Determining the Creative Thinking Levels of Fourth Grade Students at Primary School: Qualitative Research Report

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Abstract
Determining the creative thinking levels of fourth grade students at primary school are aimed at this research. The qualitative study was carried out with descriptive method. Twenty students, who were selected in accordance with the sampling method among the students receiving education in a primary school of Rize province, Güneysuyu district in 2014-2015 school year, constituted the study group of the research. Data was gathered with the "Scientific Creativity Test". In the analysis of the test, fluency, flexibility, authenticity and total scores of the students' answers were evaluated. In this regard, students' answers are scored as connected to each other. In the consequence of the research, it was determined that the students receiving high scores in sub-dimensions and in the whole test are the students, who have high academic achievements most of the time, have their own study rooms and get attention from their families regarding their education. It was determined that the students with low academic achievement generally got low scores from the test. Besides, it was seen that the same students got the highest and lowest scores in all dimensions. As a result of the research, it was recommended that the scientific creativity test can be benefited in educational environments; different studies can be carried out by using this test, and it may contribute to the researches in this field

Keywords : Creative thinking, descriptive research, primary school students

Introduction

Creativity is thinking different in the solution of an encountered situation or a problem, finding out unknown, being authentic, being able to produce different solutions, and creating original products as a result of this (Aktamış and Ergin, 2007; Işık, 2010; Torrance, 1968; Yenilmez and Çalışkan, 2011). Creativity occurs when the ways used in the solution of problems or reached results are new and original (Işık, 2012). In other words, creativity can be expressed as the ability of an individual to see the situations from a new and unusual perspective. For an individual to show a creative feature, s/he should be curios, patient, talented for making an invention, having a high imagination and interested in experiment and research (Tekin, 2008). Moreover, being creative requires to go beyond existing patterns and thinking different (Yang, Lin, Hong and Lin, 2016; Yenilmez and Çalışkan, 2011). In this respect, being able to produce different solutions to the same problem and trouble reveals out the creativity of people (Aktamış and Ergin, 2007).

Creativity, which requires being able to produce different thoughts and solutions, is consisted of preparation, incubation, enlightenment and verification processes. Preparation is the stage where the problem is started to be defined. In the incubation stage, the problem is handled both in the conscious and subconscious. Enlightenment is the stage where the thought develops suddenly with intuitonal processes. In the verification process, the person tries to verify the solution s/he found by comparing his/her accumulation of knowledge and the criteria of the problem (Kontaş, 2015). Creativity contains some sub-dimensions. According to Torrance (1990), fluency, flexibility and originality are the dimensions constituting the central elements of creativity. Fluency is the number of original ideas that a person produces with respect to a thought or situation. Flexibility is the skill of an individual to perform each different application concerning the situation. Originality (authenticity) is that the individual produces rarely seen and different answers within the group (Hu and Adey, 2002).

Children have creative skill, which is gained from birth and can be developed later on, in different levels. What important is contributing to the development of this skill, which is

existent in children. In this respect, environments where children can express and discuss their individual thoughts freely should be created in order to improve and ease these abilities of children (Aktamış and Ergin,2006; Birişçi and Karal, 2011). Likewise, free and open-minded environments where the students can look for different answers to question and problems should be provided to students in schools (Çağlar, 2010). Thereby, the problems of children about themselves and their immediate surroundings can be solved, and they can be raised as individuals looking at and evaluating the events from a different perspective (Karataş and Özcan, 2010). Moreover, with the development of creative skill, it can bring in some features to individuals such as easy adaptation to new situations, being more careful, and being sensitive to environment and other people (Erdoğdu, 2006). Even though they are used to define same situations in daily life, creativity and creative thinking are different concepts. Creative thinking includes more of mental activities, however creativity includes performance-based activities (Demirel, 2005). In this regard, creative thinking should be discussed separate from creativity. Aktamış and Ergin defined the creative thinking as 'seeing the problems and gaps in knowledge, developing ideas and hypothesis, producing original ideas, seeing the relation between ideas, obtaining new compositions by developing components of thoughts, and ultimately a design and forecasting approach. Creative thinking is changing an idea or situation, using it in different environments, looking at them differently, or the person himself/herself producing new and different ideas and products, and making new inventions even if they are small (Kıncal, Avcu and Kartal, 2016). In this respect, creative thinking takes place in all mental activities and in all environment and processes in today's world (Gök and Erdoğan, 2011; Kontaş, 2015). In this context, creative thinking is one of the skills, which is mostly needed by all people and used in keeping up with the rapidly changing world.

When looked at the literature, it is seen that there are many researches aiming to determine the creative thinking levels of students. (Aktamış, 2007; Atay, 2009; Can Yaşar and Aral, 2011; Ceylan, 2008; Craig and Baron Cohen, 1999; Demirtaş and Baltaoğlu, 2010; Gök and Erdoğan, 2011; Gönen at al., 2011; Karataş and Özcan, 2010; Kıncal, Avcu and Kartal, 2016; Kurtuluş, 2012; Öncü, 2003; Sıdar, 2011; Suddendorf and Fletcher Flinn, 1999; Yang at al., 2016). In this context, it can be said that determining the development of creative thinking skill of students are paid more attention in recent years. Because understanding the development of creative thinking skills of students is important with regard to setting light to unseen areas in their brains. For this purpose, first of all what the creative thinking is, in which areas it can be used and how it can be developed should be explained to students (Işık and Saygılı, 2015). Subsequently, creative thinking skills of students should be determined by using scientific research methods, and applications to develop these skills should be implemented. Abstract: In this context, determining the creative thinking levels of fourth grade students at primary school are aimed at this research.

Method

Research Model

Descriptive research method was used in this qualitative study. This method is benefited in the research in order to define and explain the researched situation as thorough and careful as possible, and to evaluate it in accordance with the standards (Büyüköztürk at al., 2010; Çepni, 2010).

Sample

Study group of the research was selected according to the purposive sample method. This method is preferred in order to describe the researched individuals or situations and to understand them deeply, instead of direct generalization of research findings to population (Ekiz, 2015). The research was carried out with twenty students, who were receiving education in a primary school of Rize province, Güneysuyu district in 2014-2015 school year. Information about the students participating in the research are given in Table 1. The students are coded as S1, S2, S3…, S20 in order to provide the confidentiality and to comply with the ethical rules.

Table 1. *Information About the Students Participating in the Research*

Code	Sex	Number of Siblings	Which sibling	Family type	Profession of father	Profession of mother	Income level of family	Existence of study room	Level of care for the child
S1	M	2	2	Extended	Worker	Housewife	Low	Exists	Medium
S2	F	4	3	Nuclear	Artisan	Housewife	Medium	None	Very good
S3	M	2	2	Extended	None	Housewife	Low	None	Medium
S4	F	3	1	Nuclear	Construction worker	Housewife	Medium	Exists	Very good
S5	M	2	2	Nuclear	Civil Servant	Housewife	Medium	Exists	Very good
S6	M	5	5	Nuclear	Pensioner	Housewife	Fair	Exists	Medium
S7	F	2	1	Extended	Security guard	Housewife	Low	Exists	Fair
S8	F	3	2	Nuclear	Construction worker	Housewife	Medium	Exists	Fair
S9	M	4	3	Nuclear	Artisan	Housewife	Fair	Exists	None
S10	F	2	2	Extended	Driver	Housewife	Fair	Exists	Very good
S11	M	2	1	Extended	Worker	Housewife	Medium	Exists	Fair
S12	F	3	2	Nuclear	Civil Servant	Housewife	Medium	Exists	Fair
S13	M	2	2	Nuclear	Civil Servant	Housewife	Fair	Exists	Fair
S14	M	3	1	Extended	Artisan	Housewife	Fair	Exists	Medium
S15	F	5	5	Nuclear	Cook	Housewife	Low	None	Very good
S16	M	4	3	Extended	Farmer	Housewife	Medium	None	Fair
S17	F	4	2	Extended	Worker	Housewife	Medium	Exists	Fair
S18	M	3	3	Nuclear	Pensioner	Housewife	Fair	Exists	Very good
S19	F	2	2	Extended	Construction worker	Housewife	Medium	None	Low
S20	F	3	1	Nuclear	Driver	Housewife	Low	Exists	Fair

It is seen when looked at the Table 1 that number of (10) female and (10) male students participating in the study are equal, and there is homogeneity in terms of gender variable factor. The number of siblings of students varies between two and five, and most of them are the youngest child of the family. It is understood from the table that 11 students live in nuclear families and 9 students live in extended families. While the professions of the students' fathers vary from civil servant to worker, pensioner, artisan, construction worker, security guard, driver, cook and farmer, all of their mothers are housewives. It can be said that the income state of families are at middle level. Most of the students (15) have study room.

Moreover, it can be said by looking at the table that most of the families (14) pay sufficient amount of attention to the education life of their children.

Data Collection and Analysis

Data of the research is collected with the "Scientific Creativity Test", which is developed by Hu and Adey (2002), translated into Turkish by Aktamış (2007), organized and put into its final form by Kurtuluş (2002). The test is consisted of open-ended seven questions, and each of these questions are about the dimensions of creativity. The questions in the test are related to the skills of unusual usages, problem finding, product development, scientific imagination, problem solving, science experiment and product design (Aktamış, 2007). The answers that students gave to the scientific creativity test are scored as connected to each other. First of all, one each fluency score was given to different answers that students gave to each question. Later on, one each flexibility score was also given to each different application among these answers. Finally, answers of all students for each question are written in one paper. By comparing the answers of students, two or four each originality score is given to the answer, which is less than 5%, and one or two each originality score is given to the answer, which is less than 10%, according to the question. In brief, fluency, flexibility and originality (authenticity) of answers are looked at in the analysis of the test. There is not any definite maximum score that students will get in this test, the score depends on the creativity of students (Kurtuluş, 2012).

Results

The scores that students got from the scientific creativity test and the comments about them are included in this section. The received scores are examined in sub-dimensions as fluency, flexibility, originality and the total score received from the test.

Results Related to Fluency

All other questions except the last question of the scientific creativity test are as including the fluency. The scores that students got from fluency are given in the Table 2. When looked at Table 2, the scores that students got from the scientific creativity test related to fluency are seen to be varying between 6 and 32. While S2, S4, S8, S10, S15, S16, S17, S18 and S20 got high scores related to fluency; S5, S9, S11 and S19 got low scores. All of the nine students getting high scores in the dimension of fluency are academically successful. S20 got the highest fluency score with 32 points in the scientific creativity test. This student is one of the most successful students of the class academically. As it is seen in the Table 1, his father is a driver and their economic situation is low. S/he has his/her own study room in his/her house, and his/her family is paying attention to his/her education in a good level. Seven of the nine students getting high scores related to fluency are female and two of them are male. In this context, it can be said that students getting high scores in the dimension of fluency are generally female students. While six of these students have a study room of their own, three of them don't. The economic situation of their families are seen to be at medium level. Five of these families pay attention to the academic situation of their children very well, and four of them pay attention to the academic situation of their children well. In this context, it is seen that the attention levels of the families of the students getting high fluency scores are high about their education.

Table 2. *Scores that students got from the scientific creativity test related to fluency*

Code	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Total
S1	0	2	1	3	2	2	10
S2	0	4	3	2	10	1	20
S3	0	2	2	2	8	1	15
S4	1	1	3	2	8	3	18
S5	0	1	1	2	4	1	9
S6	2	3	3	4	2	1	15
S7	1	3	2	3	3	1	13
S8	2	2	1	4	9	6	24
S9	0	0	1	1	4	1	7
S10	8	1	4	1	4	3	21
S11	0	0	1	2	3	0	6
S12	0	3	3	3	6	1	16
S13	1	1	4	2	6	1	15
S14	2	1	2	2	4	3	14
S15	2	2	2	5	9	3	23
S16	2	4	2	4	4	1	17
S17	0	5	4	5	8	5	27
S18	1	4	2	3	8	5	23
S19	0	0	1	1	4	1	7
S20	6	6	5	6	8	1	32

S11 got the lowest fluency score with 6 points in the scientific creativity test. The academic achievement of this student is at low level. The attention level of the family with the child is at good level. Moreover, this student has a study room. In this context, it can be said that family attention and having good facilities are not enough to increase the academic achievement and fluency. Another student getting low score in fluency dimension is S9. S/he is also a student, whose academic achievement, attention for courses and sense of responsibility is low. This student has a study room and his/her financial situation is good. However, the family of this student doesn't pay enough attention to the child academically. It can be mentioned that this situation is effective for the academic achievement and the fluency score of this student to be low. Another student having low fluency score is S19. This student is at middle level academically. Financial situation and the attention of the family with the child is at low level. The child doesn't have his/her own room. Another student having low fluency score is S5. The score and personal features of this student show difference. Because, the academic achievement of the student and the financial situation and attention level of the family are at good level. Based upon this difference, it can be said that high academic achievement may not be a criterion for the fluency dimension of creativity.

Results Related to Flexibity

All other questions except the last question of scientific creativity test are as including the flexibility. The scores that students got from flexibility are given in the Table 3.

Table 3. *Scores That Students Got from the scientific creativity Test Related to Flexibility*

Code	Question 1	Question 2	Question 3	Question 4	Question 6	Question 7	Total
S1	0	2	1	3	2	3	11
S2	0	4	2	2	2	18	28
S3	0	2	1	2	2	12	19
S4	1	1	1	2	3	9	17
S5	0	1	1	1	2	9	14
S6	2	3	3	4	2	15	29
S7	1	2	2	3	2	6	16
S8	2	2	1	4	6	9	24
S9	0	0	1	1	2	9	13
S10	8	1	2	1	3	12	27
S11	0	0	1	2	0	9	12
S12	0	3	1	3	2	9	18
S13	1	1	3	2	2	15	24
S14	2	1	2	2	6	12	25
S15	2	2	2	5	6	12	29
S16	1	4	1	4	2	9	21
S17	0	5	2	5	6	6	24
S18	1	3	2	3	6	12	27
S19	0	0	1	1	2	12	16
S20	6	6	5	6	2	15	40

When looked at Table 3, the scores that students got from the scientific creativity test related to fluency are seen to be varying between 11 and 40. While S2, S6, S8, S10, S13, S14, S15, S17, S18 and S20 got high scores related to flexibility; S1, S5, S9 and S11 got low scores. Seven of the ten student getting high scores from the flexibility dimension are academically strong and three of them are at middle level. S20 got the highest flexibility score with 40 points in the scientific creativity test, as it was in the fluency dimension. Six of the ten students getting high scores related to flexibility are female and four of them are male. In this context, it can be said that there is not a strong difference between female and male students in the flexibility dimension scores. While eight of these students have a study room of their own, two of them don't. Four of these families pay attention to the academic situation of their children very well; four of them well; and two of them at middle level. In this context, it is seen that the students having high flexibility scores are the children of the families taking care of their children academically.

S1 got the lowest flexibility score with 11 points in the scientific creativity test. This student is at middle level academically. It can be said that s/he is an attentive student to courses and has the sense of responsibility. Financial situation of the family is at low level, and the attention of the family with the child is at middle level. Other students, who got low scores about the flexibility dimension as in the fluency dimension, are S5, S9 and S11. In this context, when both the scores of these students and the ones mentioned above are taken into consideration, it is recognized that there is a similarity between the scores of fluency and flexibility dimensions. Because, it is seen that most of the students, who got both the highest and lowest scores in these two dimensions, are the same students.

Results Related to Originality

All questions of the scientific creativity test are as including the originality. The scores that students got from originality are given in the Table 4.

Table 4. *Scores that students got from scientific creativity test related to originality*

Code	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Total
S1	0	4	0	2	0	2	2	10
S2	0	8	5	0	9	0	5	27
S3	0	4	2	2	0	0	4	12
S4	1	2	2	2	0	2	5	14
S5	0	2	0	0	0	0	3	5
S6	1	3	5	1	0	0	4	14
S7	0	3	0	6	0	4	3	16
S8	4	4	0	8	2	2	4	24
S9	0	0	0	1	2	0	3	6
S10	7	2	4	2	0	0	5	20
S11	0	0	0	0	0	0	3	3
S12	0	4	5	3	0	0	2	14
S13	0	2	4	2	0	0	5	13
S14	0	2	2	2	0	4	5	15
S15	3	3	1	3	2	0	4	16
S16	0	6	1	2	0	0	4	13
S17	0	10	2	7	0	4	4	27
S18	2	8	1	4	0	4	5	24
S19	0	0	2	2	0	0	3	7
S20	5	10	4	5	0	0	5	29

When looked at Table 4, the scores that students got from the scientific creativity test related to originality are seen to be varying between 3 and 29. While S2, S7, S8, S10, S15, S17, S18 and S20 got high scores related to fluency; S5, S9, S11 and S19 got low scores. Four

of the eight students getting high scores from the originality dimension are very strong academically, three of them are at good level, and one of them are at middle level. S20 got the highest originality score with 29 points in the scientific creativity test, as it was in the other two dimensions. Seven of the eight students getting high scores related to originality are female and one of them is male. In this context, it can be said that female students are better than male students in originality dimension. While six of these students have a study room of their own, two of them do not. Four of these families pay attention to the academic situation of their children very well, and four of them care about the academic situation of their children well. In this context, it is seen that the students having high originality scores are the children of the families taking care of their children academically.

S5, S9, S11 and S19 got the lowest originality scores in the scientific creativity test as it was in the fluency dimension. At the same time, three of these students are those students, who got the lowest scores in the flexibility dimension. In this context, it can be stated that the scores of the three dimensions of the scientific creativity test show similarity. Moreover, it was seen that students' originality scores were lower than their fluency and flexibility scores. In this context, it can be stated that students have difficulty in thinking different.

Results Related to Total Scores from the Scientific Creativity Test

Total scores of the students they got from the scientific creativity test are calculated by summing up the fluency, flexibility and originality scores. The information about the total scores that students got from the test is given in Table 5. When looked at Table 5, total scores that students got from the scientific creativity test are seen to be varying between 21 and 101. While S2, S8, S10, S15, S17, S18 and S20 got high scores from the scientific creativity test S1, S5, S9, S11 and S19 got low scores. Four of the seven students, who got high scores from the scientific creativity test, are academically in a very good level and three of them are in a good level. In this context, it can be said that there is a positive relationship between creative thinking and academic achievement. S20 got the highest score with 101 points from the scientific creativity test, as it was in all the dimensions. This student has been the student with the highest score in all dimensions and the whole test. It can be stated that the behavior of this student is consistent with the score s/he got from the test based on the observation of the researcher teacher. This student is a different child, who composes his/her own songs about the topics s/he learns in the class, constantly reads books, sings at home or on the road, and is able to do many housework and home shopping despite his/her young age. It can be said that the student having a versatile life is related to the fluency dimension; doing activities such as housework is related to the flexibility dimension; and showing some behaviors that his/her peers do not possess is related to the originality dimension. In summary, it can be said that this student has a creative thinking skill.

Six of the seven students who got high scores from the scientific creativity test are female and one of them is male. In this context, it can be said that female students are better than male students in creative thinking skills. Three of these families pay attention to the academic situation of their children very well, and four of them pay attention to the academic situation of their children well. In this context, it is seen that the students having high scores from the scientific creativity test are the children of the families taking care of their children academically. S9 and S11, who got low scores in the whole scientific creativity test and all its dimensions, are the students with low academic achievement. In this respect, it can be deduced that creative thinking is related to academic achievement. S1 and S19, who got low scores in the test, are the students showing academic achievement at medium level. The only student with a high academic achievement but a low score from the scientific creativity test is S5. Since this situation may have many reasons, this difference needs to be examined in depth

with a separate special study. When looked at the Table, it is seen that the students' average scores are 16,6 in the fluency dimension, 22,7 in the flexibility dimension and 15,45 in the originality dimension. This is a sign that these students gave easily applicable answers (fluency and flexibility) to the questions, but had difficulty in producing different situations after a certain point (originality).

Table 5. *Total scores that students got from the scientific creativity test*

Code	Fluency	Flexibility	Originality	Total
S1	10	11	10	31
S2	20	28	27	75
S3	15	19	12	46
S4	18	17	14	49
S5	9	14	5	28
S6	15	29	14	58
S7	13	16	16	45
S8	24	24	24	72
S9	7	13	6	26
S10	21	27	20	68
S11	6	12	3	21
S12	16	18	14	48
S13	15	24	13	52
S14	14	25	15	54
S15	23	29	16	68
S16	17	21	13	51
S17	27	24	27	78
S18	23	27	24	74
S19	7	16	7	30
S20	32	40	29	101
$\overline{X}$	16,6	22,7	15,45	53,75

Discussion and Conclusion

In accordance with the findings obtained from the research, almost all of the students, who got high scores from the scientific creativity test and its sub-dimensions, are academically successful students. Likewise, the students who got low scores in the test are generally the students with low academic achievement. It was also seen in the previous researches that there was a significant positive correlation between academic achievement and creative thinking (Erdoğdu, 2006; Gök and Erdoğan, 2011). In this context, it can be said that there is a positive relationship between academic achievement and creative thinking skill.

As a result of the research, it was seen that most of the students, who got high scores from the scientific creativity test and each of its dimensions, had a study room and their

families were caring. Kara (2007), specified that one of the important factors influencing the development of creativity was the family's care towards the child. Can Yaşar and Aral (2011) determined in the study they conducted that family situations of children meaningfully effect their creative thinking skills. Similarly, Dağlıoğlu (2011) emphasized the importance of the family's role in the development of creativity in his study. In this context, it can be stated that the existing conditions such as family have an effect on creative thinking.

It was seen that female students got higher scores than male students in the dimensions of fluency and originality and in the whole test. For this reason, it can be pointed out in this study that female students are better in terms of creative thinking skills. When looked at the previous studies, it is seen that there are similar and opposite results. Gök and Erdoğan (2011) specified in their studies that female students were more interested in the events improving creative thinking than male students. Öncü (2003) determined in his study that 13-year old male students were significantly better than female students in the flexibility dimension of creativity.

The student, who got the highest score in all dimensions and whole test, has a multi-dimensional life. Similarly, it was seen in the research conducted by Kurtuluş (2012) that the versatile practices presented to the students improved their creative thinking skills. In this context, it can be said that there is a positive relationship between versatile life and creative thinking.

In all dimensions, most of those with the highest and lowest scores are the same students. In this context, a statement can be made about the similarity is encountered in the sub-dimensions of creativity.

It was seen that students easily answered the questions, but had difficulty in producing different situations during the application process. In other words, students were less successful in the originality dimension compared to the other dimensions.

The following suggestions can be made based on the results obtained from the research:

- It can be useful for the Ministry, school administrators, teachers and families to attach importance to enhance the facilities and environmental conditions of children by considering the relationship between the existing opportunities and creative thinking.
- Enriching the lives of children can be achieved by laying a burden on and giving opportunities to them at home and school based on the versatile life of the student, who got the highest score from the scientific creativity test and all its dimensions.
- It was observed that students had difficulty particularly in producing different situations (originality) in the test. Therefore, teachers can use of those techniques more in lessons such as story completion, project-based learning and six thinking hats etc., which may increase creative thinking.
- Different questions in the scientific creativity test attracted the students' attentions and they gave positive feedback. For this reason, new studies can be made in different environments with wider sampling and different variables by using this test. Evaluations can be made by comparing the results to be obtained from these studies with the results of these and the previous studies.

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