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How Gifted Primary School Students Make Sense of the Definition, Purpose and Process of Observation

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Abstract

This study examines how gifted primary school students define observation, whether they know the purposes of observation and how they manage to perform it. A qualitative study was designed to thoroughly examine the observation process of 16 gifted students and determine the factors affecting the process. The focus group meetings were analyzed with the students' pictures and the field notes obtained during their observations. The results indicated that when examining the students' behaviors in the observations instead of what they observed, they draw what they already know. Most of the students used the word "to examine" when defining "observation." Additionally, the students' drawings before the observation were relatively simple and did not have enough details about living beings. Besides, the second-grade students describe observation from a broader perspective, and their observation examples from their past experiences are short-term and object-based. The students also showed differences regarding their grade level in their opinions about which sense organs should be included in the observation process.

Key words: Observation, gifted students, primary science education, scientific process skills

Introduction

Observation is regarded as a process of determining an object's characteristics or event precisely, in a planned, systematic and generally empirical way by creating literary data. Observation is a primarily cognitive activity involving all the senses (Tomkins & Tunnicliffe, 2001). Apart from scientific observation, living beings make observations to understand their environment and regulate their relationships with other living things (Millar, 1994; Rogoff, Paradise, Mejia Arauz, Correa-Chavez & Angelill, 2003).

The indispensable factor for practical scientific observation is consciousness, one of the crucial differences between looking and observing (Tan & Temiz, 2003). Observation is considered a skill that students superficially acquire since teachers generally cannot raise awareness of observation skills (Haslam & Gunstone, 1996). In other words, students mainly cannot become competent in observation skills (Swinehart, 1987; Chinn & Malhotra, 2001). In the drawings students make or in the notes they keep during the observation process, they depict/write what they know, not what they observe, and they do not give the necessary importance to the observation process (Park & Logsdon, 2015). Teachers may also consider activities to improve observation skills as a waste of time (Tomkins & Tunnicliffe, 2001). It is known that teachers do not observe their students and classroom interactions sufficiently and, mostly, do not take advantage of observing students enough (Jablon, 2010). However, teachers need to consider the possible positive effects of practical observation skills on students and their potential to develop their instruction (Grimm, Kaufman & Doty, 2014).

Useful observations are not conducted to determine properties such as color, length, shape, and size (Griffiths & Thompson, 1993). The purpose of valid observation is to explain observed objects or events in a holistic, detailed and accurate way (Bensusen, 2020). It may not be possible to obtain data by experimenting in some disciplines. More advanced data can be obtained through scientific and detailed observations in astronomy or evolutionary biology (Smith & Reiser, 2005). Thus, observation may turn into a critical data collection tool to generate scientific data.

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Thanks to efficient observations focusing on a scientific problem in different fields, even accidents can turn into essential products that result in significant profits (Ewing, 1936). However, it is very important to know what you are observing and to concentrate on the process. Perhaps, Claude Bernard's quote may be enlightening in this context:

"The observer who does not know what he is looking for will never understand what he finds out."

There are some rare incidents, but using your senses logically to understand the phenomenon is crucial. It is undeniable that valuable products can result from scientific processes, even by chance, with effective observation skills. Observation data is a substantial step in forming scientific data since more advanced data is obtained if accompanied by experiments, mathematics or another scientific method (Chalmers, 2013).

One of the general objectives of the several science education curricula prepared by the Ministry of National Education (MoNE) in Turkey is to improve students' scientific process skills (MoNE, 2005; MoNE, 2013; MoNE, 2018; Tabak & Çalık, 2020). Observation is one of the scientific process skills, and students must practice their skills and, thus, develop these skills (Park & Logsdon, 2015). Besides, observation is within the scope of Turkey's education program as science education programs of many countries worldwide. For example, in the 1996 report prepared by the National Research Council (NRC) in the United States, it is explicitly recommended that teachers should ask questions to get to know the environment better around their students and to motivate them to find logical answers to these questions by using observation (NRC, 1996). In the report prepared by the American Association for the Advancement of Science (AAAS) in 1994, it was emphasized that students actively observe, record, enrich their observations through different tools, eliminate bias in observations, and increase the validity of the data gathered from observations by making repeated observations (AAAS, 1994).

Observation is an essential skill for children to obtain data about their environment (Monhardt & Monhardt, 2006). The observation process can also be conducted by observing more than one object or event simultaneously. During the observation process, an object, event or living being can be observed. It is also vital that the object, event or living being can attract students' interests (Elmas, Akın & Geban, 2013). For example, it was found that students mostly prefer to make observations about the natural environment and the sky (Koyunlu Ünlü, 2018). Worsham (2007) asked his students to observe their dogs in his study.

In observation, more than one object can be observed at the same time. For example, a student who observes different types of fruit can take a mandarin orange, which they are familiar with, as a reference object, and write or draw the results of their observation by comparing other fruits they have observed (Checkovich & Sterling, 2001, Oğuz-Ünver & Yürümezoğlu, 2009). A reference object can help children make a more detailed observation as it enables them to focus more on similarities and differences. Also, using a reference object can eliminate the problem of misknowledge that may always cause problems in observation, overshadowing the observation's objectivity since a student observing the observed object and the reference object will focus more on the related differences and similarities (Park & Logsdon, 2015).

The observation process and its results might be shared with other students in groups, and the process is pursued as a group work so that students can acquire some skills such as peer learning (Bodner & Elmas, 2020; Martínez, Bannan-Ritland, Peters & Baek, 2011). Students can explain the aspects of the observed object or event and why they focus on it in group discussions. It is also possible that students who observe the same object and event may draw different conclusions from the same observation. In such a case, re-observations may be requested several times. It should be noted that inferences and results may change, but observation data generally do not (Checkovich & Sterling, 2001). Students who are asked to make inferences from their observation data should be provided sufficient time and the opportunity to examine and interpret the observation data. Students that have examined and interpreted the data thoroughly may have new questions, and they may form connections between their schema and data. Thus, they can gain new knowledge and experiences, notice differences and patterns, and comprehend relationships between these concepts in detail (Oğuz-Ünver & Yürümezoğlu, 2009). Students might present evidence of the results they accomplished for valuable feedback. Evaluating and discussing students' different results from their observations will also support learning the difference between observing and making an inference. Another benefit is that they can form new research problems by utilizing new data and experiences gathered from observations (Swinehart, 1979).

Observation is often confused with inference. Inference can be defined as a skill to make statements about past events' results (MoNE, 2005). Observation and inference are closely related skills. Inferences can be made

through data based on observation. In other words, observation is a prerequisite for making inferences (Aksoy, 2019; Gürsel-Arslan & Temiz, 2004). For instance, it can be associated with observation skills when a student states that the leaves are yellow in Autumn and smell differently from the Spring. On the other hand, explaining the reason for these changes (e.g., the arrival of Autumn or cooling season) can be attributed to inference skills.

Unlike common perception, observation is not a basic means but a comprehensive process through which detailed data is obtained. Therefore, observation is far more than seeing. Furthermore, the observation process may be affected by the observer's past experiences, prejudices, psychological state, level of knowledge about the subject and similar factors beyond collecting information through the senses (Driver, 1983; Haslam & Gunstone, 1998; Haury, 2002). Thus, the detailed data obtained in the observation may better understand the observed object and event. Conducting this comprehensive observation process using an observation guide will make the process more systematic. Therefore, a guide can support students in making practical observations (Checkovich & Sterling, 2001; Swinehart, 1979). Such a guide provides students with the opportunity to make effective observations from an early age. Students can use this guide until they can acquire effective observation skills as a behavior. Besides, students can be directed to discussion based on the data they have obtained during their observations. Thus, students can produce strong arguments, which can also encourage students to have more informative discussions.

Superficial observation is a skill that students quickly acquire. Teachers' task is to support their students to improve to observe more comprehensively (Tan & Temiz, 2003). To develop students' observation skills, teachers should know how their students perform their observations and analyze students' problems while observing. Class activities can offer meaningful opportunities to examine how students make their observations.

It is essential to develop students' observation skills. Thus, this study aimed to investigate how gifted students define observation, whether they know the purposes of observation and how they manage the observation process. Research problems of the current study are stated as follows:

1. How do primary school gifted students define observation?
2. For what purposes do primary school gifted students observe?
3. How do primary school gifted students manage the observation process?

Method

Research Design

This study is qualitative and aims to thoroughly examine a group of students' observation process and determine the factors affecting it. It is a case study as it is conducted with a particular group of students who are expected to fulfill the tasks within the study's scope (Patton, 2014). This study examines students' experiences and inferences on a three-step process due to observing an earthworm and a leaf.

Participants

Participants were 16 gifted students studying in different primary schools in Afyonkarahisar province, Turkey. Gifted students have significantly higher competence than their peers in self-expression, motivation, and having a different perspective (Tomlinson, 2014). The high ability of gifted students to express themselves and explain their observations in detail in the focus group meetings was essential in selecting research participants. In addition, students were selected from different age groups in order to examine students' observation abilities according to grade levels. The general characteristics of the participants are provided in Table 1. In the results section, pseudonyms were assigned to the participants.

Table 1. Centre the caption above the table

Characteristics of Participants		Number
Gender	Female	8
	Male	8
Grade Level	2nd Grade	5
	3rd Grade	5
	4th Grade	6

The Physical Environment of the Study and the Implementation Process

The study was carried out in an institution serving gifted students in the province of Afyonkarahisar in the 2017-2018 academic years. Students attend a particular education program after formal education, including extracurricular activities, according to their characteristics. A wide range of educational materials such as robotic training sets, 3D printers and construction sets are used in this institution. Therefore, the students are familiar with such activities. Thus, students are expected to exhibit natural reactions towards the activities, supporting their observation skills in its nature.

The pilot study was conducted with 10 (Five students as two groups) students with similar characteristics to the main study participants. There is only one entity, the leaf, as an observation object. Based on the pilot study, the interview form was revised, and four new questions were added. Entities to be observed were also revised in order to relate the activity to real-life (a living being that can move was added; soil worm).

Students are currently studying in three different groups based on their grade levels in the institution where the study was conducted. This institution is providing only extracurricular support, and it is not working as a formal school. The extracurricular activity was implemented for students on different days in the same week. Since the groups did not interact with each other, students did not know or foresighted the activity. Besides, to enable the students to express their ideas more efficiently, the researcher, who the students had previously recognized, was more actively involved in all stages of the study.

Prior to the activity, a focus group meeting was held to examine how the students perceived observation and how they performed it. After the interview was completed, a short break was taken to get the students' feedback and prepare the activity tools, and then the activity started. In the first step of the activity, students were given identical stationery materials, including crayons. They were asked to draw a worm and a leaf on the same paper separately based on their previous observations (past life experience). In the second step, sufficient time was given to the students to observe a leaf whose details are exact and a living worm in Figure 1. After observing, students were asked to draw the leaf and worm on the paper. In the third step, they were expected to observe the same beings through a magnifying glass. Students were expected to draw for the last time after using a tool, and they completed the activity.

Figure 1. Entities observed in the activity

During the activities, the students were not guided on observation time and other factors. The students were allowed to observe the worm by handling it if they were willing to. Thus, the students had the opportunity to observe the movements of the worm. Meanwhile, the researchers took detailed field notes about the students' observation processes.

Figure 2. The activity processes

Data Collection Tools and Data Analysis

In the study, the focus group meeting was analyzed with the students' pictures and the field notes obtained during the students' three-step observation process. Source triangulation was achieved by using more than one source in collecting data, which increases the dependability (reliability) and credibility (internal validity) of the study (Patton, 2014).

At the end of the study, a data set consisting of three focus group interview records, 48 different drawings and field notes for 2nd, 3rd and 4th-grade levels were obtained. The focus group interview constitutes the primary data of this study, while students' drawings and field notes are supportive.

The focus group interview was conducted using a semi-structured interview form consisting of ten questions (Appendix 1). Also, the probe questions in the interview form were included to obtain more detailed information. During the interviews (with the consent of the students and parents) voice recordings were taken. All recordings were transcribed verbatim. Transcripts were examined thematically with content analysis.

In the content analysis, sentences were determined as a unit of analysis, and the data were coded by two researchers independently, and code lists were prepared. Then, consensus and disagreement were determined by comparing the two code lists. After a series of meetings, as a result of the calculation, the coding's reliability (agreement between researchers) was determined as 88% (Miles & Huberman, 1994). A sample of codes and themes were presented in Table 2.

Table 2. A section of the code list of the focus group study

Themes	Definition of observation (What is "observation"?)	Purposes of observations (What are the benefits of observation?)	Observation process (How is observation done?)
Codes	Look	to discover	by examining
	Examine	to learn by oneself	by looking
	Dream	to remember	by using a tool

Findings

The results were systematically stated in detail based on the research questions under the Definition of Observation, Function of Observation and Observation Process. While the statements of the students supported the findings, pseudonyms were assigned.

Results for the theme "Definition of Observation"

In the focus group discussion, the second-grade students mostly answered "What is observation?" using word groups. For example, Ece (second-grade) defined it as "I am thinking of seeing, examining, and visualizing in

the brain." Fatih (second-grade), on the other hand, defined it as "I am thinking of dreaming, examining and visualizing in my mind. "When it comes to third and fourth-grade students, they answered this question more clearly within one sentence. For example, Sinem (third-grade) defined observation as "Observation is to observe an entity.", and Asuman (fourth-grade) defined it as "Observation is to examine something in detail."

A significant number of students (12 out of 16) used the word "examine" when defining observation. On the other hand, three students summarized the observation as "envisioning" and two students as "looking." When the students were asked to explain these answers, for example, Mustafa (fourth-grade) explained, "Observation is to scrutinize the details of the entity.", and Zehra explained (fourth-grade), "Observation is to examine something by looking and researching for a long time." These explanations exhibit that some students are not successful enough to distinguish observation in daily life and scientific purpose, and they regard observation as looking and seeing. It can be said that they describe observation only as observing an object during their lessons, not as an essential step of a scientific process.

The field notes taken during the activity determined that the students observed the entities for a long time. It was determined that especially second and third-grade students observed the entities more than once at intervals. This result revealed that the students need a specific period so as to make a valid observation, and adequate time to ensure that the students can reach the observation objectives should be given to them. For the details to be comprehended, a mental activation is necessary. For this reason, the concept of time is a more critical matter within the context of seeing the detail and taking control of the process.

In the focus group interview, when the students' responses to the question "Give an example to an observation that you made before" were examined, it was seen that most of the second-grade students mentioned the word "examination" at this point. For instance, Bahar's (second-grade) response was: "…when I saw the worms in the soil, and I examined them for such a long time that I zoned out and did not even realize that my mother walked away."

In addition, it was determined that the observation experiences of the second-grade students were mainly short-term and object-focused, whereas those of the fourth-grade students were mostly process-driven. For example, Aysu (third-grade) explained her observation about tomatoes yielding from seeds, and Tarik (third-grade) explained his observation regarding the process of ants leaving their nests and finding food and carrying the food to their nests. The second and third-grade students exemplified their observation experiences mostly from natural events, while the fourth-grade students mostly exemplified their observation experiences from their school experiences. For instance, Batu (fourth-grade) explained his observation regarding the experiment they made at school about the changes in the structure of foods, whereas Akin (fourth-grade) explained the experiment by comparing the stone and sand they brought to the classroom.

At this point, it can be inferred that students mostly tend to observe the animals. It is seen that students mostly prefer to observe a living being rather than an object. Also, in general, they are more eager to observe a process rather than a standing object.

Please embed tables and figures in appropriate areas within the document and center them horizontally. Tables and figures should not exceed the given page margins. Provide captions (maximum length: 6 to 8 words) for each table or figure. Centre the caption above the table and below the figure. Please reference the table or figure in the text (Table1). Please do not use vertical lines in tables. For figures, GIF and JPEG (JPG) are the preferred formats.

Results of the Theme "The Purposes of Observation"

The student's response to the question "What is the purpose of making an observation?" is mainly related to obtaining data. Students also stated different purposes of observation. For instance, Sinem (third-grade) answered this question by saying, "In observation, the purpose is to follow the changes in something, and emphasized the process. Beyza (second-grade) answered the question by saying: "While making an observation, the purpose is to look closely at something and to recognize it." and Arda said: "The purpose is to explore new things." These answers indicated that students emphasized the role of observation in exploring things and tracking changes. However, students stuck to a definite group of purposes instead of a broader range of purposes of observation.

It was observed that students examined the living beings attentively by looking at them closely. When the drawings are examined, it can be determined that the drawings that they made after their observation with a

magnifying glass are more elaborate than the ones that they made before. For example, while they colored the living beings using only one color before the observation, they expressed color changes in the same living beings by toning and shading after the observation. Besides, they also emphasized the texture and some of the defects of living things, such as stains. Furthermore, it was observed that most of the second and third-grade students drew the worm with a smiling face before the observation, and their drawings were closer to reality after the observation with senses. The drawings of Sinem, a third-grade student, are provided as an example in Figure 3.

Figure 3. Examples to the drawings before observation and after the observation with the senses

In the focus group interview, students were asked, "Which creatures other than human beings make an observation? Explain with examples", to which they responded by exemplifying some survival activities of the animals such as hunting. Additionally, Akin, Arda, Batu and Asuman, who are fifth-grade students, also indicated that animals observe by using their sense of smell to recognize one another. For instance, Arda said: "…Seals kiss their newborn babies and leave a scent on them. Later on, they recognize them by that smell.".

Observation Process

When the students in the focus group interview were asked, "How is an observation made?" it is seen that twelve of them said "by looking carefully," three of them said, "by examining with a telescope or a microscope." One of them said, "by breaking into pieces."

The students were asked: "Is it necessary to prepare for observation?". It is seen that all of the second-grade students said it was "not necessary." In contrast, the other students said it was "necessary." Pre-observation preparations were explained by the students as "providing the tools, preparing the devices and selecting the place to make the observation".

To the question "Which sense organ/s do we use while making an observation?" four of the second-grade students responded as "eyes" while one of them responded as "eyes and ears." The third and fourth-grade students responded as "Observation is made with five sense organs." The field notes taken during the activity determined that most of the students, including the second-grade students, observed the living beings by touching them.

Students were asked: "What are the benefits of using more than one sense organ while making an observation?". Whereas the second-grade students could not answer at first, three students later responded as "We recognize the things that we cannot see clearly by touching them." and added, "That's how visually impaired people make observation…". The third and fourth graders stated that observing with more than one sense organ provides the opportunity to determine the details that cannot be detected in the observation made with one. For example, Mustafa explained this situation by saying: "We can recognize a small detail simply by touching, which we missed while looking."

When the students were asked: “Have you ever observed by using a tool so far?” four of the second-grade students said: “No,” while one student said: “Yes, I used a microscope.”. All the students in the third and fourth graders have used a microscope or a magnifying glass before. Students stated that they could better interpret the living beings in their observations by using tools. For instance, Arda expressed this situation by saying: “…when I observed the paper, I did not see any problem, but when I looked at it with a magnifying glass, I saw transparent spots (defects) on it.”. The field notes determined that the third and fourth graders mostly used the magnifying glass correctly. Also, as seen in Figure 4 - the drawing of Mustafa, a fourth-grade student - the students' drawings after observation with a magnifying glass were more detailed.

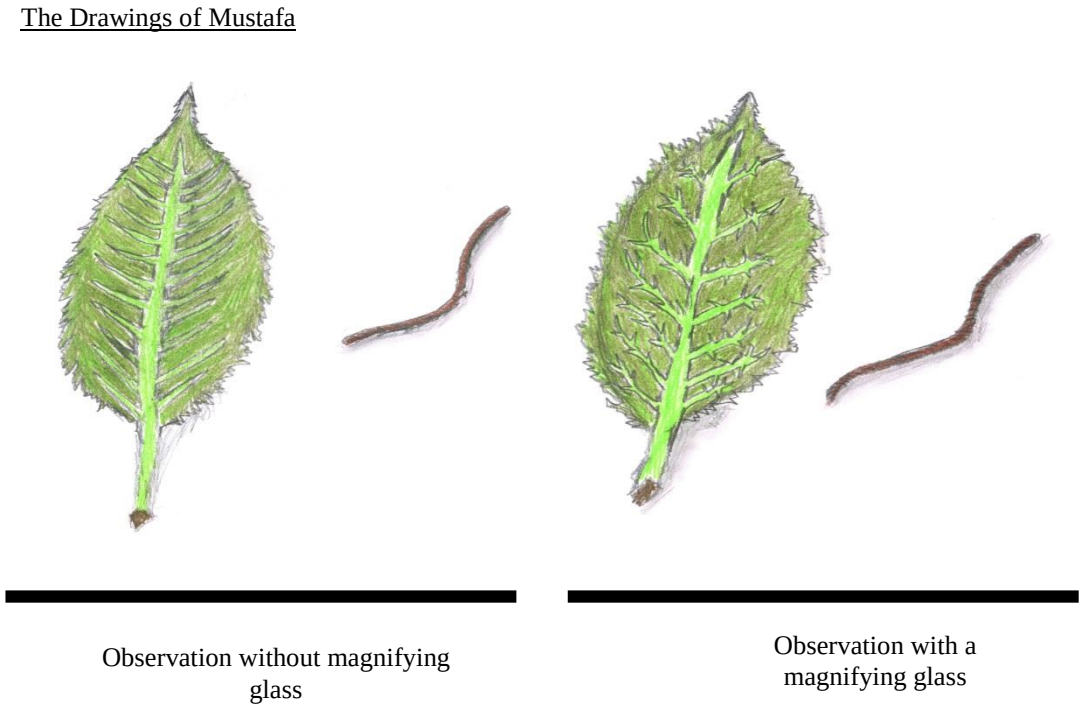

Figure 4. Drawings of observation using only senses and drawings of observation using a magnifying glass

When the students were asked: “Where is an observation made?” their answer mainly was: “In observatories, laboratories and schools.” On the other hand, Batu said: “It can be done wherever there are observation tools.” Most of the fourth-grade students believe that observation is made in a particular place. However, at the end of the focus group discussions, when asked: “If there is anything you would like to add, please specify.” Akin said: “I think observation has an important place in our lives. Even if we do not realize, we observe at any moment of the day”. On the contrary, Tarik, a third-grade student, said: “The most important sense organ in observation is the eye. Even the name “observation” comes from the word “eye” itself. In Turkish, the word observation is derived from the word eye, so that is why Tarik made such a comment.

Discussion and Conclusions

Even though the observation process is an integral part of scientific research, it may be insufficient to achieve the learning goals since it is based on the senses (Park & Kim, 1998). There are three qualities that observation should have in particular so as to have scientific quality. These three qualities of the observer are sufficient knowledge on the subject of observation, understanding the theories in the relevant field, and having appropriate attention habits (Eberbach & Crowley, 2009). When we examine the general situation of the students in the observations, it is seen that they draw what they know rather than what they observe. The prior knowledge of the students sometimes may not be parallel to reality or be sufficient. Therefore, the inclusion of high-level cognitive skills such as questioning, inferencing, or hypothesizing that accompany the students' observation will support providing more and definitive benefits (Maxwell, 1972).

In the focus group discussions conducted within this study's scope, it was presented that most of the students used the word "to examine" when defining observation. Consistent with that, it was determined that students

observed the living beings used as observation objects by examining them closely several times. Altunbay (2017) stated that one of the two most common words in the literature is "examination." Brown and Concannon (2016) proposed using a technique named PSOE, predicting, sharing, observing and explaining. Observation easily matches other skills to improve instructional quality (Sumrall, Sumrall & Robinson, 2018).

On the other hand, most of the students stated only one of the purposes of observation. Nevertheless, when the body of literature is examined, observation emerges as a multifaceted process frequently used in school, daily life, and scientific studies, which may have multiple purposes (Remmen & Frøyland, 2020). In the classroom, observing the students effectively is one of the critical observation areas for teachers. Teachers can create a developmental environment that is more suitable for the student's needs with the help of the inferences they obtain results from these observations (Jablon, 2010). Therefore, it can be said that both the students and the teachers should comprehend that observation is a very functional tool.

All of the participants go to schools in the city center, a very densely populated area. Therefore, students rarely see soil worms where they live. That is why all of the students probably observed the worm carefully. As a result, they could express the details about the movements and the worm's structure verbally or by drawing a picture. This result is consistent with the literature. In their study, in which they carried out living brine shrimp observation, Tomkins and Tunnicliffe (2001) determined that students mostly observed behavioral and structural characteristics, making living beings a part of the observation process significant advantage in attracting students' attention. Likewise, Dilek, Taşdemir, Konca and Baltacı (2020) indicated in their study that students quickly concentrate on the living beings or events they rarely encounter and have the enthusiasm to find out the details of such things.

Tan and Temiz (2003) express that losing concentration quickly while making observations may cause students to miss vital information. In this context, using different tools while making observations will keep the students' interest vivid in observation. Still, it will also be beneficial for them to learn how to use various tools and make an observation. A similar study was conducted by Worsham (2007) about pets – even though they are ubiquitous. Worsham designed a lesson for middle school students, including the observation of their dogs. That lesson was designed as five-course hours and included data analysis, presentation and cooperation, and observation skills. With such a lesson plan, it was determined that students' motivation towards observation increased. Students' observation of a living being can motivate them positively towards the lesson and the act of making an observation (Yurumezoglu & Oztas Cin, 2019; Oztas Cin & Yurumezoglu, 2020). A research inquiry process designed in a different study did not create the expected effect even though it included observing the birds (Trumbull, Bonney & Grudens-Schuck, 2005). It should be kept in mind that observation is a tool that should always be planned carefully and depended on the observer's skills.

It was determined that the students' drawings before the observation were relatively simple and did not emphasize the details sufficiently. While their drawings after the observation were more detailed, it was seen that the drawings which were closest to reality were the ones that were made after the observation with a magnifying glass. Therefore, the deeper the students' observation, the more elaborate their drawings got as well. For this reason, using a tool that enhances the capacity of sense organs while making observations may facilitate it. This result also revealed that students could express their observations by drawing or sketching (Bensusen, 2020). However, a significant portion of the students cannot show the expected proficiency in verbally expressing their observations. For this reason, enabling the students to express their observations in different forms, such as drawings, paintings, sketches and graphics, may be beneficial in increasing both permanence and awareness (Dotger & Walsh, 2015).

It was determined that the second-grade students describe observation from a broader perspective, and the observation examples they give from their past experiences are short-term and object-based. On the contrary, examples of the third and fourth-grade students are in the form of more extended process observations. Consistent with this result, the second graders - unlike the third and fourth graders - stated that preparation is unnecessary for observation. This situation may indicate that second-grade students tend to make a short-term observation, and sometimes in the form of improvisation. Altunbay (2017) indicates that the second keyword in the definition of "observation" in the literature is "monitoring." Therefore, observation corresponds to a systematic process that requires monitoring. Therefore, directing students to make systematic and long-term process observations in the first years of primary school can enable them to collect more in-depth data in their observations. Dilek et al. (2020) also stated that preschool students use their observation skills to gather information in a comprehensive framework, such as the behavior of their group and other group members, the design and development process of products, and the behavior of teachers. By this means, she emphasized that observation is the primary data collection tool of every activity stage (Dilek et al., 2020).

According to their grade level, the students also differed in their opinions about which sense organs observation is related. While the second-grade students said that observation could be made only with eyes, the third and the fourth graders indicated that observation could be made using all the sense organs. Similarly, in the literature (Griffiths & Thompson, 1993), it is stated that students make a mistake to think that observation only consists of what they see. Observation made with one sense organ may limit the data students obtain. This is because observation becomes meaningful, provided that all the senses are used for exploration (Tan & Temiz, 2003). Therefore, students should be directed towards using more than one sense organ while making an observation.

Observation has an important place in children's lives, starting from the moment they are born (Marin, 2013). As a result, children grow up as observers of their environment (Tan & Temiz, 2003). In some cases, observation skills may not develop as much as necessary, which should be reinforced immediately. Lestari, Dinata, Deta ve Pratiwi (2020) also found that students do not have the expected competence in observing different variables that affect an event or a living being and gathering information about them needs better training about observation skills. On the other hand, it is not a skill developed in a short-term intervention in schools (Tan & Temiz, 2003). For this reason, a guide may be prepared for the students to facilitate practical observation at school or in daily life (Manery, 2003; Koyunlu Ünlü, 2018).

Although observation is a fundamental element of scientific and social life, it is not a skill that is emphasized enough from primary education to the university level. Our students and teachers must recognize the opportunities that observation skills offer beyond looking. At this point, it can be said that especially many comedians analyze social events with in-depth observations and that they owe most of their success to their effective use of this skill. A similar situation is valid for the law of gravity, which Newton found due to his observations. Another example that can be given from the history of science is the case of Archimedes finding the buoyancy of water in the famous story. All these and similar examples emphasize the importance of effective observation in our lives.

Recommendations

Within this study's scope, how gifted primary school students make sense of the definition, purpose, and observation process are emphasized. It was seen that the students could not describe "observation" at the desired level but that they could explain it on a cognitive level. Program developers and teachers need to understand the definition and objectives of a basic skill like observation through activities. It is expected that students who do many observation activities will be better educated about the definition and purposes of observation. It is also vital that the textbooks include different observational activities accompanied by an observation guide structured in a specific context (Martínez, Bannan-Ritland, Peters & Baek, 2011; Elmas, 2020). Designing these activities at both ends, especially in making free observations in nature, will positively affect developing students' awareness and stimulating their interest in observation. Students' taking notes and drawing while making free observation will also affect the observation process positively.

Diversification of observation processes is another important suggestion. It should be kept in mind that there may be several different objects, situations, or living beings that may be observed. While a non-moving object is observed in some observations, you may be asked to observe a pet living with you in others. Sometimes, a process observation can be assigned as homework to diversify observation. This may be in the form of observing the germination of a seed in cotton or the molding of stale bread left by a window. The point to focus on is to repeat the observation skills frequently on different objects and processes, increase students' awareness, and improve their skills.

It should be ensured that students use different instruments and all the sense organs whenever appropriate while making an observation. It is quite crucial that the observation activities are designed so that students cannot use only their senses of hearing or sight, but also their senses of touch, smell and taste, and so that students can express their observations verbally.

Limitations

This study is qualitative. A limited number of participants were in the sample, and the purpose is not a mere generalization. This study includes data analysis on the use of senses and observation tools, which are considered helpful to support observation skill development. The sample has also consisted of gifted students

that have higher cognitive capabilities than their age group. This study's results are thought to be useful in that they include suggestions that may be helpful in the classroom environment.

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Appendix 1. Focus group interview questions

Questions

1. What is observation?
    a. What is the first words that come to mind to define observation?
    b. What is your definition of observation?
2. What is the purpose of making an observation?
    a. Why do we make an observation?
3. Have you made any observations before?
    a. If yes:
        a1. Can you give an example of an observation that you made before?
        a2. What have you observed in the different observations you have made so far?
    b. If no: I can give you time to think a little; maybe you will remember an example.
4. Where is an observation made?
    a. Can you explain with an example?
    b. Can observations be made in different indoor or outdoor settings?
5. How is an observation made?
    a. What are the stages of making an observation?
    b. With which process is the observation started and completed?
6. Is it necessary to prepare for observation?
    a. For the answer you need:
        a1. Which preparations are needed to make?
        a2. Why are these preparations made?
        a3. What are the benefits of being prepared?
    b. For the answer that is not necessary: Give an example of an observation that you did or can do without preparation.
7. Which sense organ/s do we use while making an observation?
    a. Please explain with an example.
    b. Which sense organ/s do you use to observe your surroundings?
8. Is there any benefit to using more than one sense organ while observing?
    a. If yes: What are the benefits of using more than one sense organ while making an observation?
    b. If no: Would it be an advantage for the observer if we only see but smell the object or living thing we observe?
9. Have you ever observed using a tool so far?
    a. For the answer I did:
        a1. Which tool (s) did you use?
        a2. How did this tool affect your observation?
10. Could there be other living things that observe other than humans?
    a. If yes: Which living things other than human beings make observations? Explain with examples.
    b. If not: For example, could wild animals be observing to catch their prey?