

High School Students' Images of Physicists

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Abstract

The aim of this study is to reveal the high school students' images of physicists. Participants of this study consisted of 85 students in a high school in a province center on the East Black Sea Region of Turkey. The data were obtained by adapting the "Draw A Scientist Test" developed by Chambers (1983) and updated by Song & Kim (1999) to "Draw A Physicist Test". The obtained data were analyzed by content analysis. In this study, it was determined that most of the high school students described a scientist as male, 40-49 years old, wearing sports/daily clothes, wearing glasses, looking happy, working individually, and teaching in class. It was seen that students often drew or described scientists by thinking of their own physics teachers. For this reason, it is suggested that more activities with the topic of physicist should be included in the curricula, textbooks, and course contents in order to create a more accurate perception of physicist in high school students.

Keywords: High school students, physicist, image

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Introduction

As necessitated by the information age we live in, it is important to develop the scientific skills of each individual. In order for these skills to be developed, it is also necessary for students to look at the world from the eyes of scientists (Kaya, Doğan & Öcal, 2008). At this point, students' perceptions and attitudes towards scientists can encourage students to become scientists (Karaçam, 2016; Köseoğlu & Durukan, 2017). When the literature is examined, in recent years, many national and international studies have been carried out to determine the perceptions and mental images about scientists of participants at different levels of education (Ağgül-Yalçın, 2012; Barman, 1999; Buldu, 2006; Buluş-Kırıkkaya, Bozkurt & İşeri, 2011; Chambers, 1983; Eyceyurt-Türk & Tüzün, 2017; Farland-Smith, 2009; Finson, Beaver & Cramond, 1995; Finson, 2002; Fort & Varney, 1989; Fung, 2002; Güler & Akman, 2006; Karaçam, 2015; Karaçam, 2016; Mead & Metraux, 1957; Medina-Jerez, Middleton & Orihuela-Rabaza, 2011; Newton & Newton, 1992; She, 1995; Song & Kim, 1999; Turgut, Öztürk & Eş, 2017; Türkmen, 2008; Ürey, Karaçöp, Göksu & Çolak, 2017). The first attempt to identify the origins of the image of scientist is Mead and Metraux's (1957) study. Their findings summarized as in the following sentences: The scientist is a man who is elderly or middle aged, bald, wears white coat and glasses, works in the laboratory and does experiments, and has experimental equipments (test tubes, microscope, telescope, etc). In another study which identified the image of scientist, Chambers (1983) found out that the scientist in children's mind is generally a man who wears white coat and glasses, has beard or unshaven, uses computer, telescope or microscope, and has scientific instruments, different laboratory equipments and books. Likewise, many studies about the subject have shown that, apart from a few different findings, participants of these studies have similar images of scientists. In these studies, scientists have been described as man who is in his 30s, bald, wears a lab coat, works in a laboratory or an office does experimenting, thinking (Ağgül-Yalçın, 2012; Chambers, 1983; Eyceyurt-Türk & Tüzün, 2017; Finson, 2002; Song & Kim, 1999; Turgut, Öztürk & Eş, 2017; Türkmen, 2008; Ürey, et al., 2017). This definition has been accepted as stereotype scientist image (Chambers, 1983; Eyceyurt-Türk & Tüzün, 2017; Görecek-Baybars, 2017; Song & Kim, 1999; Finson, 2002; Ağgül-Yalçın, 2012; Türkmen, 2008; Karaçam, 2016).

A considerable number of these studies in the literature have focused on identifying participants' perceptions of scientists using the "Draw A Scientist Test" developed by Chambers (1983) and updated by Song and Kim (1999). Some studies in the literature have adapted this test to their focus concepts or subjects. The adapted version of DAST to different concepts or subjects can be listed: 'Draw an engineer test' (Cunningham, Lachapelle & Lindgren-Streicher, 2005; Knight & Cunningham, 2004; Koyunlu-Ünlü & Dökme, 2017; Sungur-Gül & Marulcu, 2014), 'Draw a science teacher test' (Minogue, 2010; Thomas, Pederson & Finson, 2001), 'Draw an environment test' (Moseley, Desjean-Perrotta & Utley, 2010) and 'Draw a computer user test' (Brosnan, 1999). These adapted tests have been applied to primary school students (Brosnan, 1999; Knight & Cunningham, 2004; Cunningham, Lachapelle & Lindgren-Streicher, 2005), middle school students (Knight & Cunningham, 2004; Koyunlu-Ünlü & Dökme, 2017), high school students (Knight & Cunningham, 2004), pre-service preschool teachers (Moseley, Desjean-Perrotta & Utley, 2010), pre-service classroom teachers (Thomas, Pederson & Finson, 2001; Minogue, 2010), pre-service science teachers (Sungur-Gül & Marulcu, 2014), and in-service science teachers (Sungur-Gül & Marulcu, 2014).

Although several studies have been carried out to identify the participants' images of a scientist in the literature by using DAST, few studies have adopted the test into different concepts and used to identify the participants' images about it. It can be seen in the adopted versions of DAST that, physics, one of the science disciplines, has not been chosen as the focus concept. In this study, we chose the concept of physics and expected that the findings of this study can be enlighten the question for researchers; 'Why physics course is not liked and why it is considered difficult by students?'. The result of the national studies conducted on the attitudes of high school students towards the physics course revealed that the attitudes of high school students towards the physics course are neutral (Sezgin-Selçuk, Özkan & Demircioğlu, 2015) or negative (Kaya & Büyük, 2011) and the average attitude scores decrease as the grade level increases (Yiğit, Kurnaz & Şahinoğlu, 2015). It is also

known that students' perceptions and mental images of scientists have a significant influence on their attitudes towards science (Finson, 2002) and affect the students' career plans (Karaçam, 2016). The OECD report in 2017 indicated that, quite a few students selected science-related study fields in higher education (URL-1). Thus, it is important that students have positive images of scientists (Kaya, Doğan & Öcal, 2008). It is believed that identifying participants' images of scientist/physicist is a significant requirement in this context.

Method

This study was carried out according to the case study method, one of the qualitative research methods. It is thought that the holistic single case study which used to illuminate specific cases and carried out with a single analysis unit (an individual, a program, a school etc.) is appropriate for the nature of this study (Yıldırım & Şimşek, 2006).

Participants

The participants were chosen by convenience sampling, which is one of the purposive sampling methods. This sampling method gives speed and practicality to the research (Yıldırım & Şimşek, 2006). The participants consists of a total of 85 high school students who are studying in a high school in a province center on the East Black Sea Region of Turkey, who voluntarily participated in the study and completed the entire scale.

Data Collection Tool and Process

In this study conducted with the aim of revealing the images of high school students towards physicists, the "Draw A Scientist Test" developed by Chambers (1983) and updated by Song & Kim (1999) was adapted to "Draw A Physicist Test" (DAPT). No changes were made to the data collection tool, only the word of the "a scientist" was changed to "a physics scientist". Two experts (a science education and a physics education) opinions were received about the suitability of using the data collection tool.

As in the original test, a box was given to the students in DAPT so that they could draw the physicist in their imagination, and the students were asked descriptive questions regarding the gender, age, physical appearance, what it did, the environment it was in, and the characteristics of this physicist drawn in the box. In addition to these questions, they were asked to indicate by reason a physics they respected/admired. Finally, in order to identify the sources inspired by the students while drawing the physicists, the students were presented with options such as movies, cartoons, science journals, documentaries, student's family, or teachers.

In the data collection process, there was no time constraint, and students were left free to answer the DAPT easily. On average, the forms were filled in during 1 lesson (40 minutes).

Data Analysis

In the process of the controlling data, 85 students' forms were deemed to be valid and 12 students' forms were excluded from the study for various reasons (drawing-explanation is unrelated, drawing only). The obtained data were separately analyzed by content analysis and presented in tables with frequency and percentage values. The sum of percentile values can exceed 100% in some cases, as students indicated multiple opinions.

In the data analysis stage, both researchers examined the papers separately and made classifications. After this stage, the classifications with agreement were accepted, and the classifications with no agreement were reevaluated and categorized.

Findings

Findings related to the physicist images of high school students were presented in tables. The findings about the gender and age of physicists are shown in Table 1.

Table 1. Gender and age of physicists as imagined by high school students

Gender	f	%	Age range	f	%
Male	66	77,65	20-29	26	30,59
Female	14	16,47	30-39	20	23,53
Both male and female	3	3,53	40-49	28	32,94
Other (robot)	1	1,18	50 and above	6	7,06
Unspecified	1	1,18	Unspecified	5	5,88

It was determined that high school students thought that physicists were generally male (77,65%). It was seen that 16,47% of the students drew a female physicists, and the students drawing a female physicist were girls. 30,59% of high school students described physicists to be in the age range of 20-29, 23,53% in the age range of 30-39, and 32,94% in the age range of 40-49.



Figure 1. Gender of the physicist (S32, S44)

Example drawings of high school students' views of physicists in terms of gender and age range are presented in Figure 1. The findings of the physical characteristics of the physicist in the students' images are summarized in Table 2.

Table 2. Physical characteristics of the physicist as imagined by high school students

Physical Characteristics	f	%	
Head region	Long hair	24,71	
	Short hair	28,24	
	Messy hair	22,35	
	Groomed hair	31,76	
	Steep hair	14,12	
	Curly hair	8,24	
	Bald (No hair)	4,71	
	Sparse hair	7,06	
	White hair	5,88	
	Eurycephalic	4,71	
	Unspecified	5,88	
	Face region	Moustached	10,59
		Bearded	5,88
Whiskered		1,18	
Colored eyes		8,24	

	Brown eyed	2	2,35
	Large eyed	18	21,18
	Small eyed	5	5,88
	Small nose	9	10,59
	Large mouth	3	3,53
	Dimpled	3	3,53
	Unspecified	30	35,29
Facial expression	Happy	55	64,71
	Thoughtful	5	5,88
	Crazy	4	4,71
	Unspecified	21	24,71
Clothes	Lab coat	6	7,06
	Suit	19	22,35
	Casual/daily outfit	21	24,71
	Unspecified	39	45,88
Accessory	Glasses	24	28,24
	Necklace	2	2,35
	Belt	7	8,24
	Tie	8	9,41
	Bow tie	1	1,18
	Pocket handkerchief	1	1,18
	Rosette	1	1,18
	Cloak	1	1,18
	Unspecified	46	54,12
Height	Tall height	18	21,18
	Medium height	7	8,24
	Short height	2	2,35
	Unspecified	58	68,24
Body structure	Fat	14	16,47
	Normal weight	33	38,82
	Thin	16	18,82
	Unspecified	22	25,88

The students portrayed physicists with different hair styles (long hair 24,71%, short hair 28,24%, messy hair 22,35%, groomed hair 31,76%), while only 4,71% of the students pictured the physicist as bald. Furthermore, the students portrayed physicists with moustached (10,59%), with colored eyes (8,24%), with large eyes (21,18%), with a small nose (10,59%), and with a large mouth (3,53%). Most students portrayed physicists with a happy facial expression (64,71%). In addition, physicists were portrayed with casual/daily outfit (24,71%) or suit (22,35%), wearing glasses as an accessory (28,24%). 18% of the students portrayed the physicist as a tall person, while 33% portrayed it as a normal weight individual.



Figure 2. Physical characteristics of physicists (S62, S76)

Example drawings of high school students' views of physicists in terms of physical characteristics and features are presented in Figure 2. The findings on the type of work and work environment of the physicist in the students' images are summarized in Table 3.

Table 3. Working type and working environment of physicists as imagined by high school students

		f	%	
Working type	Individual	84	98,82	
	Group	1	1,18	
Working Environment	Indoor	Classroom	39	45,88
		Laboratory	14	16,47
		Study / research room	5	5,88
		Non-gravity room	1	1,18
	Outdoor	Garden/Nature	4	4,71
		Space	1	1,18
Others (such as soccer field, house, pool, highway)		9	10,59	
Unspecified		12	14,12	

In Table 3, it can be seen that students described the working type of physicists as individual (98,82%), and the working environment generally as an indoor such as classroom (45,88%), or laboratory (16,47%).

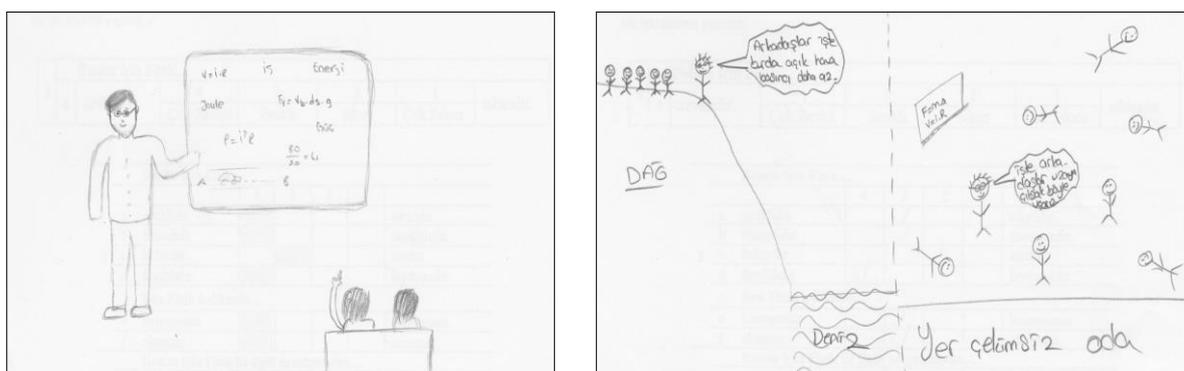


Figure 3. Working environment of physicists (S28, S57)

Example drawings of high school students' views of physicists in terms of working type and working environment are presented in Figure 3. The findings on the type of tools used by the physicist in the students' images are summarized in Table 4.

Table 4. Tools used by physicists as imagined by high school students

Tools and Supplies	f	%
Smart board	6	7,06
Key	1	1,18
Car	1	1,18
Book	1	1,18
Test tube	5	5,88
The experimental setup	3	3,53
Closet	2	2,35
Dynamometer	1	1,18
Electric tools	2	2,35
Electroscope	1	1,18
solar panel	1	1,18
Cable	3	3,53
Pen	2	2,35

Book	4	4,71
Mass set	1	1,18
Lamps / bulbs	2	2,35
Table	16	18,82
Lens	1	1,18
Compass	1	1,18
Scales	1	1,18
Board	27	31,76
Other (ball)	2	2,35
Unspecified	39	45,88

Students often specified a board (31,76%), table (18,82%), smart board (7,06%), test tube (5,88%), and books (4,71%) as the tools and supplies used by the physicist.

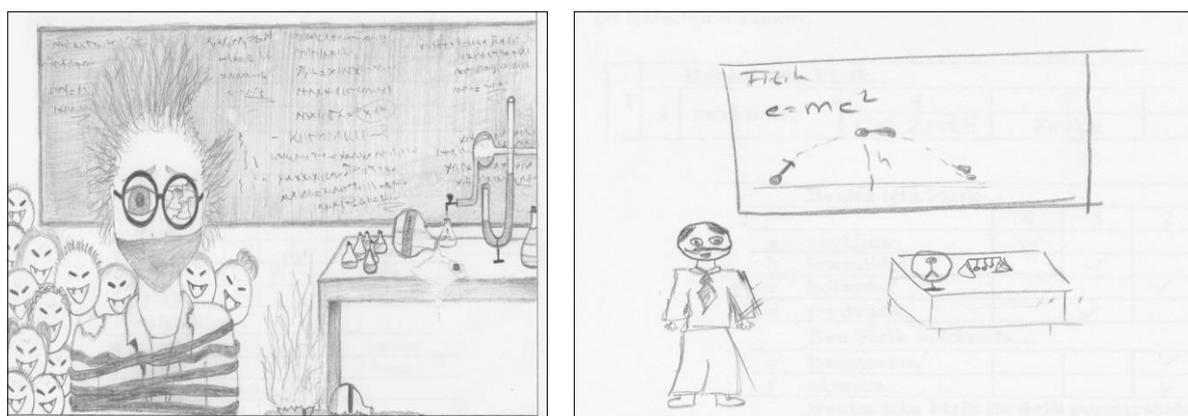


Figure 4. The tools and supplies used by physicists (S1, S51)

Example drawings of high school students' views of physicists in terms of the tools and supplies used by physicists are presented in Figure 4. The findings on the information symbols used by the physicist in the students' images are summarized in Table 5.

Table 5. Information symbols used in students' drawings

Information Symbols	f	%
Formulae	16	18,82
Symbol	7	8,24
Shape	3	3,53
Model	2	2,35
Unit	1	1,18
Table / schema	1	1,18
Unspecified	61	71,76

Information symbols used by students in the physicist drawings can be listed as formulae (18,82%), symbols (8,24%), shapes (3,53%) and models (2,35%).

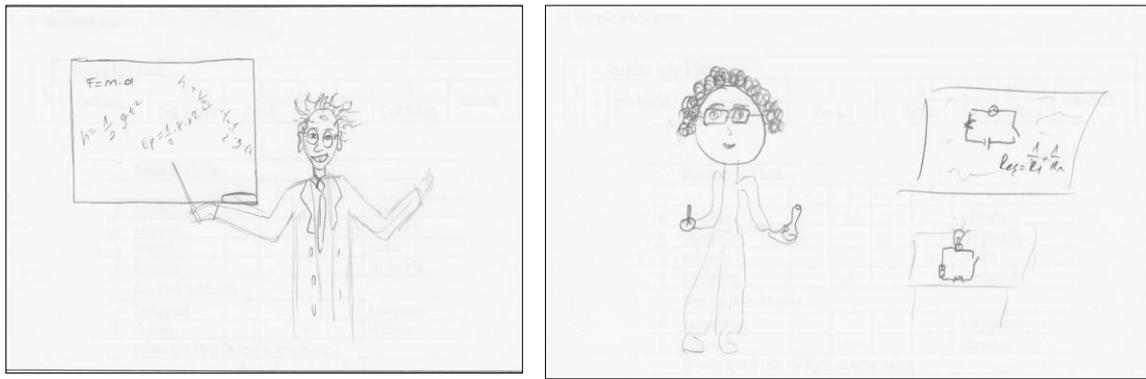


Figure 5.Information symbols used in students' drawings (S10, S27)

Example drawings of high school students' views of physicists in terms of the information symbols found in the drawings are presented in Figure 5. The findings on the professional and personal characteristics of physicists in the students' images are summarized in Table 6 -7.

Table 6. Professional characteristics of the physicist in the images

Professional Characteristics	f	%
Giving a lecture	35	41,18
Making an experiment	20	23,53
Being proficient in physics topics	11	12,94
Being able to do everything	11	12,94
Teaching	10	11,76
Producing new things (car, machine, robot, etc.)	8	9,41
Researching	7	8,24
Inventing	6	7,06
Being able to do engineering	6	7,06
Reading the book	2	2,35
Being an academician	2	2,35
Endearing physics to people	2	2,35
Being interesting in physics	2	2,35
Producing original ideas	2	2,35
Fixing	2	2,35
Making projects	2	2,35
Making the circuit with electric cables	2	2,35
Using formulas	1	1,18
Correlating events in life with physics	1	1,18
Describing matters in an understandable way	1	1,18
Repeating the issues without getting bored	1	1,18
Giving a reasonable explanation for the problems	1	1,18
Producing solutions to problems	1	1,18
Benefiting from the videos in the lecture	1	1,18
Attracting students' attention	1	1,18
Thinking about the laws of physics (form his theory, prove it, make laws)	1	1,18
Contributing to the development of science and technology	1	1,18
Doing all the plumbing in the house	1	1,18
Unspecified	2	2,35

The students listed the professional characteristics of a physicist as giving a lecture (41,18%), making an experiment (23,53%), being proficient in physics topics (12,94%), being able to do everything (12,94%), teaching (11,76%) and producing new things (9,41%).

Table 7. Personal characteristics of the physicist in the images

Personal Characteristics	f	%
Cheerful	11	12,94
Intelligent	11	12,94
Enjoyable	8	9,41
Sympathetic	8	9,41
Good person	6	7,06
Understanding	5	5,88
Funny	3	3,53
Crazy	3	3,53
Reading a lot of books	2	2,35
Serious	2	2,35
Patient	2	2,35
Permissive	2	2,35
Loving students	1	1,18
Curious	1	1,18
Quiet	1	1,18
Tired	1	1,18
Hard tempered	1	1,18
Polite	1	1,18
Determined	1	1,18

The personal characteristics of a physicist were listed as cheerful (12,94%), intelligent (12,94%), enjoyable (9,41%), sympathetic (9,41%), good person (7,06%) and understanding (5,88%). Findings related to the physicists admired by high school students and the reasons of their admiration are presented in Table 8.

Table 8. Physicists admired by high school students and reasons of admiration

Physicists Admired by Students	Reasons of Admiration	f	%
Their own physics teacher (f=38, %45,88)	Being able to teach well	12	30,77
	Being a good person	6	15,38
	Making the students like the course	6	15,38
	Being very intelligent	6	15,38
	Not recognizing anyone other than their own physics teacher	2	5,13
	Being able to teach fun	2	5,13
	Being patient	2	5,13
	Teaching the course in different ways	1	2,56
	Graduated from a good college	1	2,56
	Teaching by doing experiment	1	2,56
Albert Einstein (f=25, %29,41)	Being very intelligent	8	32
	Standing against memorization	4	16
	Personal life	2	8
	Personality that makes fun of everything	1	4
	The image in the photographs is beautiful	1	4
	Perseverance of working	1	4
	Producing good/useful things for humanity	1	4
	Unspecified	7	28
Newton (f=6, %7,06)	Contributing to the physics	3	50
	He is the only famous physicist that he/she knows	2	33,33
	Being very intelligent	1	16,67
	Continuing the researches with care and interest despite all the obstacles	2	66,67

Stephan Hawking (f=3, %3,53)	Continuing the researches with care and interest despite all the obstacles	2	66,67
	Unspecified	1	33,33
His/her father (f=2, %2,35)	Being his/her father	1	50
	Unspecified	1	50
Walter Lewin (f=2, %2,35)	Doing experiments in lecture	1	50
	Unspecified	1	50
Edison (f=1, %1,18)	Perseverance, never giving up	1	100
Richard Dawkins (f=1, %1,18)	What his made	1	100
Tesla (f=1, %1,18)	Being a genius	1	100
Unspecified (f=4, %4,7)			

The physicists most admired by students are their own physics teachers (45,88%). Among the reasons for this selection are being able to teach well (30,77%), being a good person (15,38%), making the students like the course (15,38%) and being very intelligent (15,38%). Among the admired physicists, Einstein ranks second (29,41%). Students admired Einstein for reasons such being very intelligent (32%), standing against memorization (16%) and personal life (8%). Newton, Hawking, Lewin, Edison, Dawkins and Tesla are also among the physicists admired by a small number of students. It is also seen that being very intelligent constitutes a significant part of the reasons why students admire physicists. The sources that inspire students while they draw the physicists in their images are listed in Table 9.

Table 9. Sources that inspire students while they draw the physicists in their image

Sources that Inspire Students	f	%
Physicists themselves	26	30,59
Movies	24	28,24
Their teachers	21	24,71
The Internet	15	17,65
Caricatures	15	17,65
Science magazines	8	9,41
Textbooks	8	9,41
TV programs (Techno HD, Doctor Who, back garden science)	6	7,06
Cartoons	6	7,06
Their family	4	4,71
Documentaries	4	4,71
Newspapers	3	3,53
Science fiction books	2	2,35
Other (football match, education system, imagination)	11	12,94
Unspecified	8	9,41

The sources that students are inspired by the most while drawing the physicist in their image were the physicists themselves (30,59%), movies (28,24%), their teachers (24,71%), the Internet (17,65%) and caricatures (17,65%).

Discussion, Conclusion and Suggestion

In this study conducted with the aim of determining the physicist image of high school students, the drawings and responses to the open-ended questions were evaluated in terms of “gender”, “age”, “physical characteristics”, “working type and environment”, “tools and supplies used”, “information symbols used”, “professional and personal characteristics”, “admired physicists and reasons of admiration” and “inspired sources”.

Most students (77,65%) in this study depicted a male physicist. Many studies in the literature have found that participants mostly describe scientists as men (Ağgöl-Yalçın, 2012; Akçay, 2011; Ayvacı, Atik & Ürey, 2016; Chambers, 1983; Deniz-Çeliker & Erduran-Avcı, 2015; Finson, 2002; Görecek-Baybars, 2017; Kara & Akarsu, 2013; Nuhoglu & Afacan, 2011; Özkan, Özeke, Güler & Şenocak, 2017; Song & Kim, 1999; Türkmen, 2008; Ürey, et al., 2017; Yontar-Toğrol, 2000). In this study, it was seen that the students drawing a female physicist were girls. In general, it was seen that male students tend to draw male scientists and female students tend to draw female scientists (Chambers, 1983). Similarly, in most studies, it is found that female scientist drawings are made by female students (Ağgöl-Yalçın, 2012; Kara & Akarsu, 2013; Kibar-Kavak 2008; Korkmaz & Kavak, 2010; Özkan, Özeke, Güler & Şenocak, 2017). This shows that the idea of female physicists is still not adequately settled in minds. This is also supported by the fact that the physicists admired by the students are male physicists (i.e., Einstein, Newton). It is thought that textbooks, which are the source of inspiration for students, also play a role in the emergence of this result. Karaçam, Aydın and Digilli (2014) indicate that the majority of scientists included in the textbooks are images of stereotypical scientists of European origin, male, from the middle ages, or ancient Greece. Similarly, Köseoğlu and Durukan (2017) found that all of the scientists included in science textbooks were male. Based on these results, it is believed that contents related to scientists should be increased in textbooks by giving more emphasis to female scientists.

In this study, it was determined that most of the high school students described a physicist as 40-49 years old (32,94%), wearing sports/daily clothes (24,71%) or a suit (22,35%), looking happy (64,71%), teaching in class (41,18%), with short hair (28,24%), with groomed hair (31,76%), and with a moustache (10,59%). In the study of Kara and Akarsu (2013), it was determined that according to secondary school students, scientists are usually perceived as people wearing lab-coats and glasses, with a beard, and as people who are constantly finding new knowledge and therefore perceived as happy. Arslan and Savaş (2017)'s study revealed that, secondary school describe the social scientists as happy, having short haired and wearing glasses, studying in office or in nature and using research symbols such as paper, book, pencil and shovel and anchor in their drawings. Turgut, Öztürk and Eş (2017) found that the secondary school students often describe scientists with wearing lab-coats, glasses and laboratory materials, and think the scientists are producing information by working in the laboratory. Also, this image of physicist can be attributed to the fact that students imagine the images of Einstein in their minds as a physicist, seen in movies, in the Internet, or in textbooks (Ayvacı, Atik & Ürey, 2016). This is supported by the fact that 29,41% of the high school students indicate Einstein as a physicist they admire, and the sources they are inspired by in their drawings are movies (28,24%), internet and caricatures (17,65%). In other words, it can be said that students develop images of scientists based on media organs such as Internet, newspapers, movies and cartoons (Ağgöl-Yalçın, 2012; Kara, 2013; Kibar-Kavak, 2008; Özkan, Özeke, Güler & Şenocak, 2017). In the study of Özkan, Özeke, Güler and Şenocak (2017), it was seen that the scientist image in the drawings of university students was mostly the instructors in their departments, while Einstein, Newton and Edison were the most frequent scientists in the drawings of some students.

In the drawings of high school students, physicists are mostly depicted as working individually (98,82%). Similarly, it has been determined in various studies that participants think that scientists work alone (Ayvacı, Atik & Ürey, 2016; Deniz-Çeliker & Erduran-Avcı, 2015; Özkan, Özeke, Güler & Şenocak, 2017). The students in this study drew a physicist in the classroom (45,88%), in the laboratory (16,47%), and in the study/research room (5,88%). In the literature, it has been found that scientists are generally thought to be working in indoor areas such as a laboratory or their own study/research room (Ağgöl-Yalçın, 2012; Ayvacı, Atik & Ürey, 2016; Chambers, 1983; Eyceyurt-Türk & Tüzün, 2017; Görecek-Baybars, 2017; Finson, 2002; Özkan, Özeke, Güler & Şenocak, 2017; Song & Kim, 1999; Turgut, Öztürk & Eş, 2017; Türkmen, 2008). Akçay (2011) have found that students perceive scientists as people who work in indoor. In the study conducted by Deniz-Çeliker and Erduran-Avcı (2015), it was observed that the number of laboratory drawings were very high in primary school students in the pre-test, however, after the scientific activities they participated in, an increase in the drawings of multiple working environments (drawings with both indoor and outdoor environments) was observed in the post-test. The students' perception that scientists produce

the knowledge only indoor areas such as in a laboratory can be changed with the scientific activities of out-of school environments.

A striking result in this study is that 45,88% of the students indicated a classroom as the work environment of a physicist, and specified objects such as board, table, smart board, book as tools and supplies used by physicists and emphasized lecturing (41,18%) among the professional characteristics of a physicist. This situation has been interpreted as the fact that the students regard their physics teachers as a physicist, and this leads to the conclusion that the teachers are influential on students' images of physicists. This is supported by the fact that in cases where students indicate that they admire their own physics teachers as a physicist (45,88%), they mostly try to draw their own physics teachers. Another finding that supports this situation is that students see their teachers as a source of inspiration in the drawings they make about the image of a physicist (24,71%). The studies in the literature show that teachers are one of the factors influencing the image of scientists (Ağgöl-Yalçın, 2012; Türkmen, 2008). At this point, it is thought that as a role model, it is necessary for teachers to encourage their students towards science, and to enable their students to access information like a scientist in terms of their course contents.

The sources that students are inspired by while they draw a physicist were listed as physicists themselves, movies, their teachers, Internet, cartoon, science journals and textbooks. The studies in the literature have shown that the scientist images are influenced by textbooks, teachers, extra-curricular activities, cartoons, science fiction books, the Internet, scientists' life stories, and science journals (Ağgöl-Yalçın, 2012; Buldu, 2006; Buluş-Kırıkkaya, Bozkurt & İşeri, 2011; Güler & Akman, 2006; Türkmen, 2008; Karaçam, Aydın & Digilli, 2014). For this reason, it is recommended that written materials such as textbooks and science journals should be prepared in a way that contributes to the scientist image of students (She, 1995) and that positive features of scientists should be emphasized (Türkmen, 2008; Ağgöl-Yalçın, 2012). Scientists who work in different fields, their work and life stories should be included more in visual materials such as movies and cartoons, and written materials such as textbooks and science journals (Ağgöl-Yalçın, 2012; Finson, 2002; Karaçam, 2016; Köseoğlu & Durukan, 2017).

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