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# Developing a Model for Effective Factors of Creativity in Elementary School Students: A Mixed Method

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**Abstract**

**Purpose**: The main purpose of this study was to develop a model of factors affecting students' creativity and to evaluate its validity.

**Methodology**: The research design was an exploratory (qualitative-quantitative) mix. In the qualitative part of the target population, all teachers of the sixth grade of elementary school in the 5th district of Tehran and professors of psychology and educational sciences were prestigious universities in the country, which were selected by purposive sampling of 10 teachers and 10 specialists. In a small part of the population considered in this study, all female primary school students in the sixth grade of the 5th district of Tehran in the year 1998-97, 350 of them were selected as a sample and in random clusters. In the qualitative part of the research, a semi-structured interview was used to obtain information and in the quantitative part, a researcher-made questionnaire was used. The validity and reliability of the questionnaire were confirmed. Factors with very minor changes in exploratory and confirmatory factor analyze using LISREL software and SPSS / 26 were accepted.

**Findings**: The research findings showed that seven main factors namely students' interests and abilities, teacher characteristics, textbook content, learning style, educational space and school facilities, family and management style and principals' attitudes are effective in students' creativity.

**Conclusion**: In general, since the first step in upgrading and improving any structures is to identify the factors affecting it, the findings of the present study help to develop theories of creativity, design of educational interventions, and general policies.

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## 1. Introduction

In the 21st century, students must develop three basic skills: learning skills, life skills, and technology-related skills. These three skills are commonly known as 21st century skills. Learning skills include things like critical thinking, communication, and teamwork, while life skills are related to factors such as having a goal, motivation, specific plan, appropriate decisions, and more. In addition, technology-related skills include factors such as obtaining up-to-date information and intelligence in using up-to-date technologies. Today, given the dramatic changes that have taken place in the social, political, economic, and technological spheres, students need a new skill to achieve maximum prosperity in the 21st century. This new skill is called creativity and innovation. To live a better life, students must develop the ability to be creative in a way that allows them to use existing knowledge to form new concepts and new products and use them to solve various problems (Boonchan, Pupat, Seesan, 2017).

According to Torrance (1979), any society and country that moves and plans for the development of creativity is more likely to achieve happiness and development. In other words, an education system that promotes creativity has become one of the key indicators of economic, social and political success in the 21st century (Patarawad, 2015). There is no single definition for creativity, and depending on the environment and context, various definitions of this structure have been proposed (Ma, Yang, Wang, Zang, 2018). In the present study, the definition of Liu, Chang, Wang, Chao (2020) has been used, considering that creativity is considered in students. They consider creativity as a process of active participation in activities and participation in creating new and useful things, and mention it as one of the main pillars of creating innovation.

Creativity is a skill, so it is acquired and teachable. Therefore, fostering creativity in schools is necessary to provide an opportunity for students to say who they are, what they think and what they do (Yaqubi, Jahan, 2015). Creativity is one of the factors that can be considered in the context of human social life and has various consequences. Everything we see and all the changes we feel are the result of the creative mind of man. Today's world needs creative people. Therefore, considering the role of creative and intelligent people in the development and progress of countries, we find that these people and these ideas are the main assets of countries and have a very valuable position. Today, instead of selling goods, we must produce new technical knowledge and ideas. The first condition for such a policy is to create the right conditions for the development of creative talents. It is clear that creativity is not a fixed personality trait and can be strengthened or weakened by factors or obstacles. Torrance believed that creativity can be nurtured (Yates, Twigg, 2017). With a little care, one can get all the innovations from the energy of education and its hidden force. To achieve this, the educational goals of a society must contain creative messages. For this reason, proper education of children in order to develop their creativity should be given special attention (Niazi, et al., 2018).

Creativity has both positive academic and non-academic consequences for students (Liu et al., 2019). Undoubtedly, the first step to promote creativity in students is to identify the factors influencing it (Liu et al., 2018) in a way that is appropriate to the culture and society of Iranian students, because by identifying these factors, it is possible to design educational programs. A review of research background shows that various factors such as managerial method (Amabile, Khaire, 2008; Mishra, Dhar, Dhar, 1999), teaching method (Jeffrey, Craft, 2004; Deans et al., 2006), educational atmosphere (However, Baczek, 2013; Denti, 2011), motivational factors (Basadur, 1992) and personality factors (Siknomihali, 2011; Nelson, Wood and Gabris, 2011) can all affect students' creativity. As the mentioned researches show, these researches have been done abroad and examine the effect of variables individually, which makes it necessary to conduct a research that comprehensively examines all the variables affecting creativity.

In the theoretical realm, approaches and theories can be divided into two categories. The first group emphasizes multiple internal resources and the inner group emphasizes external factors (Tanggaard, 2019). For example, Vygotsky (1962) proposes the approximate growth zone for children. Based on this concept,

learning in children interacts with adults or peers. It happens and peers and adult interaction is an opportunity to get creative. According to this theory, providing a creative environment for children is very important and has a positive effect on creating creativity in students because it is in this environment that students are not afraid to make decisions and risk creativity. In this environment, students are confident that their ideas will be respected and that their brainstorming will be met with positive reactions. According to these explanations, Vygotsky considers the attitudes and characteristics of the teacher as another important and effective factor in creativity (Dere, 2019). In general, considering the different theories and approaches in creativity, each of which emphasize different aspects, it can be concluded that in order to better understand the factors influencing creativity, this structure should be considered based on the context of the studied society (Tanggaard, 2019).

Context-based research and etiology lead to concepts such as the creativity of researchers and educators in prevention and treatment (Coie, Miller-Johnson, Bagwell, 2000). Mrazek, Haggerty (1994) believe that identifying the factors affecting a phenomenon is the first step in examining any type of process, including creativity. Although various studies have been conducted on the structure of creativity, these studies are not comprehensive enough and have looked at this concept in a one-dimensional way. Therefore, some educators believe that a direct and simple correlation between creativity and other personality and educational variables is not sufficient; because this concept can have simultaneous and multiple reasons, As a result, given the importance of creativity in many educational and non-academic outcomes, as well as the fact that always determining the effective factors in a phenomenon leads to the conditions for its improvement. The aim of this study was to identify the effective factors in creativity based on the views of primary school teachers, research background and education professionals based on the triangulation technique. In the next step, the model designed in the field method and through the confirmatory factor analysis of the first and second stages will be fitted.

## 2. Methodology

The design of the present study was an exploratory (qualitative-quantitative) mix. In the first part of the research, ie the qualitative part, and in the section on teacher interviews, the target population was all sixth grade elementary school teachers who were working in governmental and non-governmental primary schools in District 5 of Tehran in the 2018-19 academic years. In the interview section with the specialists of the society, the target of all professors in the field of psychology and educational sciences of the prestigious universities of the country, including Farhangian, Azad, Payame Noor and national universities. From the target communities of the research, 10 teachers and 10 education specialists were selected by purposive sampling method that is appropriate for qualitative research. The main criterion for selecting this number of samples was to achieve the necessary richness and duplication and in the term information saturation. In the second part of the research, ie the small part of the society, this study includes all female students of the sixth grade of primary school in the 5th district of Tehran in 1397-98 (about 3000 people, 15 schools), of which 350 people as a sample and Random cluster forms were selected so that first all schools in District 5 were divided into two equal parts and then from each part 6 schools were selected and a questionnaire was distributed among all sixth grade students. It should be noted that in the present study, SPSS 18 software and LISREL 8.7 were used.

In the qualitative part of the research, a semi-structured interview was used to obtain information. In the interview process, the researcher facilitates the conversation process by asking free questions and giving them ample opportunity to answer the questions as they wish. Among the questions asked of experts and teachers, the following can be mentioned: 1. what factors do you think are effective in the emergence of students' creativity? 2. In your opinion, what effect does a student's learning style have on his or her creativity? 3. What effect do student interests have on students' creativity? 4. What effect do abilities have on students' creativity? 5. What effect do teacher teaching methods have on student

creativity? 6. What effect does the teacher's complete mastery of the curriculum have on students' creativity? 7. What effect does a teacher's interest in teaching have on students' creativity? 8. What effect do textbook content have on students' creativity? 9. What effect does the imaginative content of textbooks have on students' creativity? 10. What effect does the structure of the courses have on students' creativity? 11. What effect does the educational environment and school facilities have on students' creativity? 12. What effect do management style and attitudes of managers have on students' creativity? 13 What effect does the family have on students' creativity? 14. How do you think the effective factors in creativity provide the ground for creativity? After completing the qualitative part of the research and data analysis using the triangulation technique, it was the turn of the quantitative part. In this section, a researcher-made tool was used to fit the model obtained from the analysis of the data obtained from the interview and research background. The sixth grade and the background of the research that was described were included in the questionnaire.

## 3. Findings

To answer the question of what variables are the factors influencing students' creativity, data theory, which is a kind of qualitative research, has been used. In this approach, a theory is created using a set of data that can describe and explain a process, an action, or even an interaction. The theory developed from the implementation of such an approach is a kind of process theory (Bazargan, 2017). In this research, in the first stage, to identify the factors affecting creativity and its indicators, the text of interviews with experts, teachers and research background were analyzed using open coding and axial coding, and in the next stage, the final variables were identified using triangulation technique. . In this way, using the content analysis method, the text of the interviews with experts in the field of education and teachers, as well as the research background were reviewed several times and became the smallest constituent and meaningful units (theme or theme). The words were reviewed and categorized accordingly with the aim of finding centrality among them. The deductive and inductive movements between the initial texts and the final categories were repeated several times to finally achieve acceptable stability and a sense of mutual satisfaction among researchers about what the data say. Figure (1) shows the factors affecting students' creativity and related markers are prepared using the triangulation technique. The triangulation technique tries to provide valid and understandable information by relying on various information sources, which here were the text of interviews with teachers and experts as well as research background (Mishra, Rasundram, 2017).

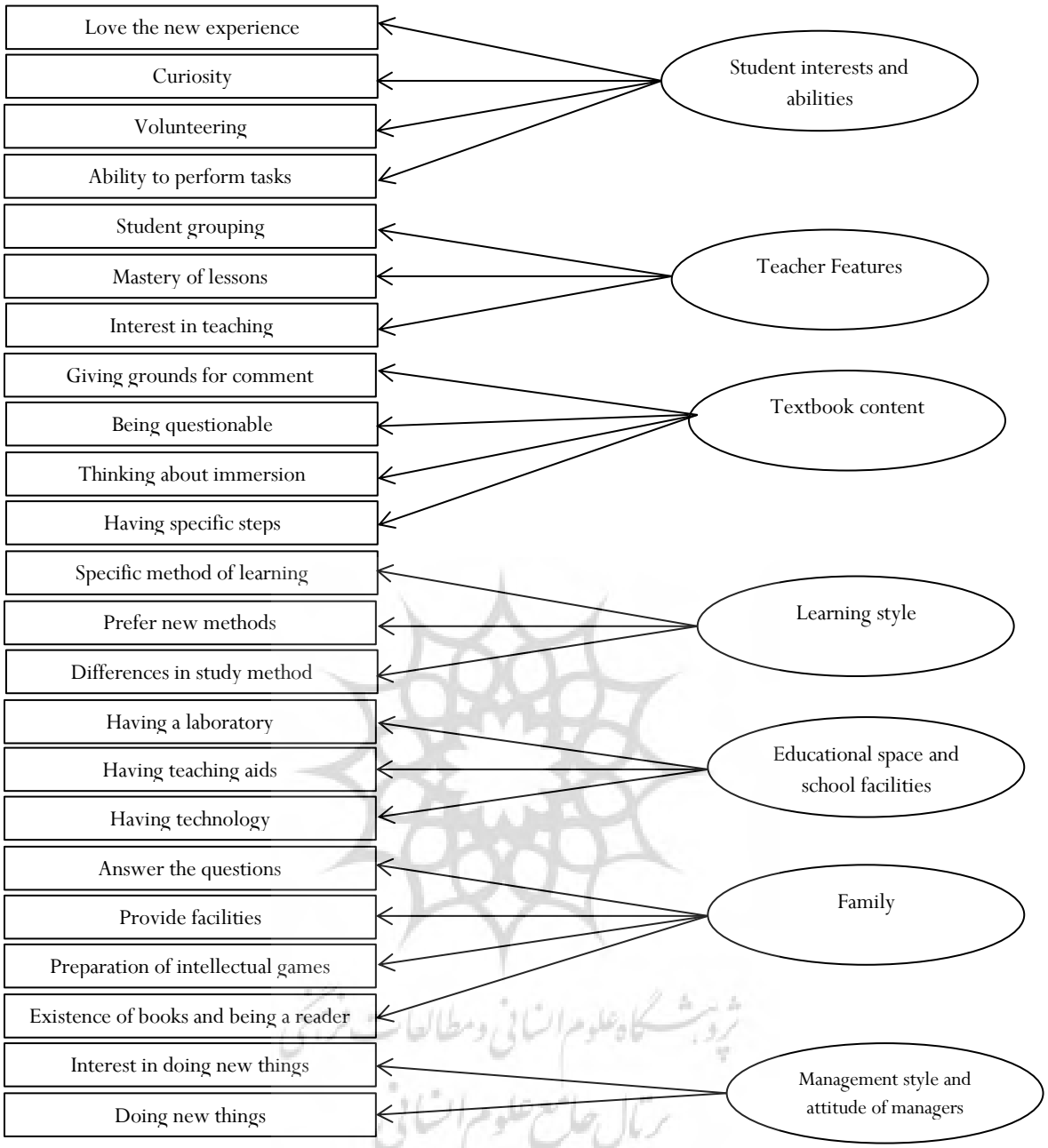


**Figure1.** Factors affecting students' creativity and their indicators based on triangulation technique

Figure 1 show that based on the triangulation technique, seven main factors namely students' interests and abilities, teacher characteristics, textbook content, learning style, educational space and school facilities, family and management style and principals' attitudes are effective in students' creativity. In addition to the main factors shown in Figure (1), the indicators of each factor are also seen in the model, in which three factors are the interests and abilities of students, the content of textbooks and families with four indicators, three factors of teacher characteristics, educational space and facilities. School and learning style are measured by three indicators and the factor of management style and attitude of managers is measured by two indicators.

Exploratory and confirmatory factor analyzes have been used to evaluate the validity of the model designed as a group among students. Before performing these analyzes, it is necessary to examine demographic information and descriptive characteristics. Table (1) shows the demographic information.

**Table1.** A selection of important fitting indicators of the drawing model

| | | Abundance | Frequency | | | Abundance | Frequency |
|---|---|---|---|---|---|---|---|
| Gender | Girl | 94 | 30/9 | Father's education | High school | 24 | 7/9 |
| | Boy | 210 | 69/1 | | Diploma | 84 | 27/6 |
| Mother's job | housewife | 210 | 69/0 | | Masters | 110 | 36/1 |
| | Employee | 72 | 23/6 | | Senior and higher | 86 | 28/3 |
| | Freelance | 22 | 7/2 | Mother's education | High school | 15 | 4/9 |
| Father's job | Employee | 148 | 48/7 | | Diploma | 115 | 37/8 |
| | Freelance | 149 | 49/0 | | Masters | 119 | 39/1 |
| | Retired | 7 | 2/3 | | Senior and higher | 55 | 18/1 |
| Number of children | 1-2 | 248 | 81/5 | Several children | 1-2 | 285 | 93/7 |
| | 3 and up | 56 | 18/4 | | 3-5 | 19 | 6/2 |

In addition to the information presented in Table (1), it should be noted that the average age of the participants in the present study is 11.7. Table (2) shows the items, mean, standard deviation, skewness, elongation and correlation with the total score of the model of factors affecting creativity. It should be noted that after collecting the data, the items were examined in terms of out-of-date data, but no case was observed, and the data were lost through the maximum estimation (EM) method (if the subject answered more than 85% of the questionnaire questions. Were) were replaced.

**Table2.** Descriptive indicators of model items of factors affecting creativity

| Items | Average | Standard deviation | kurtosis | Skewness | Correlation with the whole |
|---|---|---|---|---|---|
| 1. I like to gain new experiences | 4/57 | 0/80 | 1/74 | 1/24 | **0/23 |
| 2. I am very curious | 4/81 | 1/35 | -1/24 | 1/13 | **0/23 |
| 3. I volunteer to do many things | 4/70 | 1/29 | -1/04 | 0/83 | **0/44 |
| 4. I have the ability to perform many tasks | 5/05 | 1/04 | -1/19 | 1/71 | **0/29 |
| 5. My teacher has grouped the students in different subjects. | 4/36 | 1/82 | -0/70 | -0/95 | **0/30 |
| 6. My teacher has complete mastery of different subjects | 4/44 | 1/00 | -1/23 | 1/22 | **0/24 |
| 7. My teacher is very interested in teaching | 4/36 | 1/02 | -1/20 | 1/64 | **0/29 |
| 8. Textbooks provide the conditions for us to comment | 4/17 | 1/60 | -0/71 | -0/52 | **0/46 |
| 9. Textbook shapes raise questions in us | 4/02 | 1/72 | -0/45 | -1/02 | **0/44 |
| 10. Textbooks make us think | 4/22 | 1/58 | -0/69 | -0/48 | **0/43 |
| 11. To learn the lessons, we must go through very specific steps | 4/89 | 1/40 | -1/28 | 0/88 | *0/12 |
| 12. I study and do all homework in a specific way | 4/90 | 1/43 | -1/27 | 0/65 | *0/11 |
| 13. I like to learn lessons in new ways | 5/10 | 1/44 | -1/76 | 1/17 | **0/27 |
| 14. The way I study is different from my friends | 4/23 | 1/70 | -0/62 | -0/84 | **0/23 |
| 15. Our school has a laboratory | 4/41 | 1/89 | -0/81 | -0/85 | **0/38 |
| 16. Our school has a lot of teaching aids | 3/58 | 1/77 | -0/11 | -1/29 | **0/55 |
| 17. Our school has many technologies such as smart boards, smart heaters, video projectors, etc. | 2/94 | 1/76 | 0/37 | -1/17 | **0/31 |
| 18. My family members answer all my questions | 5/13 | 1/20 | -1/42 | 1/47 | **0/33 |
| 19. My family members provide all the conditions and facilities I want | 5/37 | 1/00 | -1/91 | 1/95 | **0/23 |
| 20. Family members provide me with mind games | 5/04 | 1/30 | -1/58 | 1/99 | **0/36 |
| 21. We have a personal library at home and my family members study | 4/47 | 1/67 | -0/90 | -0/45 | **0/40 |
| 22. The principal of our school is interested in doing | 3/76 | 1/78 | -0/27 | -1/24 | **0/52 |

| | | | | | | |
|---|---|---|---|---|---|---|
| new things. | | | | | | |
| 23. Our principal does new things at school | 3/61 | 1/75 | -0/21 | -1/23 | **0/55 | |

Table (2) shows that the correlation of all items with the total score is desirable. Also, the results of skewness and elongation of items indicate their proper dispersion because they are all in the desired range of 2% (Tabachnick, Fidell, 1996). These cases indicate the observance of the assumptions of parametric analysis. Factor analyzes (first-order exploratory and confirmatory) have been used to evaluate the construct validity of the designed model. Before performing the analysis, factor analysis capability was examined through Kaiser-Meyer-Ulkin scale and Bartlett sphericity scale. Based on this, sampling adequacy index was equal to 0.71 and the results of Bartlett sphericity test (P⟨0/001: 1395/64) was a significant indicator of this index. Therefore, considering the significance of the Bartlett sphericity test and the higher sampling adequacy index of 0.70, it can be concluded that the factor analysis capability is confirmed. Also, the correlation matrix determinant index was 0.009, which indicates that it is possible to calculate the inverse of the correlation matrix.

In order to analyze the obtained data of factors affecting students' creativity and to discover the factors affecting creativity based on statistical findings in exploratory factor analysis, the principal component method was used using orthogonal rotation of Varimax type. Table (3) shows the factor loads of each item after rotation of varimax, eigenvalue, percentage of explained variance and percentage of explained variance.

**Table3.** Exploratory factor analysis of the factors affecting

| Item number | Factor 1 | Factor 2 | Factor3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 |
|---|---|---|---|---|---|---|---|
| 19 | 0/80 | | | | | | |
| 18 | 0/68 | | | | | | |
| 20 | 0/67 | | | | | | |
| 21 | 0/48 | | | | | | |
| 4 | 0/38 | | | | | | |
| 23 | | 0/87 | | | | | |
| 22 | | 0/87 | | | | | |
| 9 | | | 0/79 | | | | |
| 10 | | | 0/68 | | | | |
| 8 | | | 0/56 | | | | |
| 15 | | | | 0/76 | | | |
| 16 | | | | 0/75 | | | |
| 17 | | | | 0/67 | | | |
| 3 | | | | | 0/72 | | |
| 1 | | | | | 0/56 | | |
| 2 | | | | | 0/55 | | |
| 13 | | | | | 0/54 | | |
| 6 | | | | | | 0/82 | |
| 7 | | | | | | 0/76 | |
| 14 | | | | | | | 0/70 |
| 12 | | | | | | | 0/56 |
| 5 | | | | | | | 0/54 |
| 11 | | | | | | | 0/48 |
| Special value | 2/21 | 1/99 | 1/79 | 1/78 | 1/77 | 1/60 | 1/53 |
| Percentage of variance explained | 9/62 | 8/68 | 7/79 | 7/76 | 7/73 | 6/95 | 6/66 |
| Percentage of variance explained by compression | 9/62 | 18/30 | 26/09 | 33/86 | 41/59 | 48/55 | 55/21 |

As Table 3 shows, as with the model designed based on interviews with teachers, professionals, and background, exploratory factor analysis based on field data includes seven factors. However, in some factors, there are differences in the items. Based on the findings of the table, it can be said that the factor loads are all greater than 0.30 and the eigenvalues of the seven factors are more than one. Considering the slight changes in the factors affecting students' creativity, the new factors were named as follows: Factor 1

= Family influences and student acceptance Factor 2 = Management style and attitude of manager's Third factor = Textbook content Factor 4 = Educational space and School facilities Fifth factor = Student interests and abilities Sixth factor = Teacher interests and mastery Seventh factor = Learning style. In the following, the discovered model of factors affecting creativity is tested by considering the measurement errors according to the analysis of the first-order confirmatory factor, in order to provide us with a more accurate estimate by considering the measurement errors. Figure (2) shows the factor loads and measurement errors.

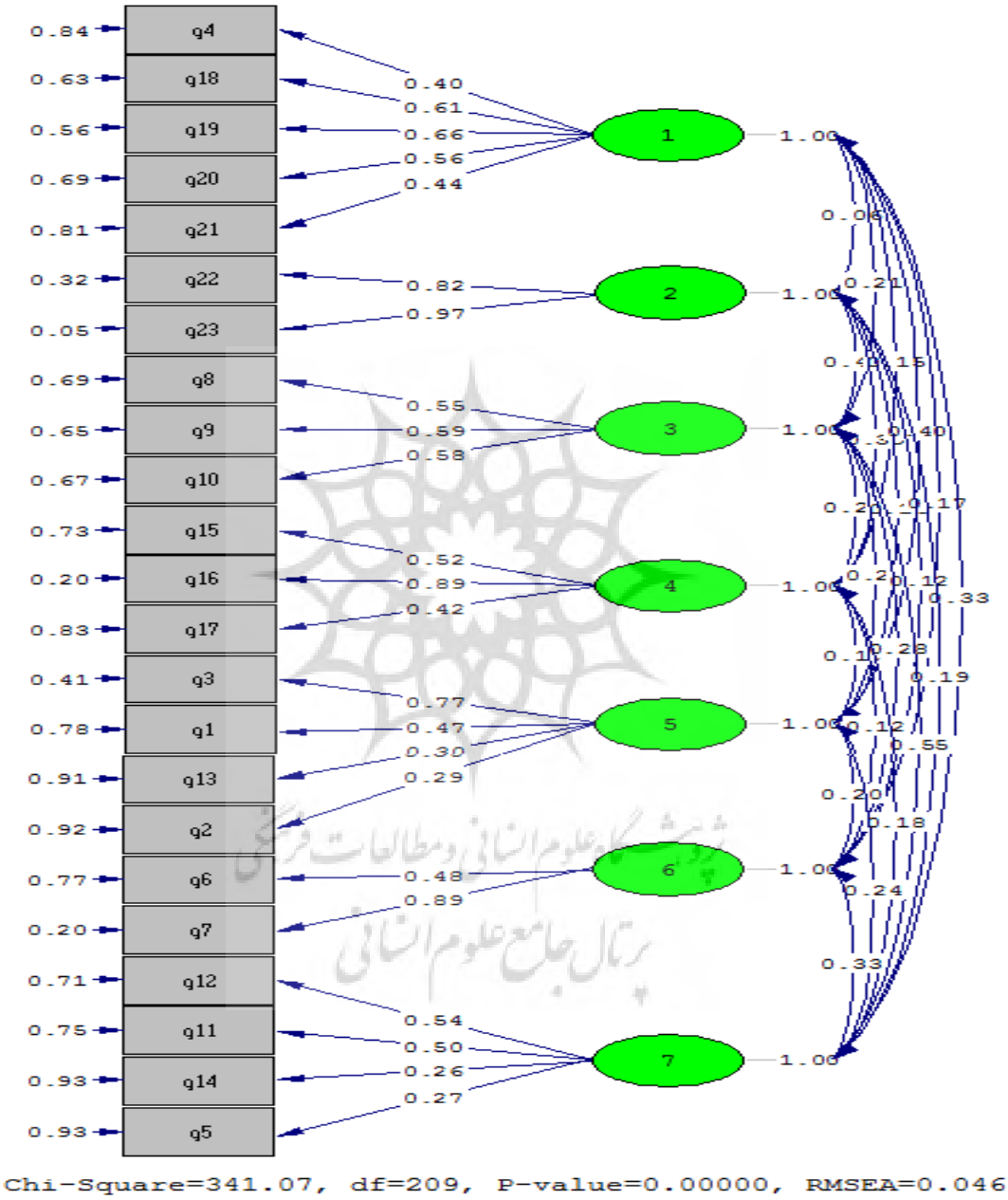


**Figure2.** Factor loads and measurement errors

As Figure (2) shows, the root mean square index of the estimation error (RMSEA) is 0.046, which indicates that the model fits, but that the X2 statistic is significant in this model. In this regard, it can be said that this statistic is very sensitive to the sample size and is always significant in high volume samples. Propose fitness (NFI) and incremental fitness index (IFI). Browne, Cudeck (1993) and Hu, Bentler (1999)

believe that if these indices are equal to or greater than 0.90, the model has a good fit. Table (4) shows all these indices.

**Table4.** Fitness indices of the first-order confirmatory factor analysis of the discovered factors

| Indicators | GFI | CFI | NFI | IFI | (RMSEA) |
|---|---|---|---|---|---|
| | 0/91 | 0/90 | 0/90 | 0/90 | 0/046 |

As Table (4) shows, the model has a good fit. This indicates the construct validity of the designed model.

## 4. Discussion

One of the most fundamental plans for education in any country is to equip students with the characteristics that they deeply need or will need in the future. Creativity is one of the hallmarks that help students adapt well to a rapidly changing world and go beyond math skills, verbal aptitudes, and other flexible 21st century citizenship. Children and elementary students today are likely to find themselves in situations that do not exist today. Creativity education is therefore important because it prepares students for an uncertain future (Lucas Spencer, 2017).

It may be a cliché to say that "students need creativity" but it is obvious that creativity is practical in many aspects of life (Soh, 2017). Therefore, considering that the first step in promoting creativity in the school environment and in elementary school students is to identify the factors affecting it, the present study aims to identify the factors affecting this structure based on the views of elementary school teachers, research background and Venice education the validity of these factors was checked. One of the effective factors in creating creativity in the present study was the interests and mastery of the teacher. This finding is consistent with the research of Prieto, et al (2006) and Deans, et al (2006). In this regard, it can be said that one of the ways that students learn to be creative is to imitate the behavior of their teachers. This is truer in elementary school children. In fact, according to Bandura (1986) observational learning theory, it can be said that students learn by observation. Therefore, the more interested the teacher is and the more he / she master the hidden teaching methods and curriculum and uses creative methods, the more creative his / her students will be. This finding was confirmed in the present study. Management style and attitudes of managers were other factors affecting students' creativity in this study. This finding is consistent with aspects of Mishra, Dhar & Dhar (1999), and Amabile & Khaire (2008). In this regard, according to the management opinion of Dimock (1986), it can be said that management is the main pillar of any organization. As a result, effective management makes any organization efficient. In an educational environment, effective management promotes communication between students, parents and teachers and helps them achieve common goals. In the present study, it was shown that these characteristics are effective in promoting creativity. Also, the educational space and school facilities were other effective factors in fostering creativity. This finding is consistent with research (Mellou, 1996 and Fasko, 2001).

In this regard, according to the context-based approaches of creativity, it can be said that creativity depends on the environment. Hence, when there are more and richer educational facilities in schools, the conditions for promoting creativity are greater, because the educational environment can influence thought processes and make them flexible and advanced. This finding was accepted in the present study. In addition, other factors affecting the level of creativity, family influences and student acceptance were obtained. This finding is consistent with research by Robinson, Freeburg, Workman (2013) and Dacey (1989). In this regard, according to the theory of creative family environment Wright, Wright (1986), it can be said that the family can provide conditions for expressing positive and negative emotions, rich learning environment, valuing a variety of mental games, and involving children in decisions. Promote creativity in them (Lifang, Lijuan, Yanyun, 2016).

This finding was confirmed in the present study. Learning styles were derived from other factors influencing creativity. This finding is consistent with the research of Eishani AtaSaad, Nami (2014) regarding this finding, according to the theory of club learning styles, it can be said that students choose how to receive and store information with their unique learning style, which is their preference. In fact, it is the learning style that determines how students adapt to different learning's, so students who have learning styles that make them receptive to new experiences and create new ways for them are more likely to be creative. The student's interests and abilities were also an effective factor in fostering creativity. This finding is consistent with aspects of research by Jaeger, Adair (2013). In connection with this finding, it can be said that interested and capable students have more active participation, spend more time thinking, and try to discover new concepts and methods in meaningful ways. They see that ordinary students are usually unaware of them. All of these characteristics can lead to creativity. This was confirmed in the present study. The final factor influencing the creativity of textbook content, this finding is consistent with the research of Van Tassel-Baska, MacFarlane (2009). In connection with this finding, it can be said that when the content of textbooks is adjusted in such a way that it creates a kind of emotional and cognitive connection with the student and it is for the student that he has enough opportunity to think creatively and use the ground to use Provides a variety of methods. In these circumstances, students' creativity increases. The findings of the present study contribute to the development of theories of creativity, design of educational interventions, and general policies. Parents can also provide a creative environment for their child based on the findings of this study. In addition, this research gives other researchers a better understanding of the factors affecting creativity and provides the basis for other research. Despite all the efforts of the researcher, this research has some limitations. This research has been done only in the elementary and sixth grade. This study was conducted in a period of time and only in District 5 of Tehran, which should be considered when generalizing the results.

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