions Regarding the "Adequacy" of the Information Obtained from the Research

The students were asked how they decided that the information they obtained was "adequate" while scanning the sources for a given research assignment, and their perceptions on this subject were tried to be revealed. It is remarkable that almost half of the students (*n*=10) decide when the information they have reached is sufficient or insufficient according to whether it is "long or short". It is seen that some of the students (*n*=6) who make up the study group decide that they are sufficient or insufficient according to the teacher's decision. Six of the students stated that the information they obtained as a result of the research was based on the criterion of "relevance to the research topic". On the other hand, some students (*n*=5) stated that they accepted "the same information being available on different websites" as a criterion for the adequacy of the information they obtained during the research process. One student said that he did not know how to decide whether the information he obtained was sufficient or not. Contrary to the other students, two students consider different sites, books, teacher's feedback, or the length or shortness of the texts as criteria, but their "convincing that the information they have obtained is detailed, satisfactory and sufficient for their comprehension/learning" as criteria. Some student opinions regarding this finding are as follows;

“Our teacher may be angry because there is little, if it is more, he says well done.” S1

“When I have access to too much information, too much accurate information.” S8

“..if it is not enough, if there is very little information, I re-research it.” S12

"As much as I'll have to learn when I learn down to the tiniest details." S13

“For example, if a long page appeared on the Internet, we must write it all down.” S16

“I understand that I have reached enough information because I write a lot.” S14

Students' Perceptions of How the Information Obtained from Sources is Used

The students in the study group were asked how they used the information they obtained from the sources and their perceptions on this subject were tried to be determined. According to the data obtained, 17 students prefer to "write" the information they have obtained from the source, 1 student "underlines the important points" in the source, 1 student "summaries what they understand for homework, but only reads if it is not homework."

When the answers of 17 students who prefer to write are examined, 3 students write after receiving confirmation of accuracy from others (teacher, family, friends, elders). While three students were writing "important places", 1 student "likes", 1 student "places relevant to the subject", 1 student "both important and relevant places", 1 student "necessary", and 1 student "important places". prefers not to write the details while writing". While one student is "summing up", 2 students write down "all the information" that they come across. While one student "reads, examines" and writes, 1 student writes "after checking the accuracy using different sources, shortening it so that his hand does not hurt". Some student opinions regarding this finding are as follows;

> "I read and underline important points." S4
>
> "…if it is not homework, that is, if it is research, I can perceive it when I read it without the need to write it…but if it is homework, if there is a summary expectation from us, then I use it in a way to explain what I understand to my classmates and my teacher." S7
>
> "I copy that page and then I write them on another page if I don't have time. If I have time, I write down the important places and details." S3
>
> "I read and write important passages with my family, asking them if it's true." S11
>
> "I write the ones I like or the beautiful ones from all of them." S6
>
> "I take the important parts and discard the unimportant parts. I'm not going into the finer details." S18
>
> "I write and then I write the one in the other source. If both are the same thing, I think it's the right answer. So if there is more summary, it can be written." S5

Students' Perceptions of Sharing the Knowledge Obtained as a Result of the Research

The students were asked how they shared the information they obtained, and their perceptions on this subject were tried to be determined. It was stated that three students preferred "to present only", 2 students "only to read", and 2 students "to tell and show a slide show or the resources they use". One student stated that "he can also share the experiment with his friends on the phone", while another student stated that "he will only show his research to everyone".

When the answers of the students who stated that they could use other methods besides making presentations were examined, 1 student stated that he could "make an activity", 1 student

stated that he could "slide show", and 1 student stated that he could share the information he obtained from his work "by writing it on a slide show or on a background cardboard".

When the answers of the students stating that they can use other methods besides reading are examined, it is seen that 1 student can "draw pictures", 1 student can "give examples", 1 student can "give a lecture and give his homework to his friends", 1 student "with his teacher of important places" and 1 student "phone, stated that they can share their research results from a computer or smart board. Some student opinions regarding this finding are as follows;

> “By presenting.” S17
>
> “To my readers.” S3
>
> “I can tell the information I have. I learned from these sources between this page and this page, you can learn from there too.” S13
>
> "I'll show everyone first." S2
>
> “I can call and share on the phone. I'll show you by experimenting." S5
>
> “I can make a presentation or a slide show.” S15
>
> “I read, I draw sample pictures.” S1

Students' Perceptions of Citing Sources in Research

The students were asked a question about citing the source in the studies and their perceptions on this subject were tried to be determined. Two students answered no to the question of whether we should cite the source. 15 students stated that the source should be specified, and 1 student stated that if it is a project assignment, the source should be indicated so that the teacher can check the accuracy of the assignment, but if it is a normal assignment, there is no need to specify the source. One student stated that there is no need to specify the internet resources as a source because they may contain unnecessary and incorrect information, but they can be specified as a source because there is correct information in the books. One student said that he needed to cite the source, but could not explain why. The results of the reasons for the answers given by the students are given below:

One of the students who answered no said that he did not "prefer" to cite the source, and the other said that he found it "meaningless".

Two of the students who stated that the source should be cited "mentioned the concept of ethics" and the others suggested "reasons outside the concept of ethics".

When we look at the ethically approaching student answers, the expressions "information theft" and "giving justice to those who do" were used.

2 students, who put forward reasons other than the concept of ethics, cite the source because "they can benefit from the same resources at other times". Three students write down the sources "for

the teacher to check the site for accuracy and neatness". One student states that "if the teacher checks the accuracy of the homework", 1 student states that "the teacher checks the correctness of the homework, as well as his/her friends' benefit" and another student states that "only his friends can benefit from it". Three students cite references so that "others may know the sources" and one student "may need a teacher". Some student opinions regarding this finding are as follows;

"Otherwise we would be committing information theft." S3

"Maybe we'll need our teacher too." S6

"Because our friends can also benefit from it." S8

"I do not prefer." S14

"For example, when we have another assignment, we can take advantage of it. S16

"Because our teacher looks at it, did he search it from the right places…" S17

Students' Perceptions of the Steps They Followed During a Research They Have Completed Before

The students were asked who determined the research they had done before. 17 out of 19 students stated that the teacher gave the research homework, and 2 students stated that they did not do any research. 17 students were asked how their teachers determined the subject of the research paper. 11 students stated that it was determined according to the subject covered in the lesson, and 2 students believed that the students could do it, so one of these students stated that the teacher gave them so that the subject they researched will be learned in the coming years. There are also students who stated that the subject was determined according to the books (*n*=1), to gather information (*n*=1) and to learn (*n*=2). One student said that the research topic was determined to increase the sense of research, reinforce the topic, and investigate what they did not know.

All 17 students did not plan for the research process before conducting the research. Two students did not use resources for the research but completed the research by asking the elders or using the information in the lesson. One student, on the other hand, tried to complete the research with his own information, but thinking that his knowledge was not sufficient, he searched the internet and used the information he found as it is. While some students (*n*=4) completed their research from one source, some students (*n*=4) completed their research from more than one source and put it into writing, and some students (*n*=2) checked the accuracy of the information they found from the first source from another source and put it in writing. While some of these students (*n*=4) presented their research with the approval of the teacher or family, some (*n*=1) completed their research with summarizing the research results. A student completed his research with his father, and the student who found the relevant sections in the research was written by his father. Some student opinions regarding this finding are as follows;

"We didn't actually investigate. He had a brother. We asked him. So we did our research. Then we got the materials and stuff. We did." S1

"…I went on the internet and wrote about the harms of recycling to the environment, I found it and wrote it in my notebook." S4

"I wrote our research paper on the internet, texts came out from there, I read them. I determined which one was correct, then I wrote it and had my family look after it. They said it would be okay, I wrote it and brought it." S11

"We never did." S17

Students' Perceptions of the Steps They Followed for a New Research

When the students were asked to identify an original research topic of their own, they determined a project topic similar to the topics completed during the year and the activities carried out in the classroom, while 11 students determined the topics that they had not seen in the year, that was not done at school, and that they were completely curious about. Some student opinions regarding this finding are as follows;

"Thermal insulation." S1

"It's actually possible to live on Mars." S15

It can be said that the students could not implement the planning process effectively. Three students first determine the material and then do research. While a student researches and determines the material, 1 student first confirms it with others, then researches and determines the last material. Three students do not do any research, 8 students only do research, and 2 students confirm their research to others. Only 1 student made research and used the results of the research and also planned the implementation process. Some student opinions regarding this finding are as follows;

"I would decide how to do it. No matter how big or how much. I was thinking about whether I should make it too long, write the location or very important places, or not go into too much detail. S3

"I would search the internet… I would take notes and try to make a model." S5

"I used to write down the information I had first on a piece of paper. Then I would do my research. I would compare that information with the information I had first-hand. Then, I would write down the results I obtained with the information I compared those two, on a piece of paper, I would find pictures and make them." S8

"I would buy my supplies. I would do my project and write it." S14

During the application process, 8 students only bring together the materials. Two students talk about the topics that are not included in the plan, 2 students do not talk about the implementation process openly, and 1 student completes the process after getting the approval of others about the research results. A student first prepares a draft and makes the original after getting approval from his family. 14 students here did not mention the outcome or impact of the project. While only one student

talks about the impact of the project during the implementation process, 3 students can explain what they will do during the implementation process and what will happen as a result of the project. Some student opinions regarding this finding are as follows;

> "I can make something like a short movie from the computer. I can make models. I can write it as a book." S13
>
> "We would send one person first. We'd get him a place there. It would stand there for a few days. If he could live and stay there, we would take everyone in turn." S15
>
> "I would search, I would find pictures. I would paste it on paper. After I come to school, I present it to everyone. S17

Students' Perceptions of Reasons and Frequency of Doing Research

The students were asked what the reasons were that led them to research, and their perceptions on this issue were tried to be determined. The answers given by the students can be examined in two basic categories. In this direction, 10 students gave answers by "centering themselves" and 2 students gave answers only "by taking the external effects in the center"; It was determined that 6 students gave answers under both headings. In addition, it was observed that 5 students answered by giving only one reason, while 14 students gave at least two reasons.

Considering the reasons given by the student by putting himself in the center, it was determined that the most research reason was "curiosity" (n=11). Eight students explain their reasons for "learning", 1 student because they "enjoy", 1 student to "check their understanding", 2 students for "knowledge", and 1 student searched for "interesting" students.

Considering the reasons given by the student-centered on external influences, it can be said that the most common reason for doing research is "homework" (n=6). Two students do research to "answer someone's questions/curiosities", 1 student "give it by the teacher", and 1 student "to get +" or "to get the teacher's eye".

Two students gave answers "independent of the subject" as telling others or showing off. Some student opinions regarding this finding are as follows;

> "Because I'm curious. Because I enjoy it." S2
>
> "If our teacher gives something, it is not without research." S4
>
> "To learn knowledge." S6
>
> "To check if we got it." S9
>
> "My family may have wondered, too. I do research for them." S11
>
> "To complete my homework." S14
>
> "..to win the favour of our teacher, to get a +." S15
>
> "The ones that interest me." S18

"To show off my friends." S19

While ten students gave more than one reason for the frequency of doing research, 9 students gave a single reason. Some of the students (*n*=4) who gave only one reason answered as "not much, not very often, rare, moderate". The most reason 19 students gave for the frequency of research (*n*=12) was "as I was wondering". Ten students stated that they do research "as homework is given". One student stated "as long as the teacher gives it", 3 students stated that "there is something he does not know" and 1 student stated, "as long as the subject is interesting, which is not too much". Some student opinions regarding this finding are as follows;

"As our teacher gives and wonders." S1

"When I don't have homework, I don't do much research. But when I'm bored, I do it when I'm curious." S3

"Not much." S4

"…I research what I don't know about them." S18

"I research what interests me the most. There is nothing that interests me very much." S19

Above, the findings of the student's perceptions of the research habits and skills they have from the beginning to the end of the research process in the science course are given. Finally, the findings obtained from the interviews about the parent's interest in the student's educational status, which can play a key role in explaining the research habits and skills of the students, are included.

Perceptions of Students' Parents' Level of Interest in Them

When the students were asked to categorize their mothers' level of care for them, 11 students answered "medium" and 8 students "high". Likewise, 9 "medium" and 9 "high" levels were found when they were classified for their fathers. A student does not have a father. Some student opinions regarding this finding are as follows;

"Normal, intermediate so." (for his mother) S6

"He is the same." (for his father) S6

"Inexplicable, so high." (for her mother) S7

"…ie medium." (for his father) S7

The students were asked how their parents decided that they were moderately interested in them. Nine students made an explanation by referring to "lack of interest". Two students made their decision by taking into account the "reaction of their families to the change in their grades". Another student decided that they were of moderate interest, based on the fact that "his family is no longer angry as before". Two students, on the other hand, stated that they did not think or did not know why they were moderately interested.

"It happens because they believe I can do it, but of course, if my grades drop, they help me because they want me to try a little harder." S6

"So he doesn't care much… he asks about my exams, for example, from time to time." S12

"They don't come to school much to see me, but they force me to do my homework." S19

"Because sometimes my mother is out for my homework and my father goes to herd the sheep, so." S14

"They don't get too angry." S4

The students were asked how they decided that their parents cared for them at a high level. A student decided that "his father would do whatever he wanted", and a student decided that "he wanted to study and have a profession". Eight students explained by referring to "the abundance of interest", while two students explained it based on the "pressure of their families towards the lessons". One student stated that he did not know why they were highly interested.

"He makes me study for lessons… to have books read, to take exams." S16

"My father sells and buys stationery and stuff. My mom doesn't allow much. My father is taking the bag or something." S1

"They want me to study and have a profession." S9

"Actually, it falls on me a lot, I got 98 on an exam last year, why did those 2 points go away and you didn't get 100, it blew my mind." S7

"Sometimes I get very tired. I say I'll do it in the morning like this mom. Your teacher gets angry with me and says do it now." S18

DISCUSSION

Most of the students like the science lesson and they offer the activities done in the lesson, the fun of the lesson, and the teacher factor as the reasons for this. A student has difficulty in science because he does not study himself. According to the general students, the science course is not among the courses they have difficulty with. Students do experiments the most in science lessons and they like to experiment the most. In addition, lectures and activities are carried out by the teacher in the science lesson.

Most of the students are able to identify the problem in case of a problem they encounter. However, instead of focusing on the issue to solve the problem, they focus on identifying the resources. More than half of the students stated that they started the research process by making a plan. Some of the students who made plans put resource analysis in the first place of the plan. Some of the students also consider checking the accuracy of the information they reach during the planning process of the research. However, when the students were asked to do research on a new topic that they had not researched before, they were asked to plan and explain, but it was determined that the students could not plan the process. During the planning process, most of the students just do research and leave. It is among the results of this study that some students did not do any research and some students first determined the materials they would use in the study and then did research. Only one

student did his research, evaluated the results of the research, and also made a plan about what he would do during the implementation process. Likewise, when asked to describe a research process they have done before, it is noteworthy that the students could not plan for the process. At this stage, it is noteworthy that the students are in an effort to have their research approved by showing it to others. It has been determined that students often tend to get approval from others in the process. From this, it can be said that students think as if they need to plan in theory, but they do not know how to plan in practice.

Almost all of the students participating in the study used more than one source to solve the problem. In Crow's (2015) study, five of the six students participating in the research use at least two sources in their research. All students use the internet as a source. Similarly, in Hirsh's (1999) study, it was concluded that every student participating in the research used the web. Ekici and Uçar (2012) stated in their research that the internet is primarily preferred. Books are the most used resource outside of the Internet. Another point that draws attention here is that a substantial number of students show consulting to others (family, friends, teachers, or someone who knows) as a resource. There are studies supporting this result in the literature (Hirsh, 1999; Ekici & Uçak, 2012; Karataş Ateş, 2013; Crow, 2015).

When the students ranked the resources according to the priority of use, seven of the 17 students indicated books as the first source they used, while eight of them stated the internet as the last source. A similar result was found in the study of Karataş Ateş (2013). Students primarily benefit from books. Contrary to this result, research results in which the internet is preferred as the first source are also found in the literature (Yalçınalp & Aşkar, 2003; Şerefoğlu Henkoğlu et al., 2015). On the other hand, in Crow's (2015) study, one out of six students stated that books were the first source, two students observed the events around them, and three students indicated that they did not use computers in their research.

While determining which source to use first, students pay attention to whether they can reach the right information. Afterward, the reliability of the source, the difficulty or ease of research, and the availability of a lot of information were determined as the features they paid attention to. In Yalçınalp and Aşkar's (2003) studies, the internet was stated as the first preferred resource, and it was stated that the reason for this was that it is difficult to watch and learn the materials in the library and it takes time to research in the library. According to Crow's (2015) study, the criterion for determining the first-ranked resources, with the effect of the environment in which the students live, is that the resources are easily accessible.

When choosing a website for their research, students pay attention to whether the site is safe or not. At the same time, the site's being relevant to the subject, the most used, known sites, and sites with correct information are among the features to be considered. As a similar result, the use of

information and the interest in the research question is the features that students pay attention to when choosing a website (Gruwel, 2009). Almost all of the students use books as printed sources. In addition, one of the most used printed resources is journals. It is seen that the biggest effect of the magazines being the most used resource is the reading of the Bilim Child magazine, which is regularly taken to the school throughout the year, by the students. However, in the study of Karataş Ateş (2013), contrary to this result, the rate of use of journals was found to be very low.

Students obtain printed resources by purchasing them from the school library, from the resources available at home, or by borrowing from each other. Another interesting result here is that the students can also purchase printed resources from the village coffeehouse. Students mostly use the school library to buy reading books. In other words, they actually use the library to buy reading books instead of getting resources for research. The reason for this situation can be shown as a planned follow-up of reading books in Turkish lessons at school. In a study conducted with 4th-grade students, it is stated that students do not see the library only as a place where homework and research are done, but as a place where they can search for information on any subject, they are curious about (Karataş Ateş, 2013).

Most students think that the number of resources used is important when seeking a solution to a research question. Some of these students explained that they used more than one source to verify the information. Other students said that if the information sought in a source is not found, they will need another source; some students stated that they would not need another source if they found information in the first source. Students, who think that the number of sources is not important, think that the purpose is not the number of sources, but the information sought, and that different sources will cause confusion as well as being positive.

Before starting to examine from a source they have determined, students either start their research by determining the subject or start their research by determining the source first. Some of the students who determine the subject first determine the resources as a second step. However, a remarkable point is that two students first tried to solve the problem with their existing knowledge, without the need to use resources. When students are asked to describe research they have done before, their efforts to complete the research with their existing knowledge are consistent with the result here.

Some students who research from the book look at the table of contents for the subject they are researching. In studies conducted in the literature, it has been stated that students mostly look at the contents section when searching for information in books (Karataş Ateş, 2013) or they use the title, cover, and index at the end of the book together with the table of contents (Hirsh, 1999). Internet users, on the other hand, choose according to the security of the Internet, the number of accesses, and the name. Another remarkable point here is that most of the students write the research topic exactly

and do not use keywords when searching the internet. In the study conducted by Ekici and Uçar (2012), more than half of the private school students who participated in the study searched using keywords, while less than half of the students in the public school who participated in the study searched with keywords. The inability of students to create keywords and query expressions is considered the problem experienced in the search process (Şerefoğlu Henkoğlu et al., 2015).

In the process of examining the source, the students write down the information in the source related to the subject. When asked how they used the information in the source, answers consistent with the result here were received, and again, the students stated that they used the information in the source by writing. However, it is also among the results of the research that students who prefer to write receive approval from others about what they will write. Besides the students who write the information in the source as it is, there are also students who underline important points. It is noteworthy that the students researched from different sources and did not assimilate the information they found and did not synthesize them. Similar results are also found in the literature (Menzi Çetin & Akkoyunlu, 2016; Walraven et al., 2009). Ekici and Uçak (2012) also determined in their study that students prefer to use ready-made homework instead of doing research and preparing original homework. It is among the results of this research that only one of the students summarized what they read or took notes. However, in the study conducted by Karataş Ateş (2013), it was determined that the students first took notes when they found the information in the sources, and according to this result, it was interpreted that the students were conscious about using the information. Accordingly, the low number of students taking notes within the scope of this research shows that the students participating in the research are not conscious of using the information in the sources.

When they finish examining the source, most of the students prefer to write down what they found in parallel with the previous result. While some of the students prefer to read what they have written for the last time, some others submit the accuracy of what they have written to others for approval or they check the accuracy of what they have written themselves. Another remarkable result was that the main purpose of a student's grades in the process was to be able to answer questions when the teacher asked questions. Students mostly share the information they have obtained by presenting, reading, or telling. In addition, activities, experiments, drawing pictures, giving examples, sharing what they have found, or using images such as slides are among the results of the research.

When the students were asked about the features that should be considered in the resources they chose, it was seen that the answers were gathered under two headings: general resources and internet resources. Within the scope of general sources, most of the students stated that they first paid attention to the source's relevance and then to the reliability of the source. In the internet resources, most of the students stated that they pay attention to the reliability of the resource on the internet and then to the subject. The result here is consistent with the result of the internet being in the last place because it is not reliable when asked to rank the resources used in order of priority with their reasons.

If students are going to use the internet, they attach importance to its reliability. Another point they pay attention to in internet sources is that the source contains the correct information, which ultimately refers to reliability. Similarly, in the studies conducted in the literature, it is stated that students doubt the accuracy of the information obtained from the internet (Yalçınalp & Aşkar, 2003; Ekinci & Uçar, 2012). The remarkable point here was that a student paid attention to the age-appropriateness of the existing resources and mentioned the difficulty of finding resources suitable for his age. Similarly, among the results of Karataş Ateş's (2013) study, it was stated that students had difficulty finding a printed information source suitable for their level.

It was found that the most important feature of the students while researching on the Internet is the security of the source. Most of the students participating in the study do not know how to determine whether the website is safe or not. Some students especially pay attention to the security warning on their phones, some students pay attention to the security sign at the top of the page, and some look to see if the correct information is available on the site. In addition, the frequency of use of the website by everyone, the firewall of the Ministry of National Education, and the appropriateness of the advertisements in the content of the site are the features that students pay attention to when deciding on their safety. In a study in the literature, students were found to be insufficient in choosing a safe source (Menzi Çetin & Akkoyunlu, 2016). In fact, although the students in this study state that they pay attention to the security of the sources they determine, they do not have enough information about determining the security of the source. For this reason, the results of this research show parallelism with the results of the study conducted in the field.

Most students agree that not all of the information in the sources is correct. Karataş Ateş (2013) also reached a similar conclusion in his research. Nine students prefer to consult another person to decide on the accuracy of the information in the sources. Few students compare with other sources. In addition, if it uses known sources related to the subject, the information in the content of the source is accepted as correct. While some students first read the information in the source and see if it is relevant to the subject, some pay attention to whether the research topic is included in the content. As a result, students do not have sufficient skills to determine the accuracy of the information in the sources. A similar conclusion was reached in the study of Walraven et al. (2009).

Students were asked how much time they spent doing research. It was noteworthy that some students gave random time slots without thinking about the subject they would research. Few students think that the duration of the research will change by taking into account the characteristics of the subject, such as whether the subject to be researched is easy or difficult, long or short. In general, students think that the time spent doing research is not important, but the information obtained as a result of the research is important. In addition, three of these students believe that long-term assignments are correct, neat, and beautiful. However, Zhang et al. (2009) concluded in their study that long-term studies cause more effort and are more unsuccessful. This study does not confirm the

idea that students' long-term studies will be more accurate. A student, on the other hand, thinks that the main thing is to complete the homework, so the time passed is not important. Another remarkable point is that if the student does not have any other course other than the course he will research, he can allocate more time for research, but the time that a student who has homework from other courses will spend on research is shortened. Students who think that the time spent doing research is important explained that if they spend too much time on research, there will not be enough time to complete their other assignments. In addition, since it is thought that misinformation can be reached in short-term studies and it is thought that long studies will result in long assignments, the time allocated for research is considered important.

While deciding the adequacy of the information obtained from the sources, the students are interested in whether the number of pages of the homework is long or short, and if the number of pages of the homework is short, they consider it insufficient. For some students, whether the homework is sufficient or not depends on the teacher's approval. Another remarkable answer is that the homework is sufficient if the information obtained is related to the research topic. In addition, according to some students, if the same information is reached when different websites are examined, the information obtained is still considered sufficient. Few students accept that information is sufficient when they are convinced that it is detailed, satisfying, and sufficient to learn concepts. In the study conducted by Walraven et al. (2009) with 9th-grade students, it was concluded that the students mentioned many criteria to evaluate knowledge, but they did not always use these criteria in practice.

Most of the students think that the sources used in the research should be specified. Remarkable results were obtained by citing references. The status of citing the source changes according to whether the assignment is a project assignment or not and according to the nature of the source. For example, there are opinions that if the source is the internet, it is not necessary to specify because it is not reliable, but if it is a book, it should be specified because it is a reliable source. Another point that the students who cite sources pay attention to is that the teacher will check or that they or others can benefit from those sources again at different times. Since very few students do not prefer it and find it unnecessary, it does not cite sources in its research. A similar result emerged in the study conducted by Ekici and Uçak (2012). Researchers have stated that students sometimes cite the source or think that it is not necessary to indicate the source, and if the grade they get as a result of the homework will be affected, they cite the source. In another study, if the author's name is not written on the research site, students do not make an effort to find the author (Walraven et al., 2009). The number of students who mentioned that citing sources is ethically important is very low. Although the students have a positive opinion that it is important to cite the source, they cannot explain enough about the reason for this. This result is in parallel with the fact that secondary school students are found to be inadequate in complying with the citation rules in the study by Menzi Çetin and Akkoyunlu (2016).

Some questions were asked based on research that the students had done before. It was asked who determined the subject of their research and it was stated that the teacher determined it according to the topics covered in the lesson. In Crow's (2015) study, three out of 5 students researched the subject they determined, while the others researched subjects related to their school duties. In addition, while four of these students researched the questions they created, one preferred the questions given to him.

Most of the students do their own research. However, a remarkable point is that a parent waits by the student during the research with the fear of entering the wrong site. Before starting a research, students do not make a plan for the research process. Most students use one or more resources in the research process. The remarkable result is that some of the students use their existing knowledge to complete the research or ask others for help from their mother, father, older brother, sister, or neighbour who goes to university or high school. Similar results were found in the literature (Crow, 2015). The reason for students who use more than one source to use the second source is to check the accuracy of what they find in the first source. In the next stage, the students present the results of the research for the approval of the teacher or family. While students question the reliability of the information on the Internet, it is quite contradictory that family elders use their information as a source in a research process. In addition, the fact that students present what they have done during the process for the approval of others can be interpreted as an indication that their students are foreign-dependent and have problems with self-confidence.

When students were asked to identify a research topic to conduct new research, it was determined that more than half of the students chose the topics they wanted to research and were curious about. Other students determined their subjects according to the activities completed during the year or done in the classroom. In the previous sections, it was mentioned that the students did not plan for the research process. Very few students explained what they would do and what might happen as a result of the implementation process. Most of the students only mention bringing together the materials they will use regarding the application process. At this stage, it is noteworthy that students tend to get approval from others.

When the students were asked about their reasons for doing research, most students answered by putting themselves in the center and explaining that they were doing research because they were curious and wanted to learn. In the study of Menzi Çetin and Akkoyunlu (2016), the fact that the students stated that they learned the content of the subject while doing the most research supports the findings of the current study. Fewer students conduct research by focusing on external influences such as homework because the teacher or someone else wants it. As for the frequency of doing research, most students answered as if they were curious and given homework. Unlike this result, it is stated in the literature that students are not interested in doing research at all or they are less interested (Menzi Çetin & Akkoyunlu, 2016).

Parents' level of interest in their children is medium or high. Students decide whether they are moderately interested in looking at the lack of interest. The excess of interest was effective in deciding that they were highly interested.

Author(s) Contribution Rate

The authors equally took part in all processes of the article.

Conflict of Interest Statement

The authors declare no competing interest.

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