Determining the Mental Images of Fourth Grade Private and Public School Students for Science Learning Environments by Drawing Technique

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ABSTRACT The study aims to examine fourth-grade private and public-school students' images of the science learning environment using their drawings. The survey was conducted in the 2017-2018 academic year, and a descriptive survey model was used. Participant group of this study consist of 357 fourth-grade students. In this study, data were collected by drawing technique. Content analysis, percentage, frequency, and Chi-Square test of independence were used in data analysis. Regarding the study results, although the learning environment in both schools consists of traditional classrooms and laboratories, differences were observed in student drawings according to school type (public-private). The private school students use the laboratory in science lessons, whereas the students in the public school use the teacher's desk as the experiment table. Another significant result of the study is that public-school students' priority is understanding the topic. In contrast, private school students assign more importance to the materials. Regarding the independence test results, Founding student behavior, teacher behavior, teacher position, and teaching method to differ in student images according to school type. But no found a significant difference between the place theme images of public school and private school students.

Keywords Science, Science learning environment, Drawing, Image

1. INTRODUCTION

Science is the process of understanding the nature of science, thinking, and discovering new scientific knowledge (Derman, 2019). Therefore, scientific literacy should increase to develop these characteristics in individuals. Many countries are making regulations in their science education programs to increase scientific and technological literacy (Hastürk & Sönmez, 2020). It is known that countries that attach importance to science and technology aim to carry out a qualified education to be at the top (Yasin, Prima, & Sholihin, 2018). Therefore, learning environments should be organized by the skills of the individuals, including researching, questioning, producing, and scientific process skills to achieve a qualified science education (Candaş, Kiryak, & Ünal, 2021). It is also known in the literature that organizing the learning environments impacts student achievement (Korkman & Metin, 2021; Salur & Pehlivan, 2021).

Learning environments should be student-centered to discuss the topics, present their ideas comfortably and show their thoughts in practice in the process (Ulu & Ocak, 2018). Besides, it has been found that learning environments that put students in the center increase

academic achievement, allow them to develop a positive attitude towards science learning and improve the image, and make the learning permanent (Karadeniz & Doymuş, 2015).

Images are the schemes that occur in the mind about information, concept, or phenomenon. On the other hand, individual images are individual schemas about a subject, concept, or phenomenon, different from each other. These differences vary according to the individuals' lifestyle, prior knowledge, and interests (Ergen, Boyraz, Batmaz, & Çevik Kansu, 2020).

It is known from the literature that the science image that individuals carry in their minds is essential in science learning (Bilir et al., 2020; Dönmez, 2017). The ways students learn science style their images of the science learning environment. Besides, students' science learning environment images can affect their interests, attitudes, thoughts, and motivations towards learning (Gökdaş & Ak,

2019). For this reason, the image of science learning environments that individuals have should be known.

It is thought that learning the mental images of individuals about a subject will be essential to reveal the strengths and weaknesses of that subject. For example, students' image of science plays an essential role in their attitude, thinking, motivation, and interest in science. Therefore, it is also very effective in learning science (Digilli Baran & Karaçam, 2020).

They are examining mental images in the literature about the science course from many perspectives. For example, studies are available to investigate the lessons taught by teaching methods and techniques on students' mental images (Çavdar & Doymuş, 2016; Develi, 2017; Parsa, 2016; Zheng & Spires, 2014). These studies' common point is to determine teaching methods and techniques on students' mental images. In addition to these studies, studies examine the mental images brought by the individual from the past that is available. Images about ideal learning environment (S. Özdemir & Akkaya, 2013), there is the investigation to compare the images for science learning environments according to education systems of countries (Turkmen & Unver, 2018). In addition to current investigations, (Şahin Akyüz, 2016) compared the actual science learning environments with the ideal learning environments according to the school's quality. As a result, it has been determined that students' about the ideal science learning environments include intelligent boards, experiment tables, and visuals in the mental images. This result revealed how the science learning environment images of the students studying in the private school are.

Therefore, this study aims to determine whether there is a difference between the student images of the private school science environment and the public school science learning environment. Based on this information, it is thought that this study will be essential to investigate the quality of the science learning environment in students' science learning process. Based on the literature's information, investigating the importance of the science learning environment's qualities is necessary for the students' science learning processes. In this context, this study's results will contribute to the institutions and organizations involved in regulating learning environments and researchers who want to work on this issue. Furthermore, the study examines fourth-grade private and public-school students' images of science learning environments using their drawings. Significant differences, if any, between students' images of science learning environment according to the type of their school (private or public) will also be revealed. In this context, the study's main question is " How is the image of the science learning environment of fourth-grade private and public school students?". The following problems have been addressed as the study's sub-questions: (1) How is the image of the science learning environment of fourth-grade public-school students? (2) How is the image of the science learning environment of fourth-grade private-school students? (3) Do students' images of the science learning environment differ significantly according to the type of their school (public-private)?

2. METHOD
2.1 Research Model
The survey model, one of the descriptive research methods, was preferred. The descriptive method is generally used to clarify a situation, an event, make evaluations within the framework of specific rules, and reveal the relationships between events. The primary purpose of a descriptive study is to provide a deep understanding of the case under investigation and explain it. In a descriptive study, the research field is directly present and evaluated (Acar, 2000, p. 30; as cited in Gay, 1996). On the other hand, the survey model serves to reveal the current situation. It deals with the current state of the situation or event under investigation and the position related to the problem (Çepni, 2014). Since the students' existing images will be revealed in this study, the survey model of the descriptive research method was preferred.

2.2 Study Group
In this study, a simple random sampling method was used. The sample of the study consists of private and public school students studying in fourth grade. Science course starts from the third grade in the Turkish education system. Students studying in the fourth grade have two school years of science learning backgrounds. Therefore fourth-grade students were included in this study. One school from each of the Konyaaltı, Kepez, and Muratpaşa districts, the three central districts of Antalya, was included. Still, permission was not granted from the schools in the Muratpaşa district. Therefore, the number of schools from Kepez and Konyaaltı districts willing to participate in the study increased. Therefore, the study was conducted with three schools from each of the two districts. The drawing method, a data collection tool, is applied as a questionnaire, which allowed the number of participants to be 357. Compared to other data collection methods (interview, observation), the mentioned questionnaire can be applied quickly to huge groups from different regions at a meager cost (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2018). So, the number of participants was kept high to get healthier and more reliable results in revealing students' images of the science learning environment.

2.3 Data Collection Tool
"Actual Science Learning Environment Drawing Test" (Şahin Akyüz, 2016) was used as the data collection tool. Obtained the necessary permissions for the drawing test were from the researchers who developed the test. The test used consists of two sections. In the first part of the test, students are asked to draw following the instructions and

answer four open-ended questions In the second section of the test. There are 17 items about students' learning preferences. In this study, students' learning preferences will not determine the second part of the test has not been using. "Actual Science Learning Environment Drawing Test" administered on 8th graders by the developers overlap with fourth-grade skills, the validity and reliability measurements of the test did not perform again. As a result of the calculation, the reliability of the research was found to be 89%. Since the reliability values above 70% are considered reliable (Miles & Huberman, 1994), the result obtained here indicates the research's reliability. The Science course begins from the third grade in the Turkish education system.

Students studying in the fourth grade have two school years of science learning backgrounds. Therefore fourth-grade students were included in the study. Various methods, including drawings, word associations, analogies, and metaphors, can reveal students' mental images (Dikmenli, 2010). Collecting data through drawings allows us to analyze social, emotional, cognitive, and motivational dimensions and evaluate them together. Therefore, drawings are a type that can be preferred as a data collection tool (Kıryak, Candaş, Karanisanoğlu, & Özmen, 2019). In interviews and surveys, children may not feel comfortable due to their developmental characteristics and may fail to express themselves correctly. Therefore, the drawing method is a better method for collecting data from children to identify the images' attitudes, interests, and beliefs (Armstrong, 2007). In this study, since it was a desire to collect data about the images of 9-10-year-old children, preferred the drawing method was.

2.4 Data Collection Process

The study's data collection process took place in May-June of the 2017-2018 academic year. In the process, participants filled the actual science learning environment drawing test with their drawings and answered as "What are you doing yourself in this drawing? Explain" "What is your science teacher doing in this drawing? Explain" "What are your friends doing in this drawing? Explain" "What are the most important things for you in your science learning environment?" four questions just below the drawing area prepared for the researcher to better understand the drawing.

2.5 Data Analysis

The content analysis method for the analysis was used of the data. Content analysis is a method that allows working indirectly to determine human nature and behavior; it is a repeatable and systematic method in which some parts of an entity are divided into smaller units and summarized by coding according to specific rules. The primary purpose of content analysis is to explain the collected data. For this purpose, similar information is a group under certain concepts and themes (Yıldırım & Şimşek, 2018) Regarding the above information, and it is seen that the most appropriate method to be used in analyzing the data collected in this study is content analysis. The Chi-Square test has determined a significant difference between the mental images of the science learning environment between private and public school students. Therefore SPSS 21 package program was used in the analysis. The drawing tests of the students and the analysis of four open-ended questions have been carried out together with an expert in science education.

3. RESULT AND DISCUSSION

This section examined whether there is a significant difference between the images of the fourth-grade students in public and private schools regarding the science learning environment and the images of the public and private school students studying in the fourth grade regarding the science learning environment. The resulting results are discussed. Table 1 presents the findings of the 4th grade public and private school students about place sub-themes.

Table 1, the drawings of almost all fourth-grade public school students (96.3%) fall under the formal sub-theme in terms of the place. A very small portion of the students (2.8%) drew an informal environment. Almost all fourth-grade private school students (93.7%) drew the formal environment for place sub-theme in private school. Only one (0.7) of the students drew informal. Table 2 presents the findings of the Chi-Square test of independence related to fourth-grade private and public-school students' image of a place.

Table 1 Findings of primary school fourth-grade students studying at public and private schools regarding the 'place' sub-theme

Theme	Sub-Theme	F	%
Public place	Formal	206	96.3
	Informal	6	2.8
Private Place	Formal	134	93.7
	Informal	1	0.7

Table 2 Findings of the Chi-Square test of independence related to 'place' theme images of private and public school students studying in the fourth grade of primary school

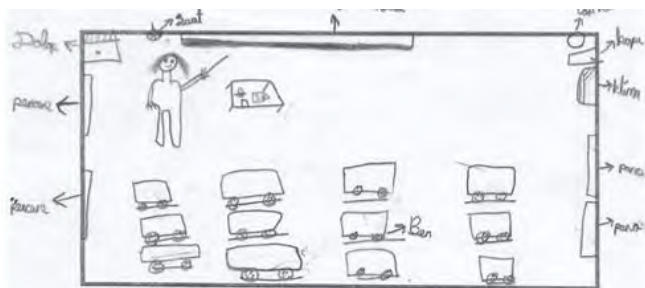| Theme	Sub-Theme	Public		Private		sd	Calculated Value	Critical Value
		f	%	f	%			
Place	Formal	206	96.3	134	93.7	1	1.8	3.8
	Informal	6	2.8	1	0.7			

Figure 1 Formal sub-theme of the place theme, student drawing (Public School)

Regarding Table 2, Calculated Value (1.8) <critical value (3.8), therefore there is no significant difference between public and private school students' images of a place.

Found no significant difference between teaching place images according to the public and private school education status. The science learning environment of fourth-grade public school and private school students consists of classrooms or laboratories. However, when students' drawings examine, it is seen that traditional classroom drawings are familiar in both schools. This result is consistent with similar studies in the literature (Şahin Akyüz, 2016). When studies on out-of-school learning environments in science education examine, it is known that teachers approach these environments positively (Bozdoğan, 2012; Kubat, 2018; Selanik Ay & Erbasan, 2016). However, formal teaching environments are generally included in students' drawings, revealing that informal environments are not preferred. It is thought that the reason for this situation may be because the financial and permit process can be complicated (Özen Orhan, 2013; Şahin Akyüz, 2016; Yavuz, 2012). Science is a field that contains many abstract concepts. Therefore, students may be prejudiced towards learning abstract concepts. It is thought that supporting science lessons without school environments (museum, zoo, national park) will attract students' interest and increase their motivation (Laçin Şimşek, 2011; Liu & Schunn, 2018; Sontay, Tutar, & Karamustafaoğlu, 2016; Turkmen, 2010). The location theme of public school is included in Figure 1.

In Figure 1, there is a relative drawn by a public school student regarding the 'place' sub-theme. According to the visual, the teacher is the person presenting the subject, and the student is the person who listens to the teacher during the course. Table 3 presents the findings of the 4th grade

public and private school students about student behavior sub-themes.

Regarding Table 3, the theme of student behavior, the drawings of 21.5% of fourth-grade public school students belong to the academic sub-theme, 67.8%, which constitute the majority, to the active sub-theme, 45.8%, which constitutes almost half of them, to the visual-spatial sub-theme. In contrast, very few students' drawings fall in the sub-themes of Using technology (1.4%) and indifferent - passive (1.4%). Regarding the theme of student behavior, the drawings of 16.1% of fourth-grade private school students belong to the academic sub-theme, the majority of the students (71.3%) to the active sub-theme, 23.1% to the visual-spatial sub-theme, 2.1% to the indifferent-passive sub-theme. Whereas none of them drew a student using technology. Table 4 presents the findings of the Chi-Square test of independence related to fourth-grade private and public-school students' image of student behavior.

Regarding Table 4, Calculated Value (12.0) > critical value (9.4). Therefore there is a significant difference between public and private school students' images of student behavior.

A significant difference was found between the theme images of student behaviors according to the public and private school education status. Academic student behavior has been drawn more of the students studying in public schools. The reason for this may be that students in public schools are usually listening or taking notes. In the theme of student behavior, the visual-spatial sub-theme was found to be the most differentiated sub-theme in terms of

Table 4 Findings of primary school fourth-grade students studying at public and private schools regarding 'student behavior' sub-theme

Theme	Sub-Theme	f	%
Public School Student Behavior	Academic	46	21.5
	Active	145	67.8
	Visual-spatial	98	45.8
	Using technology	3	1.4
	Indifferent-passive	3	1.4
Private School Student Behavior	Academic	23	16.1
	Active	102	71.3
	Visual-spatial	33	23.1
	Using technology	0	0
	Indifferent-passive	3	2.1

Table 3 Findings of the Chi-Square test of independence related to 'student behavior' theme images of private and public school students studying in the fourth grade of primary school

Theme	Sub-Theme	Public		Private		sd	Calculated Value	Critical Value
		f	%	f	%			
Student Behavior	Academic	46	21.5	23	16.1	4	12.0	9.4
	Active	145	67.8	102	71.3			
	Visual-spatial	98	45.8	33	23.1			
	Using technology	3	1.4	0	0			
	Indifferent- passive	3	1.4	3	2.1			

Figure 2 Formal sub-theme of the place theme, student drawing (Private School)

two school types. Visual-spatial student behavior has been drawn much more frequently in the images of students studying at public schools. The reason for this may be the high number of students in the classrooms in public schools, the lack of materials in the laboratory, and the inability of the teacher to do experiments and do experiments with her students. Many studies yield similar results to this result (Koç Ünal & Şeker, 2020; Ürey & Aydın, 2014). For example, Güngör Seyhan & Okur (2020) determined that, as a result of their study, there are no laboratories in many schools and that teachers do not have a place where they can perform their experimental practices (Güngör Seyhan & Okur, 2020). For this reason, they found that science teachers' experiments took place in the classroom. They found that branch teachers used the laboratory environment but mostly performed demonstrations or group experiments. While the image of using technology is not featured in the images of private school students, it has been included in the images of a tiny portion of the public school students. From this perspective, it can be concluded that students in both school types do not use technology sufficiently in science learning environments. This result is incomplete according to the requirements of the 21st century. Because, as required by the century we live in, we use technology in almost every aspect of our lives. For this reason, importance should be given to the use of technology in science education. As a result, it is seen in the studies in the literature that the use of technology is effective in student achievement, teacher-student, and student-student

communication (Zhai, Zhang, & Li, 2018; Zydney & Warner, 2016). Figure 2 contains a visual of the sub-theme of student behavior.

Figure 2 shows a drawing of a private school student regarding the theme of the place. According to the drawing, the student is experimenting with his student friends. The teacher follows the lesson away from the students. Table 5 presents the findings of the fourth-grade public and private school students about teacher behavior sub-themes.

Regarding Table 5, 29.9% of fourth-grade public school students drew the teacher as an interactive person, 38.3% as a person presenting the topic, 16.8% as a person directing the learning, 0.5% as a record keeper, 13.1% as a person watching/monitoring whereas 9.8% did nor drew a teacher. 28.0% of fourth-grade private school students drew the teacher as an interactive person, 30.1% as a person presenting the topic, 21.0% as a person directing the learning, 0.7% as a record keeper, 14.7% as a person watching/monitoring, and 2.1% did nor drew a teacher. Table 6 presents the findings of the Chi-Square test of independence related to fourth-grade private and public-school students' image of teacher behavior.

Regarding Table 6, Calculated Value (9.4) <critical value (11.0), therefore there is no significant difference between public and private school students' images of teacher behavior.

Table 5 Findings of primary school fourth-grade students studying at public and private schools regarding 'teacher behavior' sub-theme

Theme	Sub-Theme	f	%
Public school teacher behavior	Interactive person	64	29.9
	Presenting the topic	82	38.3
	Driving learning	36	16.8
	Keeping record	1	0.5
	No teacher	21	9.8
	Watching /monitoring	28	13.1
Private school teacher behavior	Interactive person	40	28.0
	Presenting the topic	43	30.1
	Driving learning	30	21.0
	Keeping record	1	0.7
	No teacher	3	2.1
	Watching /monitoring	21	14, 7

Table 6 Findings of the Chi-Square test of independence related to 'teacher behavior' theme images of private and public school students studying in the fourth grade of primary school

Theme	Sub-Theme	Public		Private		sd	Calculated value	Critical Value
		f	%	f	%			
Teacher behavior	Interactive person	64	29.9	40	28.0	5	9.4	11.0
	Presenting the topic	82	38.3	43	30.1			
	Driving learning	36	16.8	30	21.0			
	Keeping record	1	0.5	1	0.7			
	No teacher	21	9.8	3	2.1			
	Watching /monitoring	28	13.1	21	14.7			

Figure 4 Sub-theme student drawing presenting the subject of the theme of teacher behavior (Public School)

Figure 3 Sub-theme student drawing presenting the subject of the theme of teacher behavior (Private School)

The theme of 'teacher behavior' in science learning environments has similar images for both types of schools. However, the 'no teacher' sub-theme in this theme was used more by public school students. That may be that some of the public school students only boots themselves in the science learning e nvironment. In other words, the public school students who experimented with their friends at the table may have only drawn the table, the materials, themself, and their friends, and not the teacher who was elsewhere in that classroom. In both types of school, the teacher is generally drawn as the person presenting the subject. When the literatüre was examined, it was revealed that the teacher focused on presenting the subject (Baltürk, 2006; Bayındır & Arıcı, 2015; Duru, 2017; Şahin Akyüz, 2016; Tatar & Ceyhan, 2018; Tezci, Dilekli, Yıldırım, Kervan, & Mehmeti, 2017). Image of the person presenting the subject was followed by the images of the interactive person and the person who directed the learning. In learning environments, teachers have roles such as teacher, guide, student, and learner (Çakıcı, 2008). In the research, drawing the teacher as the person presenting the subject in general, drawing the role of the teacher as the instructor, secondly drawing the role of the learner as an interactive person, and drawing the role of the learner as the third person directing the learning may also be a reflection of the guide role of teacher. It has been determined in the literature that teachers use the board frequently (Bayındır

& Arıcı, 2015). However, it has been revealed that only one student per school sees the teacher as the record holder. The literature does not support this result of the study. That may be that even if the teacher keeps records during the lesson, it is not reflected in the student's image.

Figure 3 shows a drawing of a student studying at a public school on the theme of teacher behavior. According to the drawing, students follow the teacher and the experimental table from a distance.

Figure 4 shows a drawing of a student studying at a private school on teacher behavior. According to the drawing, the student performs an activity in the lesson with his friends. The teacher is giving the lesson on the board. Table 7 presents the findings of the 4th grade public and private school students about the position of the teacher sub-themes.

Regarding Table 7, 35.5% of fourth-grade public school students drew the teacher away from students, whereas approximately half (43.5%) drew them inside them. 47.6% of fourth-grade private school students drew the teacher away from students, whereas 35.5% drew them inside the students. Table 8 presents the findings of the Chi-Square test of independence related to fourth-grade private and public-school students' image of teacher position.

Table 7 Findings of the fourth-grade primary school students studying at the public school regarding the 'position of the teacher' sub-theme

Theme	Sub-Theme	f	%
Public school position of teacher	Away from students	76	35.5
	Inside the students	93	43.5
Private school position of teacher	Away from students	48	47.6
	Inside the students	51	35.5

Table 8 Findings of the Chi-Square test of independence regarding the teacher position theme images of private and public school students studying in the fourth grade of primary school

Theme	Sub-Theme	Public		Private		sd	Calculated value	Critical Value
		f	%	f	%			
Position of teacher	Away from students	76	35.5	68	47.6	1	4.1	3.8
	Inside the students	93	43.5	51	35.5			

Table 9 Findings of primary school fourth-grade students studying at public school regarding the sub-theme of teaching method

Theme	Sub-Theme	f	%
Public school teaching method	Student-centered	143	66.8
	Teacher-centered	66	30.8
Private school teaching method	Student-centered	110	76.9
	Teacher-centered	26	18.2

Table 10 Findings of the Chi-Square test of independence regarding the teaching method theme images of private and public school students studying in the fourth grade of primary school

Theme	Sub-Theme	Public		Private		sd	Calculated value	Critical Value
		f	%	f	%			
Teaching method	Student-centered	143	66.8	110	76.9	1	6.5	3.8
	Teacher-centered	66	30.8	26	18.2			

Regarding Table 8, Calculated Value (4.1) > critical value (3.8); therefore, there is a significant difference between public and private school students' images of teacher's position.

A significant difference was found between the theme images of teacher positions according to the public and private school education status. In the theme of classroom position of the teacher in science learning environments, it was revealed that the teacher was predominantly intertwined with the students in public schools. In contrast, the teacher was distant from the students in the students' images in private schools. That may be that in private schools, teachers provide more opportunities for students to discover and construct information independently. Ministry of Education made a radical change in the science program in 2004 and brought the constructivist learning approach to the program. In 2005, this understanding was put into practice. In the constructivist learning theory, individuals structure the information they obtain through their efforts. The teacher is in the role of a guide in structuring knowledge by the student. It is the active student (Akınoğlu, 2018; Kaya & Zengin, 2018). Table 9 presents the findings of the fourth-grade public and private school students about teaching method sub-themes.

Regarding Table 9, 66.8% of the fourth-grade public school students drew a student-centered teaching method, whereas 30.8% drew a teacher-centered method. Fourth-grade private schools, most students (76.9%) drew the teaching method as student-centered and 18.2% as teacher-centered. Table 10 presents the findings of the Chi-Square test of independence related to fourth-grade private and public-school students' image of teaching methods.

Regarding the above Table 10, Calculated Value (6.5) > critical value (3.8); therefore, there is a significant difference between public and private school students' images of teaching method.

According to education in private and public schools, a significant difference is found in the 'teaching method' theme in science learning environments. However, it has been revealed that the teacher-centered teaching method is used more in public schools than private schools, and the student-centered teaching method is used less than in private schools. That may be because the constructivist approach introduced by the Ministry of National Education in 2005 and the methods suitable for this approach are used more in private schools than public schools. According to the constructivist learning theory, individuals construct their knowledge themselves. The teacher is a guide in the process of structuring the information. Following this approach, teachers can use contemporary methods such as problem-based learning, project-based learning, learning through argumentation, and collaborative learning (Acat, Karadağ, & Kaplan, 2012; Mengi & Schreglman, 2013; Yılmaz & Akkoyunlu, 2006). Some studies reveal that teachers cannot fully adopt and apply constructivist learning methods that were put into practice throughout the country in 2005 (Güneş, Dilek, Hoplan, & Güneş, 2011; Tatar & Ceyhan, 2018; Yılmazlar, Çorapçıgil, & Toplu, 2014) and those who say they apply it are inadequate (Özdemir & Köksal, 2015). The finding that teacher-centered teaching in public schools is made more than private schools and student-centered teaching less than private schools may be because state schools are not applied as much as these constructivist and individual teaching methods are applied in private schools. In the study, which investigated the constructivist features of the classroom environment in the secondary school science course, it was suggested that cooperative learning in learning environments, learning by doing and experiencing, student-centered activities that include different perspectives will lead learners to think (Eroğlu, Armağan, & Bektaş, 2015). Table 11 presents the findings of the fourth grade public and private school students about teaching environment elements sub-themes.

Regarding Table 11, almost all fourth-grade public school students (92.1%) drew tools suitable for the topic, very few students (2.3%) drew technological equipment, 26.6% drew classic student desks, more than half (69.6%) drew experiment table, more than half (73.4%) drew positive experience, and 17.3% drew laboratory material. In

Table 11 Findings of fourth-grade students studying at public and private schools regarding the sub-theme of teaching environment elements

Theme	Sub-Theme	f	%
Public school the elements of teaching environment	Tools suitable for the topic	197	92.1
	Technological equipment	5	2.3
	Classic student desk	57	26.6
	Group table	1	0.5
	Experiment table	149	69.6
	Positive experience	157	73.4
	Negative experience	0	0.0
	Laboratory material	37	17.3
Private school the elements of teaching environment	Tools suitable for the topic	123	86.0
	Technological equipment	20	14.4
	Classic student desk	12	8.4
	Group table	54	37.8
	Experiment table	114	79.7
	Positive experience	87	60.8
	Negative experience	1	0.7
	Laboratory material	92	64.3

Table 12 Findings of the Chi-Square test of independence related to the theme images of teaching environment elements of private and public school students studying in the fourth grade of primary school

Theme	Sub-Theme	Public		Private			Calculated value	Critical Value
		f	%	f	%	sd		
The elements of teaching environment	Tools suitable for the topic	197	92.1	123	86.0	7	147.8	14.0
	Technological equipment	5	2.3	20	14.4			
	Classic student desk	57	26.6	12	8.4			
	Group table	1	0.5	54	37.8			
	Experiment table	149	69.6	114	79.7			
	Positive experience	157	73.4	87	60.8			
	Negative experience	0	0.0	1	0.7			
	Laboratory material	37	17.3	92	64.3			

contrast, none of the students drew negative experiences. The majority of fourth-grade private school students (86.0%) drew tools suitable for the topic, 14.4% drew technological equipment, 8.4% drew classic student desk, 37.8% drew experiment table, the majority (79.7%) drew positive experience, 60.8% positive experience and 64.3% drew laboratory material. In contrast, only one student drew negative experience (0.7%). Table 12 presents the findings of the chi-square test of independence related to 4th grade private and public-school students' image of the elements of the teaching environment.

Regarding Table 12, Calculated Value (147.8) > critical value (14.0). Therefore there is a significant difference between public and private school students' images of the elements of the teaching environment.

A significant difference was found in the images of 'teaching environment elements' of the students according to their education status in private and public schools. However, in this theme, in both types of schools, most of the students' images have a suitable tool in their images.

Based on this result, it can be interpreted that teachers want to concretize the subject according to the cognitive characteristics of the students in the concrete operational period. When the literature is examined, it has been revealed that teachers tend to teach their lessons with concrete material (Baltürk, 2006; Pişkin Tunç, Durmuş, & Akkaya, 2012; Şimşek, Hırça, & Coşkun, 2012; Yazlık, 2018). For example, it has been revealing that the technological equipment in the science learning environment is much more in private schools. The reason for this may be that the financial means of private schools are better than public schools. While the classical student desk in the public school is more common in student images, the group table is very much drawn in private schools. While the experimental table is seen in the majority of student images in both school types, it can be concluded that while the real experiment table is used in private schools due to the details such as the faucet, the sink, the U-shaped table that covers the whole classroom, in the state schools the student desk is used as the experiment

Table 13 Findings of the primary school fourth-grade students studying in public and private schools regarding the sub-theme of the elements that are important to the student in the learning environment

Theme	Sub-Theme	f	%
In public school the elements of the learning environment that are important to the students	Cleanness	22	10.3
	Having a laboratory	6	2.8
	Materials	35	16.4
	Security	3	1.4
	Learning/understanding the topic	49	22.9
	The topic itself	32	15.0
	Quiet place	29	13.6
	Being careful/doing it right	10	4.7
	Listening	8	3.7
	Interaction with the teacher	15	7.0
	Undertaking a task	6	2.8
	Interaction with friends	17	7.9
	Having fun	1	0.5
	Explanation of the station	7	3.3
	Experimenting	25	11.7
	Everything	1	0.5
	My existence	5	2.3
	Seeing the experiment	5	2.3
	Health	0	0.0
	Being successful	8	3.7
In private school the elements of the learning environment that are important to the students	Cleanness	2	1.4
	Having a laboratory	1	0.7
	Materials	44	30.8
	Security	12	8.4
	Learning/understanding the topic	27	18.9
	The topic itself	6	4.2
	Peace/silence	5	3.5
	Being careful/doing it right	13	9.1
	Listening	6	4.2
	Interaction with the teacher	10	7.0
	Undertaking a task	0	0.0
	Interaction with friends	9	6.3
	Having fun	5	3.5
	Getting an explanation	1	0.7
	Experimenting	22	15.4
	Everything	3	2.1
	Itself	3	2.1
	Seeing the experiment	3	2.1
	Health	6	4.2
	Being successful	4	2.8

table or generally the teacher table. In both types of schools, it was found that students' images generally contain positive experiences. The student who had a negative experience was absent in the public schools subject to the study. A negative experience encounter in the image of a student in private schools. That may be due to the downbeat mood of the student before drawing or the negative attitude towards the science learning environment.

When the two schools are compared, the sub-theme that makes the difference between them the most is the "laboratory material" sub-theme. Students generally have a beaker, microscope, graduated cylinder, scaffold, test tube, magnifier, etc., in the science learning environment in private schools. While most of the laboratory materials were drawn, the number of students drawing these materials in public schools is deficient. The laboratory

materials are drawn by very few students studying at the state school. The subject covered when the natural science learning environment drawing test is applied to the students is a subject that does not require laboratory materials. Public school students generally teach science lessons in traditional classrooms. The reason why laboratory materials are included in the images of private school students may be because science learning environments in private schools take place in laboratories based on drawings. Table 13 presents the findings of the fourth-grade public and private school students about the elements of the learning environment that are important to the students.

According to Table 13, 10.3% of the fourth-grade public school students answered as cleaning, 2.8% as laboratory, 16.4% as materials, 1.4% as security, 22.9% as learning/understanding the topic, 15% as the topic itself, 13.6 as peace and silence, 4.7% as being careful/doing right, 3.7% as listening to the teacher, 7.0% as interacting with the teacher, 2.8% as undertaking a task /explaining a topic, 7.9% as communicating with friends, 0.5% (one student) as having fun, 3.3% as getting an explanation, 11.7% as doing experiments, 0.5% (one student) as everything, 2.3% as the topic itself, 2.3% as seeing the experiment, and 3.7% as to be successful; nobody mentioned health in the answer. Regarding the elements in Table 4 that are important for the students related to the learning environment, which emerged with the question

"What is the most important thing for you in the learning environment?", 1.4% of the fourth-grade private school students answered as cleaning, 0.7% as laboratory, 30.8% as materials, 8.4% as security, 18.9% as learning/understanding the topic, 4.2% as the topic itself, 3.5 as peace and silence, 9.1% as being careful/doing right, 4.2% as listening to the teacher, 7.0% as interacting with the teacher, 0.0% as undertaking a task, 6.3% as communicating with friends, 35.0% as having fun, 0.7% as getting an explanation, 15.4% as doing experiments, 2.1% as everything, 2.1% as the topic itself, 2.1% as seeing the experiment, 4.2% as health and 2.8% as to be successful. Table 14 presents the findings of the Chi-Square test of independence related to 4th grade private and public-school students' image of the elements of the learning environment that are important to the students.

Regarding Table 14, Calculated Value (75.9) > critical value (30.1); therefore, there is a significant difference between public and private school students' images of the elements of the learning environment that are important to the students.

A significant difference was found between the theme images of the essential elements in the science learning environment for the students between the two types of school. In the theme of the elements that students care most about in the science learning environment, learning / understanding the subject has been the most preferred element in public school students. Also, the subject itself,

Table 14 Findings of the Chi-Square test of independence related to the images of the theme of the things that are important in the learning environment for the students of private and public school students in the fourth grade of primary school

Theme	Sub-Theme	Public		Private		sd	Calculated value	Critical Value
		f	%	f	%			
The elements of the learning environment that are important to the students	Cleanness	22	10.3	2	1.4	19	75.9	30.1
	Having a laboratory	6	2.8	1	0.7			
	Materials	35	16.4	44	30.8			
	Security	3	1.4	12	8.4			
	Learning/understanding the topic	49	22.9	27	18.9			
	The topic itself	32	15.0	6	4.2			
	Peace/silence	29	13.6	5	3.5			
	Being careful/doing it right	10	4.7	13	9.1			
	Listening	8	3.7	6	4.2			
	Interaction with the teacher	15	7.0	10	7.0			
	Undertaking a task	6	2.8	0	0.0			
	Interaction with friends	17	7.9	9	6.3			
	Having fun	1	0.5	5	3.5			
	Getting an explanation	7	3.3	1	0.7			
	Experimenting	25	11.7	22	15.4			
	Everything	1	0.5	3	2.1			
	Itself	5	2.3	3	2.1			
	Seeing the experiment	5	2.3	3	2.1			
	Health	0	0.0	6	4.2			
	Being successful	8	3.7	4	2.8			

peace/quiet, experimenting / being able to experiment, materials, and cleanliness stand out compared to other sub-themes. It is seen that public school students find the cleaning element important (Table 14). This situation makes us think that the students studying in public schools do not find cleaning sufficient. When the studies in the literature are examined, there are results for students to complain about cleaning problems in schools (Göksoy, 2017; Yüksel, 2019). The laboratory element has been given more in public schools than in private school students. Students in public schools write it more. As understood from student drawings, science learning in public schools is not done in a laboratory environment, and students want a laboratory. When the studies in the literature on this subject are examined, it is observed that, similarly, public school students want to do laboratory activities from their teachers (Kılıç & Aydın, 2018). The laboratory element is less in private schools than in public schools because private schools have budgets allocated to laboratories (Üzümlü, 2019). The abundant material element is written more in public schools than in private schools. Students' missing material in the teaching environment may have arisen in their drawings. Based on this, it can be deduced that the students do not find the instructional environment material sufficient (Okuyucu, 2019).

The security element was written by private school students more than public school students. This situation is closely related to how students interpret the concept of security. Students in private schools may have answered security by referring to the strict safety rules in their schools. Learning/understanding the subject has been written extensively by students of both school types. It can be considered normal that this element is essential in both types of school. The issue itself is written more often in public schools than in private school students. In this study, teachers took place more proportionally as the person presenting the subject in public schools' images. The reason for this situation is thought to be that the teacher wants to explain the subject herself due to reasons such as a large number of classrooms in the public school and the skill of the teacher in classroom management. The rate of writing the peace/silence element in public schools is higher than in private schools. It is thought that the crowded learning environments of the students and other reasons may create a peaceful learning environment in the student. Being attentive / doing right, listening, interacting with the teacher, interacting with friends, having fun, experimenting, everything, the student himself, seeing the experiment, and the successful elements were written by the students studying in both types of school at close rates. This situation can be considered normal. The element of taking part is not written by any students in private schools but by a small group of public schools. The reason for this may be that students want to take more positions in public schools. The element of disclosure is written more

frequently to students in public schools. That may be because the classes in public schools are more crowded. It is difficult for teachers to explain separately according to each student's learning style and the possibility of not choosing it. The health factor is written more frequently in private schools. There may be more attention to health issues in private schools or vice versa. That is also an issue that needs to be investigated.

CONCLUSION

As a result, this study aims to investigate the learning environment images of public and private school students in fourth grade and determine whether there is a significant difference between these images.

No significant difference was found between the place theme images of public and private school students. This result reveals that teachers working in public and private schools do not prefer informal environments. A significant difference was found between public and private school students' student behavior theme images. The most prominent in this theme of the study are the drawings showing the visual/spatial sub-theme. Within the scope of visual-spatial intelligence, students follow an experiment and a situation according to their drawings. From this point of view, it can be said that the lessons are teacher-centered in public schools. There was no significant difference between public and private school students' teacher behavior images.

However, when the drawings of the 'no teacher' sub-theme of this theme are examined, it was determined that private school students stand out more than state school students. This situation shows that the training carried out in private schools is mostly student-centered. A significant difference was found between the state and private school students' images of the position of the teacher. Teachers are intertwined with students in public schools, while in private schools, teachers are located away from students. This result is consistent with the 'no teacher' sub-theme drawings in the teacher behavior theme of private school students. Found a significant difference between the teaching method images of public and private school students. There is a student-centered education in both school types. However, student-centered education is more common in private school student images. A significant difference was found between the images of teaching environment staff of public and private school students. According to this result of the study, it stands out that the classroom order in the public school is in the classical order. Another element that stands out in this theme is the frequent use of laboratory materials in the drawings of private school students. Based on this result, it can be said that private school students perceive science lessons more as teaching with experiments. A significant difference was found between public and private school students' images of things that are important to students in the teaching

environment. Among these images, it has been determined that the state school students draw the most cleaning element in the school. Based on this result, the drawings of the public school students made drawings due to cleaning problems. Another element that emerges in this theme is that public school students attach importance to the element of peace. This situation may be the inability of both students and teachers to ensure the peace of the lesson. Private school students often drew the materials element. According to this result, those students give importance to teaching environment materials. In addition, it is one of the prominent sub-themes that private school students give importance to being careful / doing right. This result may be due to the students' desire for the expected success from science education to be error-free.

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