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An Action Research on the Development of Research and Formatting Data as a Table Skills through Research-Based Teaching in Life Studies Course

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ABSTRACT

The aim of this study is to develop third grade primary school students' research skills and formatting data as a table skills as a secondary skill through research-based teaching in Life Studies course. Within the scope of this purpose, action research design was used in the study. The study group consists of third grade primary school students in the researcher participant's class in the 2021-2022 academic year. As a sampling technique, easily accessible sampling, one of the purposeful sampling methods, was used. The research lasted eight weeks, one day a week. During this period, activity-based skills training was applied to improve students' research and formatting data as a table skills. Through these activities, solutions were sought for the deficiencies observed in the process. Data were collected through observations made during the trainings, researcher diary, field notes and student worksheets. The data obtained from the research were analyzed with descriptive and content analysis. As a result of the study, students gained knowledge about research skill and its sub-steps and developed awareness and perception change towards research. They realised that conducting research is not only collecting data but also has other stages. However, they conducted all their research on the internet. They had difficulties in interpreting and organising the complex and dense information they encountered on the internet. This situation caused loss of motivation from time to time. However, students formed an idea about the steps to be followed while conducting a research.

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INTRODUCTION

In the 21st century, individuals are expected to have attitudes and behaviours such as processing information, questioning, researching, directing information with observations, implementing an idea, learning to learn and being curious and entrepreneurial. Defined as 21st century skills, these are also the priority of curricula. In this context, the use of skill-based practices in teaching is among the prominent issues in research.

Acquiring and using knowledge effectively is realised in situations where people have the chance to choose. Therefore, when an individual comes to the conclusion that the information is useful for them, they tend to do research (Hepworth & Walton, 2009, pp. 3-4). Among 21st century skills, ability to do research is among the capabilities that need to be acquired in advance for the development of many essential qualities. The inevitable increase in information sources makes it difficult to access accurate and reliable information. Therefore, studies on the relationship between research and learning have increased day by day (Arı, 2017; Bilir, 2015; Çavuşlu, 2014; Çelik, 2012; Dilbaz, Yelken & Özgelen, 2013; Duran, 2015; Duran & Dökme, 2018; Kaya, 2009; Keçeci, 2014; Kidman & Casinader, 2017; Obwegeser & Papadopoulos, 2016; Sarı & Ören, 2020; Tsivitanidou, et al. 2018). Jerome Bruner (1960) defines research as *"a process of discovery in which students find solutions to problems through scientific enquiry"* (Alouf & Bentley, 2003, p.3). Dochartaighise (2012) describes it as *"channelling, evaluating, selecting and delimiting information rather than gathering information"*. Looking at the foundations of research skills, the educational theory of pragmatism, which was influential with Charles Sanders Pierce, William James, and John Dewey in the early 20th century in America after the industrial revolution, emerges with progressivism. Pragmatism aims for knowledge that can be adapted to the future through the reconstruction of experience and knowledge. A good curriculum programme and inquiry-based activities have an important place in making this possible (Cevizci, 2019). *"Creating an active, enquiring classroom environment in school is indispensable in achieving the goal"* (Cevizci, 2019, p.132). Research in education is considered to be a powerful tool that enables people to learn about a subject area, learn how to learn by helping people develop independent learning skills (Hepworth & Walton, 2009).

Studies show that research-based methods increase the retention of knowledge and academic achievement (Bozkurt, 2012; Bozkurt, Ay & Fansa, 2013; Çalışkan & Turan, 2008, p.619). Llewellyn (2007, p.27) states that learning through research leads students to independent thinking by strengthening their knowledge, skills, and attitudes. For this reason, Carnell, and Fung (2017) state that research skills are necessary for all students and all disciplines. They also state that it should be explicitly included in curricula. In the literature, there are various studies conducted to develop research skills with students of different age groups and in different disciplines (Altay, 2022; Coşkun, 2018; Ecevit, Balcı, Yıldız, & Sayan, 2021; Hotaman, 2008; Kanatlı-Öztürk, 2018; Ödün-Başkıran, 2022; Tekindur, 2022). In the curriculum in Türkiye, research skill has taken its place in the curricula in line with the developments in the world throughout the history of the republic. In this context, it is seen that research skills are included in the majority of the programmes (Ministry of Culture, 1936; Ministry of Culture, 1948; MoNE, 1968; MoNE, 1997; MoNE, 2005; MoNE, 2009; MoNE, 2018). For example, among the aims of the 2005 Primary Education Curricula is to direct students towards scientific thinking, research, and study skills. One of the eight common basic skills in all courses in the programme is research skill. Research-inquiry skill is explained in the programme with the following statements: *"Research skill includes recognising and comprehending the problem by asking correct and meaningful questions, planning research on what and how to do in order to solve the problem, predicting the results, considering the problems that may arise, testing the results and developing ideas..."* (MEB, 2009, p.17-18). As can be seen, research skill enables the student to take a mentally active role. What is important here is that the teacher is equipped to guide the student. 2009 Life Studies Programme prepares this ground for teachers. It does this through outcome-skill matching in terms of

which skill is appropriate for which outcome. It also explains the steps of the skills in detail. Thus, it guides the instructors. The first step of research skill in the programme starts with asking questions. Then, students are asked to make observations and make predictions based on their observations. Then the data are collected, recorded, organised, and explained. Finally, the research results are made ready for presentation. Thus, the process related to the skill is completed (MEB, 2009, p.17-18).

Formatting data as a table skill is addressed in a broad and descriptive manner as *table, diagram and graph reading skills* in the 2009 Programmes. However, while research skills are included in the 2015 and 2018 Life Studies programs, formatting data as a table skills are not included separately. The sub-steps of research skills are as follows: “asking questions, observing, predicting, collecting data, recording data, organizing data, explaining data, presenting research results” (MEB, 2009). Formatting data as a table skill was included with the statement "Reads maps, tables and diagrams easily." (MEB, 2009). In this study, formatting data as a table skill is handled within the scope of the sub-step of research skill. For this reason, it is included as an indirect skill in the study. While applying the sub-steps of the research skill, it is involved in the stages of expressing and interpreting the results of observation in various ways as tables, graphs, and writings. Especially in studies that encourage students to research, it is aimed to transform the research results into simple materials such as tables and graphs. More precisely, students are expected to transform their data into appropriate tables according to the research questions (Aşkar vd., 2023).

The general aim of the Life Studies course is to provide students with practical knowledge. Tuncer (2009) says that the learning areas artificially divided by education are actually intertwined in real life and that the Life Studies Curriculum aims to present this to students. Research skills help the development of practical knowledge. Gültekin (2015, p.16) states that the Life Studies course is a life lesson that helps children gain versatile day-to-day abilities. The fact that the research skill that will be used throughout life is addressed within the scope of this course is also related to the overlap between the course and the skill. In the literature, it was not found that teaching practices for the development of research skills were carried out within the scope of Life Studies course. This study is considered important in terms of filling the gap in the field.

Purpose and Importance of the Research

In this study, it was aimed to enable third grade primary school students to actively use the research skill and the indirectly the formatting data as a table skill through various activities implemented in the Life Studies course and to teach them how to conduct a research and which stages to go through. For this basic purpose:

"1. How is the contribution of the research skill-based practice in the teaching process?

2. How is the contribution of the research skill-based practice on students' research?" questions were sought to be answered.

In the Life Studies course, skills are used in an integrated manner. While developing research skills, what is learnt is presented in a simpler and more comprehensible way such as tables, graphs, and diagrams. This study was considered important in terms of demonstrating the functionality of research skill in the programme.

METHOD

Information about the research design, study group, data collection tools and processes, data analysis and ethics committee approval are given below.

Research Model

In this study, action research design, one of the qualitative research methods, was used. "Action research is a continuous process for problem solving" (Yıldırım & Şimşek, 2013, p.335). Its aim is to

produce solutions to the problems that the researcher observes in the school or educational environment through remedial practices (Creswell, 2017, p.776). In this study, action research design was preferred in order to reach the solution of the problem experienced by the researcher participant in the classroom. Berg (2011) brought together different action research approaches and categorised them under three types: "technical/ scientific/ collaborative action research", "practice/ cooperation/ discussion-oriented action research" and "emancipatory/ developmental/ critical action research" (as cited in Yıldırım & Şimşek, 2016, p.308). In this study, "technical/scientific/collaborative action research" was used. In this approach, the aim is to test or evaluate an application within a predetermined theoretical framework (Yıldırım & Şimşek, 2016, p.308). Accordingly, the researcher participant implemented the research-based teaching approach in their own classroom. The process was analysed by all researchers and evaluations were made regarding the application.

In this study, the action research process consisted of 4 stages. Firstly, the research topic was decided (1). Then the study group was selected (2). Then action plans were prepared and implemented (3). Finally, the data obtained were analysed and their credibility was ensured (4). All these stages are explained below.

Selection of Research Topic

Researchers have been working on issues such as the development of the skills in the Life Studies curriculum and the inclusion of the related skills in the curriculum from past to present. Research and formatting data as a table skills are two of the skills that researchers have been working on. During the studies on these capabilities, the researcher (the first author of the study) realised that the students in the class did not perform well in studies that required them to use research skills. The teacher observed that the students could not follow the steps of the research process and that they asked for help from other people more often in these studies compared to other works. In addition, students were not aware of how to present their research using tables, diagrams, or graphs. The researchers thought that they could develop solutions to these observed problems by developing action plans together.

Formation of the Study Group

The study group consisted of 9 female and 8 male students in the researcher participant's class in a private primary school with a relatively high socio-economic level in Istanbul. The school offers International Baccalaureate (IB) education. The International Baccalaureate aims to raise inquiring, knowledgeable and sensitive young people who will help create a better and more peaceful world through intercultural understanding and respect (IB, 2017, p.7). In line with this purpose, education and training activities are carried out at the school to ensure that students grow up as inquiring and enquiring individuals both in the classroom and outside the school. The determination of the study group was influenced by the fact that the IB education implemented at the school offers a suitable school-classroom atmosphere for the development of the skills discussed in the study, and that the researcher participant thought that they could obtain in-depth and rich information from the students in their class. Since the researcher participant chose their class as the closest sample, easily accessible case sampling, one of the purposeful sampling methods, was used in this study (Yıldırım & Şimşek, 2013, pp.135-141).

Preparation and Implementation of Action Plans

Since it is contrary to the nature of the research process to give all of the research skill sub-steps in a single lesson consecutively, the research process sub-steps were divided into two groups by the researchers as shown in Figure 1. All subsequent studies and action plans were carried out according to this binary grouping.

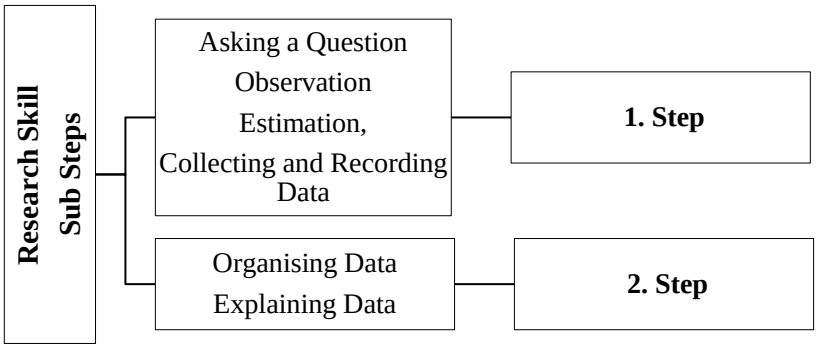


Figure 1. *Research skill sub-steps divided into two groups by the researchers*

Action plans and worksheets were prepared by the researchers according to the research skill sub-steps divided into two groups. The prepared plans and worksheets were finalised by taking expert opinion. Ethics committee permissions were obtained. According to the action plans, a total of 8 lesson contents, in which 5 Life Studies course outcomes were addressed, were applied to the students. The application was continued for 8 weeks in total.

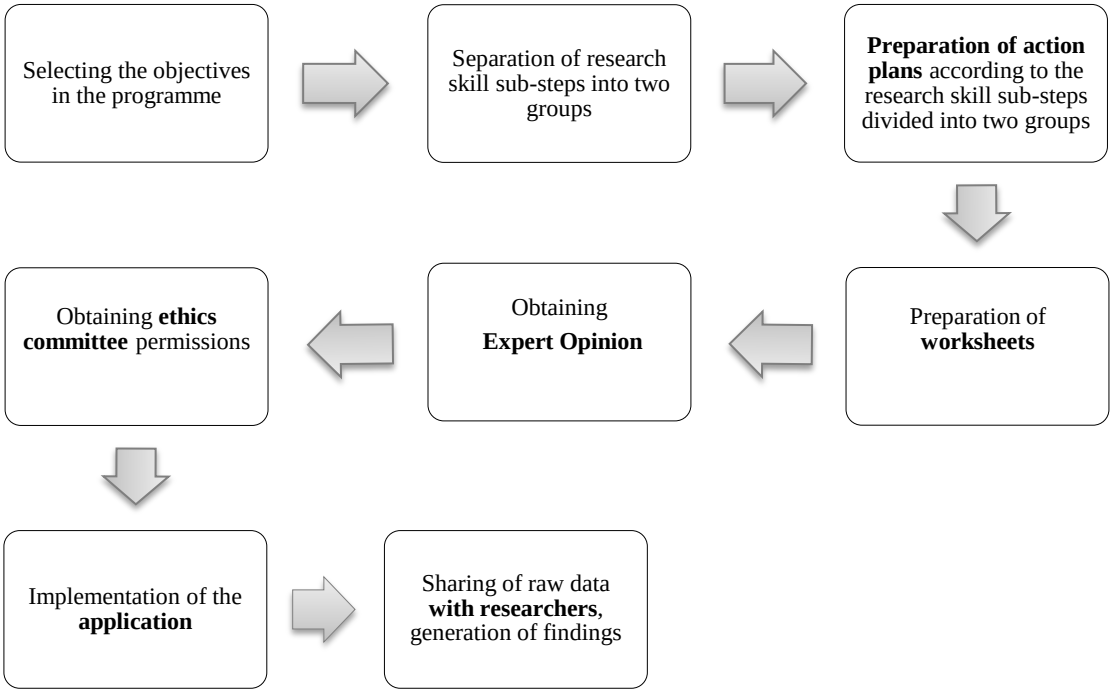


Figure 2. *Process path of research-based applications*

In the study, each action plan was carried out one day a week for one lesson hour. A Life Studies lesson topic was discussed for two weeks. In the first lesson on the selected topic, the lesson was usually started with an introduction that could attract the students' interest in the topic. Through dialogues with the students, it was ensured that they felt the need to do research on the selected subject. Below is the introduction of the lesson on "Wasted Resources" and a sample of typical dialogues between the students and the researcher:

The lesson started by watching a short animation of a mother who makes use of stale bread and her children who love to eat this bread, and the students were asked "Do you also have bread that you buy at home but cannot consume?" and "What do you do with the bread that you cannot consume?". The students were asked to give examples from their lives about the bread and food that

were not eaten. They gave answers such as "We feed it to animals", "My mother uses it in other dishes". The students were asked the question "Why do your mothers make so much effort to prevent the bread that you cannot consume from becoming waste?". The answers from the students were as follows: "There is a lot of labour in the production of bread.", "There are people in the world who cannot find food. Even a single grain is valuable.", "We are trying to prevent waste." "Let us not waste our resources" poster was shown to the students and the question "What is meant by the word resource in the sentence?" was asked. The answers from the students are as follows:

Duygu : It is what we need.

Veli : Water is a resource.

Mete : Our food, time.

Eda : Electricity is like water. Air is also a resource.

Based on these answers, the resources used at home, at school and in our country were determined with the students and the word "resource" was defined. Then, the questions "What is waste and saving?" were asked to the students. From the answers given by the students, it was seen that they had knowledge about the concepts of resource, waste and saving. The researcher asked the students "Do you know which resources are wasted the most in Türkiye or in the world?". The students listed the answers that came to their minds one after the other: "Electricity, water, food...". The researcher said that everyone had different estimates, but they were looking for the most accurate answer and asked the question "How can I get the most accurate information about the most wasted resources?". The students gave the following answers to the question:

Eda : We will do research.

Mert : We can ask Google.

Can : If we do research, we will find many sources. We can find accurate information.”

The students were asked the question "Shall we research the subject of waste?" and they enthusiastically answered that they wanted to do research."

After an introduction to the determined topic that could attract the students' interest and direct them to research, the first stages of the research skill given in Figure-1 were taught together with the students. Worksheets prepared by the researchers according to the sub-steps of the research skill were used for the students to record their work. By using a common worksheet format, it was aimed for the students to recognise the sub-steps of the research process. In addition, it was tried to develop an awareness of the order of these steps. At the end of the first lesson on the subject, students were directed to conduct research and record the results with the method of their choice. The students carried out these studies at home, outside of class time. In the face-to-face lessons in the classroom during this time interval allocated to the students for research, discussions were held about the difficulties experienced by the students in the research process and how they could overcome these difficulties. Students were frequently reminded that they should continue their research by focusing on their research questions.

In the second lesson of the determined subject, the second stage of the research skill given in Figure-1 was discussed. Accordingly, the activities of organising and interpreting the data obtained by the students by using tables, graphs and diagrams were carried out. During these activities, the worksheet format prepared by the researchers was used. At the end of this lesson, students were given the opportunity to present their work to their friends one by one. The Life Studies course outcomes selected in the preparation of the action plans, the names of the action plans and the dates of implementation are given in the table below.

Table 1. *Implementation process and topics addressed*

Objectives Addressed	Topics	Action Plans	Research Skill Sub-Step Group Addressed	Dates
HB.3.2.1. Compares the characteristics of the childhood of family elders with the characteristics of their own childhood.	**Comparison of Childhood Periods**	1. Action Plan	1. Step	23.11.2021
		2. Action Plan	2. Step	30.11.2021
HB.3.1.9. Makes unique suggestions for the effective and efficient use of school resources. **HB.3.2.6.** Makes original suggestions for effective and efficient use of resources at home.	**Wasted Resources** (Distance Learning)	3. Action Plan	1. Step	07.12.2021
		4. Action Plan	2. Step	14.12.2021
HB.3.3.4. Takes adequate and balanced nutrition to maintain health.	**Get to know the Food Pyramid** (Distance Learning)	5. Action Plan	1. Step	21.12.2021
		6. Action Plan	2. Step	28.12.2021
HB.3.5.9. Researches the people who have contributed to our country with their work.	**People who Contributed to Our Country** (Distance Learning)	7. Action Plan	1. Step	04.01.2022
		8. Action Plan	2. Step	11.01.2022
Total:	4 Topics	8 Action Plan		8 Days

Data Collection Tools and Processes

In the study, firstly, the gains of the Life Studies course that can be associated with research skills and then the sub-steps of the research skill to be taken as a basis for the creation of action plans were determined. These stages are asking questions, observing, predicting, collecting and recording data, organising data and explaining data (MoNE, 2009, p.17-18). These stages were guiding in the creation of action plans and materials. The data were collected online after the first implementation so that the research would not disrupt the programme at the school in the 2021-2022 academic year. In data collection, standardised worksheets prepared by the researchers, which were finalised after receiving expert opinion, lesson observation form, and field notes taken by the researchers were used.

Worksheets

The sub-steps of the research process were divided into two stages by the researchers. Accordingly, two separate worksheets were prepared. It was aimed that the worksheets would serve as a guide and the students would continue their research in accordance with the research skill steps in these worksheets. For this purpose, two standardised worksheets were used. In the first worksheet, the first stages of the research skill process given in Figure 1 (asking questions, making observations, making predictions, collecting, and recording data) were discussed. In the second worksheet, the second stages of the research skill process given in Figure 1 (organising data, explaining data) were addressed.

Field Notes

These are the observations made by the researchers during the application and the notes taken during the process, in which important moments and dialogues are recorded.

Data Analysis

Content analysis and descriptive analysis methods were used to analyse the data obtained from observations made during the lessons and worksheets. The main purpose of content analysis is to reach concepts and relationships that can explain the collected data. In cases where more than one researcher works together in data analysis, it is necessary to conduct a study on coding reliability. In this case, the researchers code the same data set and reach a coding percentage by numerically comparing the coding similarities and differences. In such studies, it is necessary to reach a reliability percentage of at least 70

per cent (Yıldırım & Şimşek, 2016, p.242, p.246). During the analyses, a second researcher coded the data to ensure coder reliability. Descriptive analysis is the analysis of the data according to the predetermined themes related to the research problem, aiming to reveal the data in a striking way with direct quotations from the participants (Yıldırım & Şimşek, 2013, p.256).

Analysis of Field Notes and Worksheets: In the study, Content analysis and descriptive analysis were used to analyse the field notes and student worksheets kept by the observers during the lessons. While analyzing the data, the researcher carefully read the student worksheets. Codes were created. Sub and main categories and themes were reached from the codes. The data quantified according to the themes were tabulated. Findings were supported with quotations from student worksheets. The data were also coded by the second researcher. The consistency value was found to be 0.89. The real names of the students were not included in the study. Instead, students were given nicknames such as Can, Ela.

In order to increase the validity of the research, one of the researchers conducted the implementation while the other one made lesson and student observations during the implementation process. The researchers took field notes separately. To better understand what was written on the worksheets, students were given the opportunity to explain their work during and between the lessons. It was aimed to ensure the reliability of the research with the worksheets and field notes kept by the researchers, and data diversification was used. The process was reported as detailed as possible. In addition, the data were confirmed by checking the consistency of the information obtained from various data collection tools (Güler, Halıcıoğlu & Taşğın, 2015). The opinions of three experts were taken to determine whether the activities were appropriate to the level, whether they covered the acquisitions, and whether they were purposeful or not.

Ethics

The ethics committee permissions required for the research were obtained from Istanbul University-Cerrahpaşa, Graduate Education Institute Social and Human Sciences Research Ethics Committee with the decision dated 09.11.2021 and numbered 2021/265.

FINDINGS

Figure 3, This figure describes the general systematics of the findings obtained in this study. As can be seen in Figure 3, the research skill sub-steps guided the preparation of lesson plans and the realisation of activities in all action plans, conducting student research and presenting the findings. All the data obtained through the implementation of the action plans are synthesised and shared below. In addition, student studies and notes obtained from the observer are also presented as examples to support the data obtained.

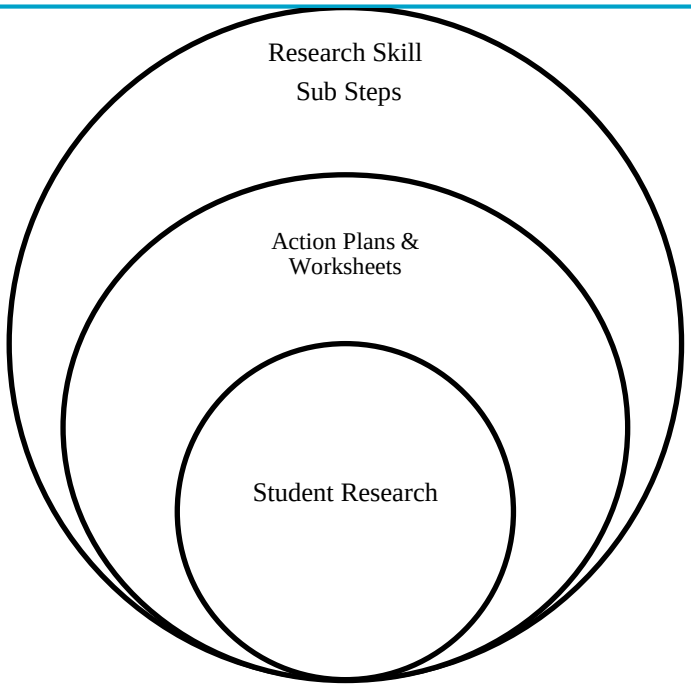


Figure 3. *General Systematics of Research Findings*

Action Plan 1

In line with Action Plan 1, the lesson on "Comparison of Childhood Periods" was started with an introduction that would attract students' attention to the subject. In order to make the students feel the need to do research on the subject, they were asked the questions "What do you think is the difference between your childhood and my childhood, how can we learn the differences between our childhoods?". The students gave answers such as "We can ask your mum, we can look on the internet, we can do research". The answers were collected, and it was stated that the most accurate information on the subjects of interest could be obtained as a result of research. It was stated that scientists also conduct research for this purpose. It was expressed that scientists first start their research by finding a topic and then ask questions that can direct the research process related to the topic they find. It was also added that scientists continue their research by following certain steps. The children were told that they could find the similarities and differences between their teachers' childhoods and their own childhoods by researching just like a scientist.

After this stage of the lesson, the research skill sub-steps (asking questions, making observations, making predictions, collecting, and recording data), which are given in Figure-1 and determined as Stage 1, were handled, respectively. Worksheets prepared by the researchers were used to take the necessary notes. The students were guided on how to think at these stages and to understand the effect of the stage they dealt with on the research process.

The work started with writing the topic sentence. How the topic should be determined and what to pay attention to were shared with the students. They were asked for their suggestions about the topic sentence. After the topic sentence was written, the stage of asking questions, which is the stage in which the research questions appropriate to the topic are written, was started. At this stage, the research questions suggested by the students were as follows:

Pınar : What was the name of your school?
Veli : Did children draw pictures?
Mete : How was the technology?
Duygu : How were the games?
Ebru : What games children used to play?
Okan : What did you do at school? How were the school buses?

When the research questions proposed and written by the students were analysed, it was seen that some students, such as Pınar, asked questions that required a single answer such as "yes, no". Others, such as Mete and Duygu, asked questions with more than one answer because they were not restricted and did not have the

necessary time and opportunities to conduct research. The answers were analysed in class. It was emphasised that questions with a single answer such as "Did children draw pictures?" caused the research process to end, the answers to other questions could not be obtained or additional questions were needed. It was stated that questions such as "What was the technology like?" were too wide-ranging to be answered completely. The reasons for the difficulty of answering wide-ranging questions during the research were discussed in the class. It was observed that many students, such as Ebru and Okan, were able to ask focussed research questions with a specific scope that could explain the research topic. The fact that such questions were suitable for clarifying the research topic was made realised by the class discussion with the students. Statements in the observer notes about the research questions are given below.

> "The students had no difficulty in asking questions. They were influenced by each other. They asked similar questions to each other. Some questions were narrow in scope, and some were too broad to be investigated." (Taken from the observer's notes dated 23.11.21)

It was stated that the next step after the writing of the research questions was the ***observation*** sub-step, which was the part where observations were made about the researched topic. The students were asked to describe the changes they had noticed since their birth or were aware of from the conversations they had with their families. Students had difficulty at this stage. They needed clues to give answers. Some observations shared by the students as a result of these clues are as follows:

Gül : Phone screens are getting bigger.
Mete : Gaming computers came out.
Veli : There were no drones back then.
Duygu : Foldable keyless phones came out.
Can : When my mother was little, they did not have mobile phones.
Pınar : There was no internet in the past. Everyone was doing research by looking at books.
Mert : Toys did not used to be electronic.
Eda : Houses were single storey. Children did not play with tablets. They played on the street. My parents always played hide and seek.

As can be seen when the answers given by the students are analysed, most of the students made their observations on the subject from a single perspective with a very narrow viewpoint. According to the field notes, only three students, together with Eda, wrote their observations from a broad perspective with the changes they were aware of in different areas such as "houses", "technology", "games".

After keeping records of the observations, the students were asked to write their predictions about the research questions they wrote. In the ***prediction*** sub-step, it was observed that the students avoided answering the questions because they were worried about giving wrong answers. After the students were informed about this issue, they gave more comfortable answers to the questions. The answers given by some students to the research questions in the prediction sub-step are as follows:

"Research question: What was the technology like?
Gül : Undeveloped.
Kaan : There was no technology.
Veli : Technology was zero.

Research Question: What was the things like?
Ebru : Things were very wormy.
Duygu : It was worn out.
Ali : Things were made of wood.

Research Question: How were the games?
Cansu : They were small.
Can : Games were played without technology.
Sinem : The toys were wooden.
Pınar : Games like hopscotch were played."

The above answers explain the observer's field notes.
"Students made predictions about some research questions based on their previous knowledge and

observations. While there were some students who made random guesses, it was observed that misconceptions affected the guesses of the majority." (Taken from the observer's notes dated 23.11.2021)

Collecting and recording data in this step, it was explained to the students that it was necessary to decide which methods should be used to collect and record data appropriate to the research topic and questions. The students were asked to determine and write down where they would collect the data in accordance with the subject. It was observed that the students were quite productive in this regard and had no difficulty in giving appropriate answers. Some of the data collected from the student worksheets related to the data collection and recording step are as follows.

"Data collection step:

Pınar : I can do interviews. I can look at old things. I can do research.

Mert : I will ask the old-timers. I will collect it by research.

Data recording step:

Cansu : I can file a report.

Mete : I will write it on paper. I will write it on the computer."

As can be seen in the examples above, many students answered the question *"Where will we collect the data?"* by doing research during the lesson. This situation made the researchers think that the students perceived the process of conducting research only as the process of data collection.

Action Plan 2

A box containing old toys, a photo album with old pictures, a slide prepared by the researcher about her childhood and a computer were brought to the classroom. The students recorded their data on the T-table by looking at the old toys belonging to their teachers, interviewing their teachers, and examining the albums with the data collection and recording method they determined in the previous lesson. The statement in the observer notes of the data recording step are as follows.

"The students were very excited throughout the process. They were able to record data with methods such as T-table and direct notetaking. Four students could not work efficiently in the data recording step due to reasons such as writing in a longer time than their peers, wasting a lot of time outside the subject with the material they examined, and losing motivation due to mistakes made. (Taken from the observer's notes dated 30.11.2021)

After this stage of the lesson, the research skill sub-steps (organising the data, explaining the data), which are given in Figure-1 and determined as Step 2, were handled, respectively. In the step of ***organising the recorded data***, it was explained to the students why the recorded data should be organised. The importance of choosing a method suitable for the characteristics of the data was emphasised. Students were shown examples such as figure graph, object graph, Venn diagram, tally table, frequency table and asked which representation method is suitable for their data. A class discussion was held on several methods about the suitability of the method for the research. Students were directed to organise their data with the methods they chose. At this stage, it was observed that all students except 1 student organised their data using a Venn diagram. The researcher noted in the practitioner field notes that this situation was related to the effect of the discussion in the classroom.

It was observed that the excitement observed in students while writing research questions and collecting data decreased while organising the data. It was thought that the decrease in motivation was due to physical and mental fatigue towards the end of the lesson. Below are sample studies of a student who recorded data using a T-table and partially organised them using a Venn diagram.

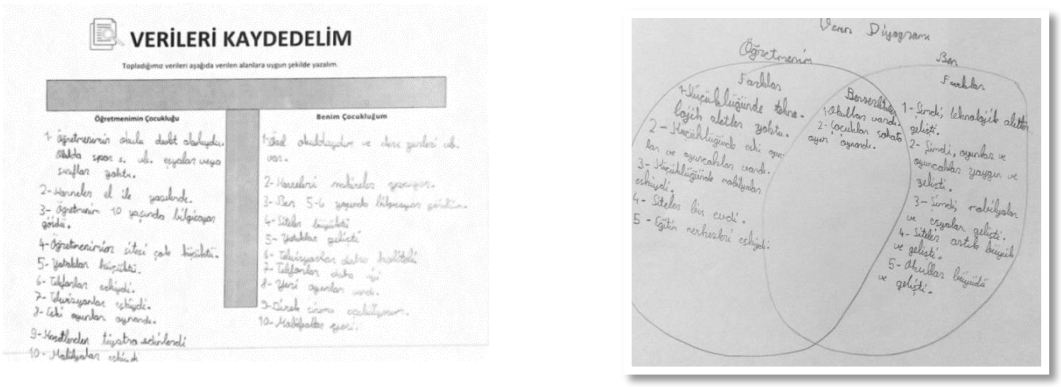


Figure 4. *T-table and Venn diagram of Can.*

In Figure 4, it is seen that some of the data recorded by the student in the T table are not in the Venn diagram. Like Can, many students had difficulty in transferring the data they recorded completely. In addition, at this stage, when the tables created by the students were analysed by the researchers, it was seen that there were no answers to the research questions in the tables. Therefore, it was thought that the students could not perceive that the research questions managed the whole process. It is planned to take additional measures for both problems in future lessons

After the data were organised with the selected method, the step of ***explaining the data*** was started. Students had no difficulty in reading and interpreting the tables and diagrams they created.

> Most of the students explained the recorded data with a single sentence in the section allocated in the worksheet. 7 students were able to summarise and explain their data. 1 student left this field unanswered. (From the observer's notes dated 30.11.2021)

Action Plan 3

In line with Action Plan 3, the lesson on "Wasted Resources" started with an introduction in which the concepts of "waste, saving, resource" were discussed to attract students' attention to the subject and to reveal their prior knowledge on the subject. For the students to feel the need to do research on the subject, questions were asked to the students -as in the previous lesson-. Accordingly, the students were asked "How can we access the most accurate information about the most wasted resources in the world?". To these questions, the students answered "We can do research. We can ask Google. If we do research, we can reach many sources and find more accurate information." At this stage, it was observed that the students were very excited and wanted to start the research process immediately. To start the research process, worksheets prepared for the students were distributed.

After this stage of the lesson, the sub-steps of research skill, which are given in Figure-1 and determined as ***Stage 1***, were handled in order. Students took the necessary notes about their research on the worksheets distributed.

The research process started with writing the topic sentence. By means of the suggestions from the students, the topic was determined as "Wasted resources". Then, the stage related to the sub-step of ***asking questions*** was started. The things to be done at this stage were reminded. Students were asked to write their research questions. The research questions suggested by the students are as follows:

Pınar : Which resource is wasted the most?
Can : Which resources are wasted the least?
Veli : Which resources are we wasting?
Mete : How many tonnes of water is wasted in our country?
Ayşe : How much food is wasted in a year?

At this stage, it was observed that the students did not have difficulty in finding research questions as in the previous lesson. As before, they were influenced by each other's research questions and wrote similar questions to each other. Unlike the previous lesson, in this lesson, it was noticed that students asked less questions that required a single answer or were not focused, that is, questions that were far from

explaining the research topic and were not circumscribed.

Observation stage was started. At this stage, students were asked to share what they noticed and saw about wasted resources. It was realised that the students did not have difficulty at this stage and that they had many observations on this subject. Some of the students' observations are as follows:

Can : I see bread being thrown in the bin. I see people crumpling napkins and playing basketball with it.
Kaan : They show their hands to the electronic soap dispensers at school. Soap runs down the drain and collects at the bottom.
Pınar : In restaurants, I see people leaving their food unfinished. The waiters throw away the leftovers. I see mouldy whole loaves of bread left on the street next to rubbish bins. Also, a lot of water is wasted when washing our apartment block.
Eda : Mum never throws bread in the bin.

As seen in the answers given in the sub-step of ***making observations***, Pınar makes her observations with a wide perspective with the events she witnessed in different places such as restaurants, streets, and apartments. The majority of the students in the class also recorded their observations about the subject using a wide perspective like Pınar. When Eda's answer is examined, it is seen that Eda made her observations with a narrow perspective by considering only her mother's behaviour. When the worksheets were analysed, it was seen that a total of 3 students, including Eda, recorded their observations about the subject with a narrow viewpoint.

At the ***prediction*** stage, the question "What should predictions be made according to?" was asked. The students answered this question as "We should look at the research question". It was noted in the observer notes that the students were much more comfortable and braver in the prediction step compared to the first lesson. Some of the predictions made by the students according to the research questions are as follows.

Okan's Estimation Related to the Research Question "Which is the Most Wasted Resource?" When I cross the bridge at night, I see that the top of Istanbul is white. That is why electricity is wasted the most.
Can's Estimation about the Research Question "Which is the Least Wasted Resource?" Fruits and vegetables are wasted the least.

When the predictions of Okan and Can given above as an example were analysed, it was seen that some of these students made predictions based on their observations, and some of them made random predictions independent of any criteria, as in the comment "The least amount of waste are of fruits and vegetables".

The students were informed about the last ***step of collecting and recording the data***. The students were asked to determine and write down where they would collect the data in accordance with the topic. They gave appropriate answers to the subject. They stated that they would collect the data "from the Internet, encyclopaedias, books, other people" and that they would record the data "by taking notes and using computers". The answer "by doing research" given to the question "Where will I collect the data?" in the previous lesson was not observed in any of the students in the second application. The studies with the students on the subject were terminated after this stage. They were directed to conduct research in their out-of-class time according to the research questions they wrote and the data collection-recording method they determined.

Action Plan 4

In line with Action Plan 4, the lesson was started by reminding the concepts mentioned and discussed in the previous lesson. Upon the students' impatient statements such as "I could not find the answers to all my questions. There was nothing on the internet.", a conversation was started with the students about whether they had difficulties in ***collecting and recording the data***. During the conversation with the students, some noteworthy sentences about the research are as follows:

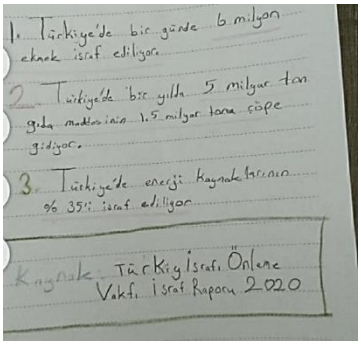
Mete : I could not find answers to some of my questions. I could not find anything for 2020. I found information according to 2018. I found that food was wasted, but I could not find how much it was wasted.
Pınar **:** I found percentage results. I could not find any other results.

Ali **:** In my research, I found strange things like natural gas, lignite. I could not figure out what they were.

Can : I could not find out how much food and water are wasted.

It was observed that the students had difficulties in reaching the right sources in their research, reading, and interpreting the sources they reached. It was thought that this situation was due to the fact that the students could not understand many written texts due to their age and could not recognise the units of measurement used in expressing the quantities of the sources. Due to the limitation of the application period, it was not possible to repeat the data collection phase or to change the research question. For this reason, the students were told that they could continue the research with the data they obtained. It was expressed in a language appropriate to the level that they may encounter similar situations in the research process.

After this stage of the lesson, the sub-steps of research skill, which are given in Figure-1 and determined as ***Stage 2***, were handled, respectively. In the step of ***organising the recorded data***, why the data should be organised was explained to the students once again. The students were shown various examples and asked which representation method was appropriate for the data obtained. A class discussion was held, but the students who could not understand the meaning of the data they obtained had difficulty in choosing reasonable representation methods. The researcher guided the selection of the graph. The tabular method was chosen, and the representation was reduced to the level appropriate. The following are examples of Eda's work, who organised her research notes with the tabular method.



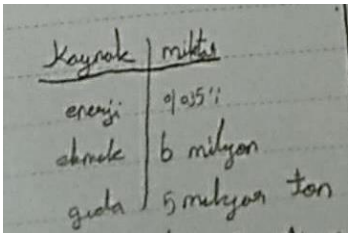


Figure 5. *Eda's research notes*

As it is clearly seen in Figure 5, the student reached different information about each source in their research. This student tabulated the results with the guidance given in the class. As can be seen in Figure 6, the data obtained cannot be compared with each other. It is also seen that the student made mistakes while transferring information from research notes to the table.

The students did not have any problems in drawing the table selected with the guidance of the researcher. It was also shared with the students that the data obtained were not suitable for interpretation and comparison with each other. For this reason, the desired efficiency could not be obtained in the step of ***explaining and interpreting the data.*** When the student worksheets were analysed, it was seen that 7 of the students left the relevant section unanswered, 5 students tried to explain the tabulated data with a single sentence as "The table shows the wasted resources". 2 students explained the tabulated data as "In my table, it is explained how much water and electricity are wasted in our country. It is seen in my table that clothing waste and bread waste are also quite high in our country."

Action Plan 5

In line with Action Plan 5, in the lesson on "Balanced Nutrition", it was tried to draw students' attention to the subject based on their prior knowledge on the subject. For this purpose, students were asked questions such as "With whom do we share the world we live in?", "Are plants and animals important for humans? If so, explain the reason for this." The students were made to think about the fact that plants and animals are our food sources. With the videos watched, it was aimed for students to learn about the areas in which plants and animals are utilised. Students were asked to classify foods as plant and animal foods through visuals. Students were presented with a visual of a newspaper article. The students were told "Plant and animal foods should be consumed in an

adequate and balanced manner. If you want to learn how much you should eat from plant and animal foods, you can look at the food pyramid." was read to the students. Drawing attention to the words "Food Pyramid" in this sentence, the students were asked the question "What is the food pyramid?". With this question, it was aimed to make the students realise what they know about this subject. The students were asked the question "If you are a scientist and you are invited to a television programme, if you are not sure about your knowledge about the food pyramid, what would you do to get accurate information?". The students gave the following answers to the question without thinking.

Sinem : We do research.
Pınar : We ask questions, we speculate.
Mete : We make observations.

The notes taken by the researcher during the observations about the answers given by the students are as follows:

> The answers given to the question "What do you do to obtain accurate information?" consist of research skill sub-steps. These answers suggest that students started to perceive the concept of "doing research" with its sub-steps (From the observer's notes dated 21.12.2021)

The students said "Come on, teacher! Let us investigate the food pyramid." and they were very eager to do research -as in the previous lesson- with excitement and by interrupting the lesson flow. After this stage of the lesson, the sub-steps of the research skill, which are given in Figure-1 and determined as ***Stage 1***, were handled in order. The students took the necessary notes about their research on the worksheets distributed. In addition, the support of the researcher on the students was deliberately partially reduced with this lesson.

At the stage of determining the topic, the students understood what the research topic was. The research topic was determined as "Getting Information About the Food Pyramid" by brainstorming in the classroom. The students were told that the sub-step of **asking questions** was started. The students were asked "What should be done at this stage?". They answered, "We will ask the questions we are curious about" and "We will write the questions we want to investigate". It is thought that the importance of the research question writing step in the research process has started to be understood by the students. The research questions suggested by the students are as follows:

Gül : How to read the food pyramid?
Pınar : What information does the food pyramid contain?
Eda : Which foods are at the top or bottom of the food pyramid?
Okan : What does the food pyramid do?

The notes kept by the observer during the writing of the research questions are as follows:

> "The students enjoyed writing and finding research questions. They were very excited to say the questions they found. The ones who could not find the answers to some of the research questions in the wasted resources lesson talked among themselves in this lesson and warned each other with sentences such as "Do not ask ranking questions, such answers do not exist on the internet." They warned each other with such sentences. This situation suggests that students have started to become aware of the writing of research questions and the importance of it in the research process (From the observer's notes dated 21.12.2021)."

When the worksheets of the students were analysed, it was seen that 12 students asked focussed research questions that could explain the research topic and had a specific scope. 2 students, on the other hand, asked unfocussed questions that were far from explaining the research topic, were not circumscribed, and did not have the time and opportunity to be investigated.

In the observation and prediction phase, students were asked to work individually. All of the students were able to write their observations in accordance with the research topic and their predictions according to their observations and research questions without the need for help. In the ***observation*** sub-step, it was observed that all students except 1 student made observations with a broad perspective. In the ***prediction*** sub-step, it was observed that almost all of the students made predictions about the research questions by determining their previous knowledge and lives as a criterion. The worksheets of two students are shown in Figures 6 and 7. These

worksheets provide examples that support the observations of the researchers below.

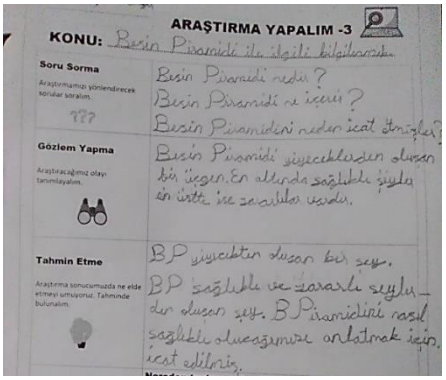


Figure 6. *Ela's worksheet*

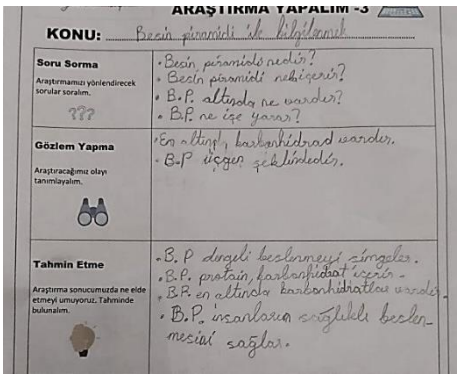


Figure 7. *Pınar's worksheet*

In the ***data collection*** step, students were asked to determine where they would collect the data in accordance with the subject. It was observed that the students gave answers similar to the answers they gave in the previous lessons. It was noticed that they often answered the data collection section as "Internet" or "Google". Examples of the answers given in the student worksheets are presented in the figures below.

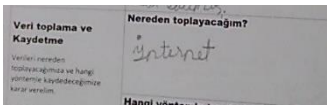


Figure 8. *Ela's worksheet*

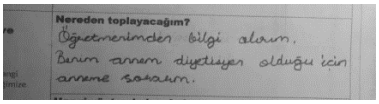


Figure 9. *Şirin's worksheet*

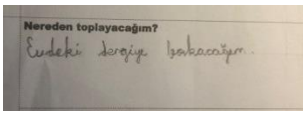


Figure 10. *Duygu's worksheet*

Like Ela, 14 students in the class stated that they would collect data through research on the internet or Google. Şirin said that she would get information from other people such as her teacher and her mother who is a dietician. Duygu and 2 students stated that they would collect data in different ways than their other friends by looking at magazines or books at home.

Almost all of the students answered the section on the worksheet related to the sub-step of ***recording the data*** as "I will make a report, I will take notes" as in the previous lessons. It was observed that the students were not willing to record the notes by means of tables, graphs, etc. and were timid. The observer's notes on this subject are as follows.

> "Students are not sufficiently familiar with methods other than note-taking. For this reason, they have difficulty in choosing the method suitable for their data. Methods other than note-taking require a higher level of cognitive competence. Therefore, I think that methods other than note-taking are less preferred (From the observer's notes dated 21.12.2021)."

The studies with the students on the subject were terminated after this stage. According to the research questions they wrote and the data collection-recording method they determined; students were directed to conduct research in their extracurricular time.

Action Plan 6

The students were reminded of the concepts and discussions about the subject in the previous lesson. It was observed that the students reinforced their knowledge about the subject covered in the previous lesson with their answers such as "We talked about the food pyramid", "Bread and cereals are at the bottom, teacher", "The pyramid tells people what they should eat". Since the majority of the class chose the "note-taking" method, it was desired to draw the students' attention to this area. Gül's mind map in **Figure 11** and Can's notes in **Figure 12** were analysed in the classroom. The advantages and disadvantages of both note-taking methods were discussed.

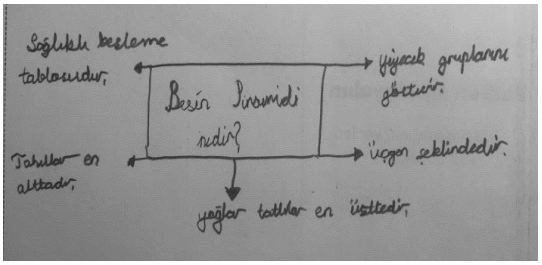


Figure 11. *Gül's research notes*

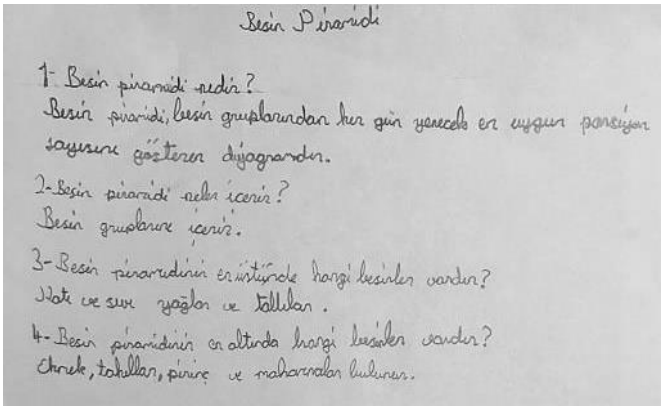


Figure 12. *Can's work*

During the conversation, the students stated that Gül's method was more effortless than the other methods in recording data. They said that with this method, readers can understand the information more easily. The students considered the fact that the research questions were not included in the mind map as a deficiency of the method. Regarding Can's study, they stated that writing was very tiring. They said that this difficulty could be solved with the help of computer.

During the processing of Action Plan 4, students stated that they had difficulties in the data collection phase. For this reason, in this lesson, the question "What difficulties did you experience during the data collection phase?" was asked to the students. They said that they did not have any difficulties. They wanted to share the results they obtained with excitement. The note taken in the researcher's diary about the data collection phase is shared below.

> "The fact that the students were directed to conduct research on understandable and accessible information appropriate to their level seems to have increased the motivation of the students during the research process. In the studies to be carried out on research skills, it should be considered whether the selected subject requires prerequisite learning and whether the data to be obtained will be appropriate for the level (From the observer's notes dated 28.12.2021)."

After the introductory activities of the lesson, the sub-steps of the research skill, which are given in Figure-1 and determined as **Stage 2**, were handled, respectively. In the step of ***organising the recorded data***, 2 of the students showed the data obtained as a result of their research on the table, while 13 of them showed them on the food pyramid. Individual studies were carried out with the students to prevent data loss while organising their data. The students were directed to include all the answers to the research questions in their tables or drawings. The students were asked the following questions about the food pyramid they drew: "Why was there a need for such a graphic about nutrients?", "What would happen if the information given in this pyramid was written in the form of items?". The answers from the students are as follows:

Ebru : It is more noticeable that way.
Mete : You do not waste time reading. It is more understandable.
Şirin : If it were written down, no one would pay attention and read it.

After the answers given, it was thought by the researchers as follows: The awareness of the students about the place and importance of the data organisation sub-step in the process has increased.

The step of ***explaining the data*** was started. At this stage, it was emphasised that it is also important to know how to read a diagram. The students were asked to explain whether they obtained results related to their predictions based on the predictions they made at the beginning of the research. The students explained the following:

Okan : I thought there were unhealthy foods at the bottom and healthy foods at the top. It turned out the opposite. I learnt that carbohydrates are at the bottom and fats and sugars are at the top."

Şirin : I thought there were vegetables at the bottom, but I saw those foods such as wheat

and bread were at the bottom. The food pyramid helps us to have a balanced diet."

Pınar **:** I found out that the food pyramid is a diagram showing the number of servings to be eaten daily. I had seen it before, but I didn't know how to read it."

The students enjoyed comparing the results of the research with their predictions. They answered the questions with fun. Students were excited to see in a concrete way that they could reach the right information through research. When the worksheets of the students were analysed, it was seen that 7 students explained their data with a single sentence and 8 students summarised their data in the sub-step of explaining the data. At the end of the lesson, an exit ticket activity was carried out with the students about reading the food pyramid. Students left the lesson by reading the pyramid correctly.

Action Plan 7

In line with Action Plan 7, in order to increase the readiness of the students for the lesson on "People Who Contributed to Our Country", a reading book about the life of Aziz Sancar was read with the students one week before the implementation. It was ensured that the students got to know Aziz Sancar. The lesson started with a video about him. In the video, he said "I am happy for my hometown. May it be auspicious for our country." Based on this, the contribution of the award to our country was questioned. Students were asked whether there were people other than Aziz Sancar who contributed to our country. They mentioned many names such as "Sabiha Gökçen, Akşemsettin". The students were asked "How can you find out that there are people who have contributed to our country other than the people you mentioned?". The students answered "By doing research" without any hesitation. Then the researcher asked the question "Which sub-steps does the research process consist of?". The students answered, "Asking questions, predicting, making observations", "The topic should be determined at the beginning." "Googling." "We take notes. We tabulate the notes we take.", "Lastly, we make comments." The observer included the sentence "Students' awareness of the sub-steps of research skills increased." in his notes dated 04.01.2023 about the dialogue.

After this stage of the course, the sub-steps of research skills, which are given in Figure-1 and determined as ***Stage 1***, were handled in order. In this course, the support of the researcher on the students was deliberately minimised. Students were directed to work individually.

During the topic determination phase, the students were aware that they would choose a research topic related to the activities in the introduction of the lesson, as they were used to from previous lessons. They were able to determine the research topic easily. In the sub-step of ***asking questions***, it was observed that the students acted in a way that they knew what to do. Some of the research questions written by the students at this stage are as follows:

Cansu : In which field are there the most successful people in our country?
Veli : How many scientists have lived in our country?
: Who has achieved the most success in the field of science in our country?
Pınar : In which fields has our country achieved the most success?
Duygu : Who received the Nobel Prize?

As can be seen in the examples above, when students worked individually, they wrote questions with a single answer and comprehensive questions with many answers. It was thought that the students still needed more guidance in this regard. For the research process to continue, students were allowed to think about the questions they wrote. Students were guided to organise their questions.

At the ***observation*** stage, it was observed that children with a low level of interest in their environment had difficulty in writing their observations about "People who contributed to our country". The students who had difficulty made sentences such as "I have no observations", "I can't think of anything".

In the ***prediction*** step, students wrote their guesses without any guidance. The research question "In which field are there people who have achieved the most success?" was asked. The question was asked: "I think the most success has been achieved in the field of sports. I hear this a lot." As well as the student who answered, "How many children have received awards in karate?", there were also students who answered, "There may be 20 children.". From this point of view, it was observed that some of the students in this lesson made predictions based on their observations, while others made random predictions. While writing their predictions, it was

recorded that some students made conversations such as "I wonder what will actually come out?". It was thought that being able to confirm their predictions with the results of the research excited them.

The step of ***collecting and recording the data*** was started. In this step, students did not need any guidance. As in the previous lessons, they frequently answered "Internet" or "Google" for data collection and "I will make a report, I will take notes" for data recording.

Action Plan 8

Before starting the implementation of Action Plan 8, students' research reports were analysed. It was observed that students mostly could not find direct answers to their research questions. It was noticed that they wrote the closest and shortest answers to their questions. As soon as the lesson started, the students wanted to read their research reports to their classmates. The other steps of the research were reminded, and the students were asked the question "Why should the notes taken in the research be organised?". Most of the students answered this question as "For the readers to understand...". According to the researchers, the practices carried out in the 1st, 3rd and 5th action plans and the subject of drawing and interpreting tables, graphs, diagrams influenced the students. This situation made it easier for them to understand why tables and graphs are needed.

After the introductory activities of the lesson, the sub-steps of the research skill, which are given in Figure-1 and determined as ***Stage 2***, were handled, respectively. In the ***data organisation*** stage, different table and graph examples were shown to the students. They were asked to choose the most appropriate representation method for their own data and organise their data accordingly. Fourteen of the students in the lesson chose the tabular representation method. Based on the fact that they frequently chose this method in previous lessons, the researcher wanted to learn the reason for this situation. The researcher asked the students the question "Why did you choose the table method?". The students gave answers such as "This method is easy for me", "I also use this method in my homework", "Readers can understand it immediately". One student in the class organised their data by using a mind map.

Figure 13. *Eda's work*

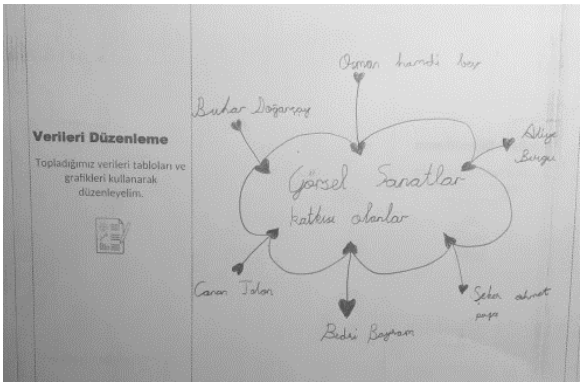


Figure 14. *Şirin's work*

As can be seen in the figures above, Eda organised her data using the table method. Şirin, on the other hand, organised her data using mind maps. Like Eda and Şirin, all of the students in the class were able to tabulate their data. However, when the research reports created by the students at the beginning of the lesson were compared with the tables they drew, it was observed that -as in previous lessons- they did not include some of the data they recorded in their tables.

In the sub-step of ***explaining the data***, students were able to interpret their data in accordance with the research questions and the tables they drew. In this step, two of the comments written by the students on the worksheets related to the data they organised are presented below as examples

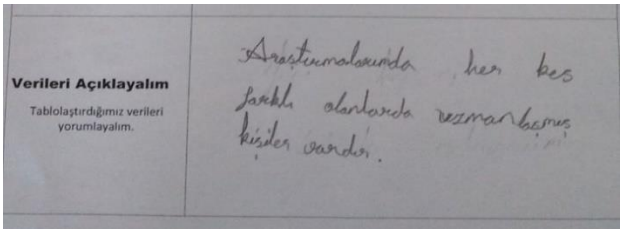


Figure 15. *Eda's work*

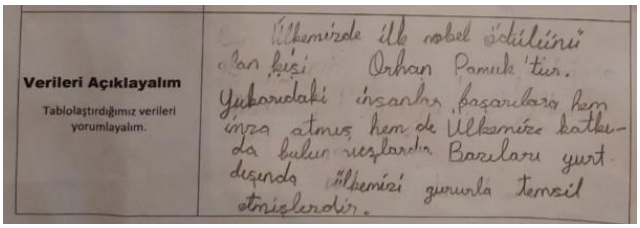


Figure 16. *Pınar's work*

Eda explained her data in her study using a single sentence. Eda did not include details in writing. When asked, she could explain her table in detail. Pınar summarised her table by mentioning the properties of the data she obtained. While 6 students in the class explained their data with a single sentence, 9 students summarised the data like Pınar.

Students were also asked to compare the results of the research with the predictions they made in the data explanation step. Accordingly, the students gave the following answers: "I thought Aziz Sancar was the first person to receive the Nobel Prize, but I learnt that Orhan Pamuk received it.", "I couldn't find an answer to my research question. I don't know if my guess was wrong.". At this stage, it was once again realised that not having the skills of writing the right research question and interpreting the data obtained from various sources affected the research process.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

As stated in the literature, the development processes of students' research skills through research-based applications have been examined. The main purpose of this research is to reveal the development of research skills. In this way, the strengths and weaknesses of the application made in the development process of research skills were taken into consideration. This situation will shed light on the application of research skills in Life Studies course. Our study is important because it is the first in the field in terms of eliminating this deficiency in the Life Studies course.

The effectiveness of the application in the classroom and the effect of the application on students' research were analysed. In this context, the findings were analysed according to the sub-steps of the research skill in the 2009 Life Studies Programme. The first step is the step of asking questions. This step is important for students to acquire research skills. Because failure to acquire the first step of the process will negatively affect the other steps. The importance of the questioning step is also found in the literature (Akyol, Yıldırım, Ateş & Çetinkaya, 2013; Aydemir & Çiftçi, 2008; Dindar & Demir, 2006; Büyükalan-Filiz, 2002; Savaşkan, 2013; Yürümezoğlu, 2008). In this study, it was observed that students asked questions requiring a single answer such as "yes, no" or asked questions that were not focused on the topic. These types of questions appear in various studies as low-level cognitive questions in the literature (Akyol, 2001; Erdoğan, 2017; Yurtbakan, 2022). In a study, it was observed that the inability to ask questions continued in the later years of primary education (Çakıçı, Ürek & Dinçer, 2012). However, aiming to develop students' mental processes while conducting research, asking questions related to the subject and selecting useful ones from the questions are important on research skills (Karamustafaoğlu & Havuz, 2016). According to a research, the important thing is that the student asks their own question and searches for the answer themselves. (Karakuş, 2001). In this study, it was observed that students were able to produce research questions. It was understood that they easily grasped the process and did not have difficulty. It was concluded that they could answer the generated questions. However, students who asked longer or shorter questions than necessary lost motivation. As a similar result, a previous study states that in research-based classroom practices, students construct knowledge when they answer questions with efforts in accordance with the research steps. In addition, as a result of the study, if the questions formed by the students were appropriate for their level to answer, their motivation increased, if not, it decreased (Tatar & Kuru, 2006). From this point of view,

the step of asking questions motivates students while directing them to research and plays an important role in structuring knowledge. Since motivation provides meaningful learning, students who are not sufficiently motivated cannot participate in the research process or passively listen to the lesson (Edelson, Gordin & Pea, 1999). However, it is also known that research-based learning activities improve students' motivation (Bilir, 2015).

In addition, the importance of the teacher's guiding role in this process (Ash, 2000) is clearly evident at many stages of research and observation skills. Students may lose the integrity of research skills from time to time. They may deviate from the research question by making wide perspective observations. On the contrary, they can also make very shallow, narrow-perspective observations. At these points, the importance of the teacher's guidance is understood. Özdemir and Işık (2015) also revealed in their study that the teacher's guiding role is very important in the research and observation stages. Especially in research-based applications, the teacher's guidance is important in developing students' scientific process skills (Yıldırım & Altan, 2017). In this study, the observation skill progressed together with the prediction step, which is the third step of the research. Students learnt to confirm the prediction result through observation skill. In the study, the more the subject of observation was from life, the wider perspective they made their observations. This situation is in direct correspondence with the principle of close to far principle of the Life Studies course. For this reason, lessons are planned by considering the immediate environment in the Life Studies course (Uçar, 2004). In addition, while using the prediction skill, students either made predictions based on a criterion or made random predictions. In a study, it was concluded that students who made random predictions were ones with low metacognitive knowledge (Şengül & Budak, 2017). However, in this study, students' metacognitive knowledge levels were not addressed. In this study, students made random guesses that were not related to the topic.

Another result of the research is that the students received information only from the internet during the data collection phase. They preferred to record the data by taking notes. It is thought that this situation may have been caused by the students' choice of the easily accessible way of obtaining information and the familiar way of organising data. In addition, students developed awareness about the stage of collecting and recording data. Initially, students perceived research only as a data collection process. As a result of the study, they tried to find appropriate answers to the research questions by filtering the information. At the end of the process, they were able to explain and apply at least one of the research steps correctly. Students had a positive perception change about the research process. However, they had difficulty in interpreting the information they accessed from the internet during the research process. At this stage, they tended to abandon the research, or their motivation decreased. Students could not decide which information to choose among the large amount of information on the web. According to experts, information should be short. As it expands, it becomes difficult to make a decision when selecting because of the details (Durna & Demirel (2008). A similar study shows that unnecessary, complex, and dense information on the internet is information pollution. This pollution leads to results such as giving up searching for information and low motivation (Fırat & Kurt, 2008, as cited in Fırat & Kurt, 2015). In the literature, it is seen that students have difficulty in extracting the information on the internet (Yalçınalp & Aşkar, 2003) or they do not know how to use the information and resources they access (Ekici & Özenç-Uçak, 2012). This situation reveals the importance of applied studies that teach students how to use the information they access.

At the stage of organising the data, it was observed that the students tended towards a single type of arrangement in organising the information and preferred to create tables that they were familiar with. In this study, creating tables and graphs was easy due to the fact that the topic was previously covered in the mathematics course. In fact, the problems that Taşdemir, Demirbaş & Bozdoğan (2005) observed in their study on reading and interpreting graphs in the Science course, which arose from the lack of numerical operations, reveal the importance of this cooperation with the mathematics course. In

addition, another study shows that mathematics skills are highly effective in predicting table skills (Pala & Başıbüyük, 2019, p.51). In the last step, explaining the data, students explained the data in a single sentence or tended to summarise the topic.

As a result, inquiry-oriented learning activities develop research skills in students. Similar results were also seen in the literature (Bilir, 2015). However, this development does not evolve at the same rate in all steps of the research. For the research skill to develop fully, its sub-steps should have been improved separately before. Research skill is simplified by considering it separately from its sub-steps. It is more complex than it seems, but it is not at a level that cannot be gained. In addition, teacher guidance is also very important for this skill, especially in primary school. With the right and good guidance, research skills can be developed, and scientific process skills can be gained in children from an early age.

As a result of the research, it is possible to make the following suggestions:

- Sample activities suitable for the stages of research skill can be presented in Life Studies textbooks.
- The sub-steps of research skill can be studied separately.
- The number of objectives directly related to research skills in the Life Studies programme can be increased.
- Other methods and techniques can be used to improve the research skills of students at the third-grade level of primary school.
- The frequency of studies on research skills in the Life Studies programme can be increased.
- Primary school studies on which skills students need when using research skills can be diversified.
- In another study, students could be asked to format the data as a table using different methods.

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