An action research on the scientist image of 4th grade students

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Abstract

Many scientist image studies have been conducted with the participation of many students from various grades and from various age groups. In these studies, stereotyped images were determined and activities were designed to change the existing ones. However, there are still missing points in Turkey in terms of investigating the scientist image of the children at primary school age and changing this image through action study. Based on this point, the aim of the present study is to change the scientist image of the primary school children living in low socioeconomic conditions through telling scientific stories and direct reflecting

activities. The study was conducted on 12 fourth grade students who were studying at a primary schools located in a village in Tokat in Turkey. In the context of the study, stories were read about the scientists who conducted studies in the field of science and social sciences and who achieved great success stories in their cultural environments and in international field, and activities based on direct reflection were conducted. The study was conducted throughout 9 weeks between September 2017-November 2017. At the end of the study process, it was observed that there were changes in the scientist images of the students; and it was concluded that the interests and curiosities of the students could be sustained with visits from scientists in the classrooms of the students together with supportive activities.

Keywords: Action research, draw-a-scientist-test, scientific stories, scientist image.

Introduction

The scientist images of the students, who studied at school from primary to university for more than twenty years, were investigated. In the very heart of these investigations, it was observed that the scientist image, which already existed in the minds of the students, was influential in the career planning, interests, and attitudes of the students towards science (Boylan, Hill, Wallace and Wheeler, 1992). Many factors may be involved in making students acquire the scientist image. Among these factors, the attitudes of the science teachers and science education given at schools have the greatest share (Yontar-Toğrol, 2013). According to Miele (2014), the basic aim of the science teaching is to ensure that students learn science willingly, and follow the development in the field of science teaching. The interest and needs of students on science may affect their images about science. Based on this point, the images of students on science and scientist have always been a matter of curiosity.

In studies conducted on the scientist images of students, it was observed that the scientists wear glasses, generally male and work in laboratories, alone, hair is messy, tired, have messy working places that are full of experimental tools, use microscopes, and conduct research on animals (Korkmaz and Kavak, 2010; Mead and Metraux, 1957; Özel and Doğan, 2013; Thomas, Henry and Snell, 2006; Türkmen, 2008). These studies were conducted on several age groups, and it was determined that the images on scientists are similar to each other. These results and similar other results

are called as stereotypical images in the literature (Buldu, 2006; Finson, 2003; Fung, 2002; Song and Kim, 1999).

Several measurement methods were used to classify scientists, which are structured interview and open-ended questions (Narayan, Park and Peker, 2009), questionnaires (Sjøberg, 2002), drawings (She, 1995) and rubrics (Huber and Burton, 1995) . However, researchers generally used the Draw-A-Scientist-Test (DAST), which was developed by Chambers (1983). DAST is a drawing test and does not require any writing. Chambers (1983) examined scientists in seven categories in his study, which are; laboratory coat, glasses, hair, research symbols (scientific tools and laboratory equipment), knowledge symbols (file drawer, basic books), technology (technological devices), suitable headlines and writings (e.g., science topics and formulas). In studies that were conducted by using DAST, it was observed that different components were influential on scientist like course books (Hsiao-Ching, 1995), social and cultural values transferred from the family (Scott and Mallinckrodt, 2005), the effects of teachers and peers (Lee, 2002), scientific centers and museums (Sharkawy, 2012), media sources and popular culture (Steinke et al., 2007).

Flick (1990) reported that visits that would be made by scientists in classrooms might be influential in changing the stereotypical images of students. Çakmakçı, Tosun, Turgut, Örenler, Şengül and Top (2011) recommended the use of cartoons or drawings in which the lives of scientists are depicted, organizing visits by scientists, and organizing visits to scientists. Mason, Kahle and Gardner (1991) emphasized the importance of teacher education programs, and Kaya, Doğan and Öcal (2008) mentioned about the change that was expected in the attitudes of teachers. When the relevant literature was reviewed, it was observed that the direct approaches could be used about the image on science and telling scientific stories were effective (Kruse, 2010; Milne, 1998).

Scientific Stories and Their Effects on Scientist Image

The scientific stories or short texts used by teachers might make science become more attractive for students (Sharkawy, 2012). However, the most important thing that must be considered during the use of stories or texts was telling students that stories are an indispensable part of science, and sometimes it reflected fictions. In addition, teachers must be able to control the social and cultural messages through the stories they tell (Milne, 1998), because young children who are at primary school

age have not developed their scientific literacy skills yet, and have mystical understandings (Egan, 1988). For this reason, efficient teaching must be performed in young age groups by emphasizing the story schemes (humans or animals that have natural powers) in scientific stories. As the age proceeds, natural characters might be intensified, and certain concepts like amount might be added (Corni, Giliberti and Fuchs, 2013).In scientific stories that will be used at schools, it is important that information that will motivate students is used like the life of scientists, what s/he studies, and the reasons that motivate him/her must be emphasized. In addition, it is also important to choose people that will represent science from among the people around children (Felt and Fochler, 2012).

Scientific stories are used to develop the critical thinking ability, problem solving skill and inquiry abilities in children, because students see themselves as the main characters of the story and start solving problems in this way, which is more entertaining for them (Klassen, 2007).When telling scientific stories, it is possible to narrate the characters in a direct or implicit approach. Implicit approach, the understanding of nature of science; is a learning outcome that can be achieved by developing process skills, teaching science subjects and doing science (Lederman and Stefanich, 2004). According to this approach, scientific process skills teaching or informed inquiry activities should be used to improve students 'and teachers' natural views of science (Khisfe and Abd-El-Khalick, 2002). Khishfe and Abd-El-Khalick (2002) aimed to examine and compare the influence of implicit approach and the influence of direct reflective approach on the nature of science of sixth grade students. In the study, the nature of science is changeable, emphasizing constructs based on empirical evidence, including inferences, imagination and creativity. The same inquiry activities were applied to the experiment group and the control group. While a direct reflective approach was followed in the experimental group, an implicit approach was applied in the control group. Through a questionnaire consisting of open-ended questions and interviews, pre- and post- opinions participants' were determined. In the opinion of the participants in the control group there was no change after the application. In the opinion of the students in the experiment group, a more informed opinion has been passed.

Also, according to Akerson and Hanuscin (2007), direct approaches have positive effects on the student and teacher about the viewpoint on science.

Direct Reflective Approach and Its Effects

Direct approaches represent the activities in which science may be observed in classrooms and are not activities in which science is directly involved. During these activities, students discuss topics, and ask questions. In this way, a basic and structured science concept is formed in the minds of students (Lederman, 2006). In studies in which direct reflective approach was used, it was observed that the understandings on science were plenty in number, and these meanings could be transferred into other fields (Akerson, Khalick and Lederman, 2000; Rudge and Howe, 2009; Scharmann, Smith, James and Jensen, 2005).

Direct reflective approach has several positive effects like conducting the discussion within the classroom, working under the supervision of the teacher, having writing and evaluation activities as a conclusion (Kaya, 2011). According to Abd-El-Khalick and Lederman (2000), direct reflective approach produced more positive results when compared with implicit approaches. Schwardz, Lederman and Crawford (2004) prepared direct approach-based activities on the nature of science with teacher candidates, and Lin, Lieu and Chen (2012) prepared books based on course books that were enriched with the nature of the science. With this approach, changes were observed in the beliefs and perceptions about scientific image both in the eye of teachers and students.

The basic aim of the present study is to show how well the methods are successful in converting the scientist image that already exists in the literature. The specific aim of this study is to determine the efficacy of activities that were based on direct reflective approach and telling scientific stories method to change the images in the minds of the students who had stereotypical images about scientists.

Method

Research Design

The action research was used in the present study. Action research shows differences from other traditional approaches in terms of collecting, analyzing and interpreting the data (Cain and Milovic, 2010). Action research is systematically and consistently carried out by trainees to improve and improve their practice (Calhoun, 2002).

Participants

Twelve 4th grade students, who live in low socio-economic conditions in Turkey, participated in the present study (six male, six female students). All the students who participated in the study had similar information about the science.

The Role of the Author of the Study

The author of the present study was also the practitioner teacher of the study. The author completed her doctorate degree in the field of science, and has an experience of twelve year teaching. The selection of the activities and stories used in the study was done with the initiative of the researcher. The researcher told the stories, collected the study data and analyzed them in the present study.

Instructional Context

In this study, the images of the students about scientist were evaluated both before and after the application. The application was done in fall term of 2017. The stories on the works, social structure and working methods of scientists were read to the students firstly. It was cared for that the names of scientists like Edison, Einstein, Graham Bell and Stephen Hawking, who are mentioned in course books, were not included in the stories. The stories that were presented Marie Curie (Apuhan, 2015), Amelia Earhart (Çimen, 2008), Nermin Abadan Bulat and İlber Ortaylı (collected from the literature and developed by the author of the study), Ali Kuşçu (Çınar, 2016), Aziz Sancar (Terzioğlu, 2016) and Zekai Muammer Tunçman (Gümüşoğlu, 2001).The lives of scientists who were born in their countries and who were well-known all over the world were presented in stories. The presentations of stories were performed in three stages. In the first stage, questions were asked to the students on science and scientists, and their interest on stories was aroused. In the second stage, the stories were read, the pictures of scientist were shown, shorts biographies were presented, and students were encouraged to express their thoughts in intervals. The students were asked to draw a picture describing their ideas on scientists after each presentation, and a corner was organized in the classroom with the title "The Scientists I Know". In this corner, drawings, writings on thoughts, and depictions on scientists were given place. In addition, when the stories on scientists were finished, the students were asked to keep "Science Diary". They were also asked to write their viewpoints and impressions on the scientists they knew on that specific day. In the

last stage, students were asked to depict a scientist, and write their viewpoints on him/her. In this stage, it was questioned what the students would ask the scientist if they were given the chance to meet him/her, and why they chose him/her.

After the stories were finished, three activities that were prepared in the light of the direct reflective approach were applied to the students. These activities were "From the Thermoscope to Thermometer, Lottery Game", which was developed by Alkış-Küçükaydın et al. (2014) and "Science with Concept Wheel", which was developed by Doğan, Çakıroğlu, Bilican and Çavuş (2010).

Research Instrument

In the present study, the Draw-A-Scientist-Test (DAST) was used to discover the images of the students on scientist. In DAST, which was developed by Chambers (1983), students depict their images about scientists in a simple manner. The drawings are analyzed according to a check list. In addition, for the purpose of increasing the reliability of DAST, the students were asked to write a few sentences about their drawings. In addition, the students were asked to keep a "Science Diary" after the activities and stories, and to write their impressions about scientists.

Data Analysis

DAST was developed by Chambers (1983) for the purpose of revealing the scientist image, and was converted into DAST-C by adding a checklist by Finson, Beaver and Cramond (1995). In DATS-C, which may be considered as a checklist or as an evaluation chart, there are main and sub-categories, which are personal properties, research symbols, knowledge symbols, technological products, and scientific products, the gender of the scientist and the working environment. The drawings of the students are transferred into this checklist by counting. For the purpose of ensuring the reliability of the data collected, the drawings of the students were also evaluated by another researcher, and 93% consistency was achieved. The other researcher, who made the evaluation, was a science teacher who completed the undergraduate education in this field. The data in which inconsistencies were detected were re-evaluated, and presented in the study. The frequencies (f) and percentage (%) distributions are shown in checklists according to the gender variable.

Results

The findings obtained from the drawings of the students about the outlook of a scientist are given in Table1.

Table I. The outlook of a scientist

		Before Application						After Application					
Gender		Lab Coat	Eyeglasses	Beard	Mustache	Bald	Strange Hair	Lab Coat	Eyeglasses	Beard	Mustache	Bald	Strange Hair
Girls	f	-	4	-	-	3	2	-	-	-	-	-	-
	%	-	67	-	-	50	33	-	-	-	-	-	-
Boys	f	-	3	-	1	6	3	-	-	-	-	-	-
	%	-	50	-	20	100	50	-	-	-	-	-	-

In Table I, the data obtained from the students before and after the application about the outlook of scientist are interpreted. It was observed that most of the students had stereotyped images about scientists before the application. However, when the drawings on the images were evaluated, it was observed that there was no laboratory coat and mustache both before and after the application. On the other hand, it is interesting that all of the stereotypical images about the outlook of scientists changed after the application.

Figure 1. Drawings on the outer look of a scientist

When Table 1 and Figure 1 are examined together, after the application, it is observed that the scientist does not wear glasses and the hair is smoother.

The findings obtained on the research symbols used by scientist in the drawings of the students are given in Table II.

Table II. The research symbols used by scientist

		Before Application					After Application				
Gender		Test-Glass	Microscope	Experimental Animals	Plants	No Scientific Equipment	Test-Glass	Microscope	Experimental Animals	Plants	No Scientific Equipment
Girls	f	4	-	1	-	-	-	-	-	-	6
	%	67	-	17	-	-	-	-	-	-	100
Boys	f	3	-	1	1	3	-	-	-	-	6
	%	50	-	17	17	50	-	-	-	-	100

According to Table II, it was observed that test tubes were used as the research symbol by all students before the application (67% in girls, and 50% in boys).In addition, it was also observed that one girl and one boy drew an experimental animal, and one boy student drew a plant. After the application, on the other hand, it was observed that none of the girl and boy students drew any research symbols.

When Figure 2 is analyzed it is observed that one male student drew a scientist, which he claimed having seen in the media. In this drawing, the scientist is preparing elixir and ensures that a plant grows and developed with the help of this elixir. The drawing after the application belonged to a boy student again, and depicted the scientist as receiving praises after research, and should be rewarded.

Before

After

Figure 2. The drawings on the research symbols used by the scientist

The findings on the knowledge symbols which were obtained with the drawings of scientist by the students are given in Table III.

Table III. The informative symbols used by scientist

Before Application						After Application			
Gender		Books	File Cupboard	Graphics/ Mathematical Expressions	No Sign and Symbol	Books	File Cupboard	Graphics/ Mathematical Expressions	No Sign and Symbol
Girls	f	-	-	2	2	-	-	1	5
	%	-	-	33	33	-	-	17	83
Boys	f	1	-	2	4	1	-	-	5
	%	17	-	33	67	17	-	-	83

When Table III is analyzed it was observed that the students used knowledge symbols -although few in number- before the application. This was a book symbol drawn by a boy student, graphics/mathematical expressions drawn by two girl students, and graphics/ mathematical expressions drawn by two boy students. After the application, it was determined that one boy student used the book symbol; however, it was a different student. The graphics/ mathematical expressions were decreased in girl students after the application, and completely disappeared in boy students.

Figure 3. The drawings on the informative symbols used by the scientist

It was observed that there were clear differences between the drawings of the students about scientists before and after the application.

The findings on the technological products used by scientists drawn by students are given in Table IV. However, interesting findings were obtained here. In this context, none of the students drew technological products before the application, and one girl and one boy student drew planes, and one boy student drew a computer after the application.

Table IV. Technological products of the scientist

		Before Investigation					After Investigation				
Gender		Machines	Robots	Computer	Aircraft	No Technology	Machines	Robots	Computer	Aircraft	No Technology
Girls	f	-	-	-	-	6	-	-	1	1	4
	%	-	-	-	-	100	-	-	17	17	67
Boys	f	-	-	-	-	6	-	-	-	1	5
	%	-	-	-	-	100	-	-	-	17	83

Figure 4. The drawing on the technological products used by the scientist

A drawing that was not in favor of the students was determined before and after the application. In this context, two students drew planes after the application. Possible reasons for this may be discussed in the discussion section.

The findings obtained about the gender of the scientist image by the students are given in Figure 5.

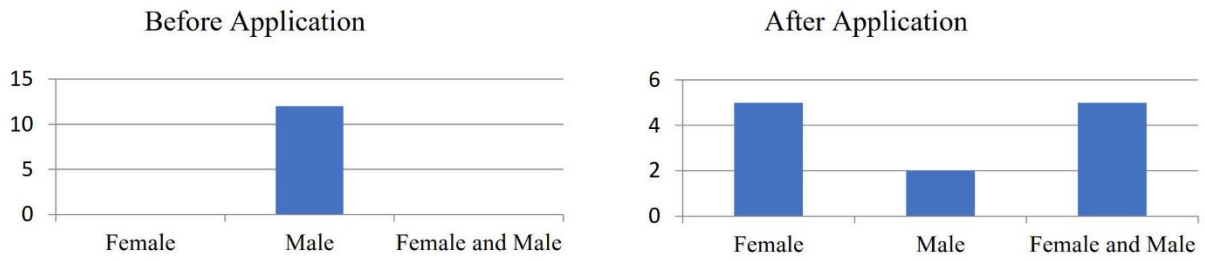

Figure 5. The criterion of gender

When the scientist drawings of the students before the application were analyzed it was observed that all students had a male scientist perception. After the application, it was observed that this rate was decreased, and the students drew male and female scientist working together. The examples of the drawings in which the mental images on the gender of scientists are given in Figure 6.

Figure 6. The drawings on the gender of the scientist

Based on the drawings of the students, the findings on the facial expressions of the scientists by the students are given in Table V. When this table was analyzed it was observed that the facial expressions of scientists did not change much before and after the application. When Figure 7, which include the examples of the drawings of

students, and Table 5 were analyzed together it was observed that the students generally depicted scientists as happy people.

Table V. The facial expression of the scientist

Before Application				After Application	
Gender		Happy	Uncertain	Happy	Uncertain
Girls	f	6	-	6	-
	%	100	-	100	-
Boys	f	5	1	6	-
	%	83	17	100	-

Before After

Figure 7. The drawings about the facial expression of the scientist

Based on the drawings of the students, the findings about the characteristics of the environment where the scientist works are given in Table VI.

Table VI. The working environment of the scientist

Before Application							After Application				
Gender		Laboratory	House	Garden	Space / Planets	No context	Laboratory	House	Garden	Space/ Planets	No Context
Girls	f	4	-	3	-	-	1	1	2	-	3
	%	67	-	50	-	-	17	17	33	-	50
Boys	f	3	-	3	-	-	-	1	2	-	3
	%	50	-	50	-	-	-	17	33	-	50

When Table VI was examined, before the application, students imagined scientists in laboratory (67% in girls, and 50% in boys) and in the nature/garden (50% in boys

and girls). According to the images of the students after the application, there were decreases in the rates of the drawings that depicted scientists in laboratory (one girl) and in the nature/garden (two participants in girls and boys). After the application, students reflected the working environment of scientists in different ways. These rates are close to each other, and it was observed that one participant preferred to draw the scientist in a laboratory, two participants depicted the scientist at home, and a total of six participants did not show the scientist in any environment.

The examples of the drawings of the students on the mental images of the working environment of scientists are given in Figure 8.

Before After

Figure 8. The drawings on the working environment of the scientist

When the viewpoints of the students written in the diaries were analyzed, the perceptions on scientist are summarized in Table VII.

Table VII. The perception about the scientist

	Girls (n=6)		Boys (n=6)		Total (n=12)	
	f	%	f	%	f	%
Hardworking	2	16	4	33	6	50
Warm-hearted	3	25	1	8	4	33
Kind-hearted	4	33	1	8	5	42
Loving children	1	8	5	42	6	50
Smiling	1	8	1	8	2	16
Intelligent	4	33	5	42	9	75

When Table VII was analyzed it was observed that after the application, most of the students (75%) considered the scientist as clever/wise. Again, most of the students (50%) imagined scientists as hardworking people. The students stated that they wanted to meet Aziz Sancar if they were given the opportunity of meeting him, and ask him why he preferred science. Right at this point, girl students mostly stated that they wanted to meet Amelia Earhart, and boy students stated that they wanted to meet Aziz Sancar.

Finally, a statistical analysis was carried out in order to obtain a general picture. The items in the checklist used to evaluate students' drawings were scored. According to this, each symbol in student drawings was scored as 0-1, and it was tested whether there is a statistical difference in student drawings . The Wilcoxon Signed-rank test results are presented in Table VIII.

Table VIII. Wilcoxon Signed-Rank test results of pre-and post-test scientist drawing test scores

Pre-test/Post-test	n	Mean Rank	Sum of Ranks	z	p
Negative Ranks	10	7.80	78.00	-2.282*	.023
Positive Ranks	3	4.33	13.00		
Ties	8	-	-		

* Based on positive ranks

The results of the analysis shown in Table VIII show that there is a meaningful difference between the pre-test and post-test scores of students participating in the drawing test ($z=-2.282$, $p<.05$). When the mean rank and sum of ranks scores are taken into consideration, it is seen that this difference is favored by the positive rank, that is, the post-test score. It can be said that the implementation which is carried out according to these results is an important influence of the students on the image of the scientist.

Discussion and Conclusion

The scientist images of various age groups from various educational stages were investigated in several studies so far (Mead and Metraux, 1957; Song and Kim, 1999; Thomas et al.,2006; Türkmen, 2008). The present study, on the other hand, was conducted on the action research design with the students living in low socio-

economic conditions in a small village in Turkey. With this study, the existing stereotypical images of students were changed and the effects of various methods on changing the images were investigated. Some changes were determined in the present study. In the light of the findings obtained in the present study, changes were determined in the images of the students about scientists after the application was conducted. The students, who imagined scientists as wearing glasses, with moustache, bald, or having messy hair, did not include these elements in their drawings after the application was conducted. The stereotypical images of students determined before the application are given in the literature (Doğan, 2015; Song and Kim, 1999; Yontar-Toğrul, 2013). It is considered that the initial images of the students occurred due to the media, because these students who live in low socio-economic conditions, had not met any scientist before and had no information about their works. In previous studies conducted in the same field, it was reported that the media had negative effects on students about the images of scientist and guided students to a "bad scientist" image (Özel and Doğan, 2013). It was observed in the present study that the stereotypical images about the outlook of scientists were completely changed. It was concluded in the present study that hanging the pictures of scientists on the class notice board, reading the biographies and stories about scientists, and introducing scientists in this way were influential in changing the image of scientists.

Before the application, the students drew test tubes, experimental animals and plants, respectively as the symbols of research. These images that existed in the students comply with the relevant literature (Mead and Metraux, 1957). After the present study, it was observed that all the images of the students on research symbols changed completely. The reasons for this may be that the emphasis was on the social lives of the scientist that were introduced in the context of the study and they were mostly from the field of social sciences. Because it was observed in the drawings that scientist read books, made declarations to the media, and donated to relief agencies. In addition, it is also possible that this situation helps children develop positive feeling about scientists. Some students wrote in their diaries that they wanted to become scientists when they grew up, and help children like themselves. According to Buldu (2006), the reason why students want to become scientist is that they consider it as a funny thing.

When the images of the students about the knowledge symbols used by scientists were analyzed, it was observed that the students drew books and graphics/ mathematical statements before the application. After the application, only one student included graphics/mathematical statements. The student was asked the reason of this drawing and the student stated that she did not draw the works of the scientist, but it was a drawing about their childhood of the scientist. In other words the student drew the education received by the scientist when she was young. Based on these statements, it may be claimed that the students are curious about the childhoods of scientists, and have the idea that they were children once in the past, and had daily lives. Türkmen (2008) stated that teachers were important in primary education years in the formation and sharing of the perceptions about science and scientist. He also mentioned that the student-centered education was effective in preventing the stereotypical images. In this case, it may be considered that the activities in the present study were guiding in the change of images in students.

Another interesting this was also observed in the present study. In this context, no technological symbols used by scientists were observed in the drawings of the students before the application; however, computer and plane symbols were observed in the drawings after the study. Especially female students were impressed by Amelia Earhart, and were interested in the flight experiences of her. However, it was a male student who used a plane in his drawings. The male student was stated about his drawing that he was impressed by Amelia Earhart, and wanted to experience flying. The students adopted a scientist without discriminating between female and male gender might be considered as a positive value of the study. Similar results were reported in the literature. For example, it was reported that female students were mostly interested in Marie Cruie, and male students were mostly interested in Edison, Einstein and Newton as role models (Song and Kim, 1999; Thomas et al., 2006; Türkmen, 2008).

Before the application, all male students drew male scientist. This image was also reported in many previous studies (Çakmakçı et al., 2016; Doğan, 2015; Mead and Metraux, 1957; Özel and Doğan, 2013; Song and Kim, 1999; Thomas et al.2006; Türkmen, 2008; Yontar-Toğrul, 2013). Diffusion was observed in the gender of the scientists in the drawings of the students after the application. Two of the students drew male scientists, while five students drew female, and five drew a team of scientists. The reasons for this were interpreted as that the works of female scientist

were considered as interesting, and showed achievements through difficulties. Because, in interviews made with the students who said that they were impressed by Amelia Earhart, they said that the achievements of them as women were considered as a model of courage, and this was inspiring for them. As it is observed, scientists may be affected not only by the outlook of scientist but also by the culture in which they grew up.

In general, it was observed that the students mostly drew scientist as a happy, lovely, helpful, hardworking, and smart/wise. All students drew scientist as a happy person. As far as it was found possible, the drawings of students that showed scientist as happy people were exhibited. In addition, the students also stated that they would ask questions to the scientist if any of them visited their classrooms.

The students initially preferred the working environment of scientists as the nature/garden or laboratory. After the study, it was observed that there were slight changes in this perception. In the interviews on the drawings, some students stated that some scientists had to have laboratories to conduct works. No adequate visual aids were obtained for Zekai Muammer Tunçman, who was selected in the scope of the study, and his picture showing his works in laboratory was not hung in the notice board. One of the students in the interviews stated that it was easier for him/her to draw this picture. In this context, it was concluded that students must be provided with different opportunities.

When evaluated in general terms, many stereotypical scientists that were included in the literature were not observed in the drawings of the students in the present study. It is considered that this is related with the age, level, socio-cultural environment, and media. Different from the findings reported in the studies in the literature, it was observed that the younger students had more stereotypical images (Özel and Doğan, 2013). The reason for this might be the effect of magazines, course books and teacher speeches (Türkmen, 2008) which are considered as the sources of images.

Recommendations

In the present study, which was conducted in the 4th grade primary school students, the functionality of the methods used to change the image of scientist in the literature was tested. For this purpose, it was ensured that the image of scientist was changed by telling scientific stories and by using direct reflecting activities. The findings

obtained in the present study showed that the methods used in the present study were adequate in changing the outlook of scientist, the research symbols used by scientist, knowledge symbols, technological products and gender. The students who depicted scientists as happy people both before and after the application could not change their images about scientist having the laboratory as the working environment. However, it must be born in mind that the scientist image in the minds of the students is a barrier before the science (Finson, 2003). In addition, the present study was designed as an action study in a small village school. Based on this point, future researchers should conduct image studies with wider groups on changing the scientist images of students, which may produce more definitive results. However, such studies must be conducted with teachers, and these perceptions must be imposed to students by teachers, because many studies conducted in the same field emphasized that there are magazines, course books, films, the media, social media and teachers in the center of scientist image (Song and Kim, 1999; Thomas et al., 2006; Türkmen, 2008). In addition, it was also observed in the present study that the activities used and the stories told were effective and beneficial in changing the images of the students. During the conducting activities in classes, a newspaper article was read to the students. An interview made with Aziz Sancar in a newspaper attracted the attention of the students, and they tried to contact this scientist through e-mails. With similar activities, inviting a scientist to the classroom and introducing him/her to the students and a conversation between them -especially with scientists from social sciences field - will attract attention in similar studies and will be beneficial in terms of providing information in the field of social science.

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