

Research article

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Imaginative Thinking and The Image of The World of Younger Schoolchildren in a Visual Educational Environment

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Abstract

Introduction. The problem of forming an image of the world and imaginative thinking is particularly relevant in modern conditions of transformation of education and changes in the forms and methods of information presentation. The current approaches to the formation of imaginative thinking and the image of the world are considered, first of all, traditional educational technologies. In our research, visual tools and strategies that form the conditions of the visual educational environment play an important role. **Methods.** The study involved 120 primary school students from the Children's Art School (60 people) and the Rostov-on-Don secondary School (60 people). The "Worldview" methodology and the "Assessment of imaginative thinking" methodology were used to study the image of the world. Methods of mathematical statistics (descriptive statistics, Pearson Chi-criterion, Mann-Whitney U-criterion, analysis of variance) were used in processing the results. **Results.** It was revealed that the younger students from the Children's Art School and secondary school have a dominant "Landscape" picture of the world. For schoolchildren from the Children's Art School, the choice of an image in the form of a "Landscape" picture of the world is more pronounced. Schoolchildren from the Children's Art School are characterized by a high level of development of imaginative thinking. The analysis of variance showed significant differences between groups of schoolchildren in terms of imaginative thinking. For schoolchildren with a "Landscape" and "Mediated" picture of the world, a higher level of imaginative thinking is characteristic. **Discussion.** The results obtained confirm that in the conditions of a visual educational environment, there is a more intensive development of imaginative thinking and the image of the world. The results are also consistent with the research of other authors dealing with this problem.

Keywords

visual educational environment, visual strategies, visual activity, imaginative thinking, image of the world, thinking, primary school students, "Landscape" picture of the world

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Introduction

Currently, intensive transformations of education are taking place, primarily due to the fact that digital technologies are becoming part not only of the educational process, but also part of the lifestyle, the life world of a person, acquiring the status of a psychological reality (Klochko, 2016). Distance learning technologies are developing (Abakumova et al., 2019; Efremova, Shapovalova & Huseynova, 2020; Fedotova, Belousova & Vyshkvyrkina, 2022; Salomon, 2000; Sudarwati, 2018), their implementation and scientific reflection having become a global reality (Arsenijević et al., 2022; Jiang et al., 2022; Selco & Habbak, 2021). Many researchers believe that the number of pedagogical innovations that ensure the development of creative capacity includes visualization (Makarova, Makarova, & Varaksa, 2017), visual thinking strategies (Maldonado López, Ledesma Chaves & Gil Cordero, 2023; Clarke, Flaherty & Yankey, 2006) thus indicating the importance of using visual resources for formation of students' interest. The role of the digital visual environment for student collaboration is explored (Liu, Lee & Huang, 2023). Caldwell, Whewell & Heaton (2020) show the influence of visual posts on creative thinking, Boldt & Strub (2023) stating the connection between drawing and thinking, the development of creative thinking in visual activity.

There is a sufficient amount of research devoted to the problems of imaginative thinking. On the one hand, these are classic works on the study of thinking: O.K. Tikhomirov (2002), J. O'Connor & I. McDermott (2012), J. Gharajedaghi (2011), M. G. Luchs (2015), D. H. Meadows (2008), M. Resnick (2003). On the other hand, it is a huge library of research on various types of thinking. If we are talking about visual activity, then the development of imaginative thinking is of primer interest (Boldt & Strub, 2023; Belousova & Muratova, 2014; Belousova, Yamanova & Sinchenko, 2021; Caldwell et al., 2020; Liu et al., 2023; Littlemore & Low, 2006; Makarova et al., 2017; Pishchik & Molokhina, 2017).

The methodology of thinking development involves the use of cognitive maps (Davydova, 2022, Dautov, 2018; Dautov, 2021; Tolman, 1948). Cognitive maps are a form of visualization of students' ideas about the world to solve tasks and problems. The

modern generation is brought up on visual culture and is visual (Lima, Jouini, Namaci & Fabiani, 2014); we can talk about the role of visualization associated with the use of visual activity, drawing as the main means by which the image of the world is developed, or cognitive maps and imaginative thinking as the ability to solve problems in a figurative way.

The educational environment and educational technologies play an important role for the emotional and cognitive development of younger schoolchildren (Belousova, Kozukhar & Ryumshina, 2015; Yasvin, 2002). The creation of a developing educational environment is associated with the creation of psychological foundations for supporting the development of younger schoolchildren and elaboration of their needs for self-study and the formation of appropriate intellectual, communicative and practical skills. The formation of an educational environment for the development of a child's personality and psyche implies the need to design the interaction of a child with adults, as well as interaction between children. At the same time, such interaction (learner–learner, learner–adult) includes the implementation, among other things, of the intellectual sphere in the form of solving cognitive tasks of various types. Cognitive tasks may differ in the type of psychological mechanisms that implement them (tasks of the sensorimotor, sensory-perceptual level, mnemonic, mental, imaginative). The nature of the tasks determines the type of mental processes that ensure the decision process (Belousova et al., 2015).

The use of visual thinking strategies based on the visual activity of students increases the possibilities not only of perceiving and processing information, but also the ability to form a general idea of the world, solve problems (Maldonado Lopez et al., 2023; Ellborg, 2018), generate deep thinking when solving problems and generalize basic ideas (Maldonado López et al., 2023), develop thinking (Abaho, Olomi & Urassa, 2015; Karimi et al., 2016).

In the conditions of a Children's art school, the educational environment involves the development of skills and competencies of visual activity, drawing skills, assuming clearer observation and detailing of the surrounding worldview. Visual activity is based on imaginative cognition of reality, which can be carried out at any level, including thinking. Visual activity involves specific ways of forming mental operations, such as analysis, synthesis, comparison, generalization, which are carried out through the transformation and generalization of the content of the reflection of the figurative form (Tikhomirov, 2002).

We believe that a visual picture of the image of the world and the formation of imaginative thinking are formed due to the use by schoolchildren visualization strategies related to the use of drawings, graphs, various color solutions, visual narratives of the surrounding world, the use of the ability to generate thinking when solving problems and generalize basic ideas in a figurative form.

In psychology, various concepts related to the problem of forming an image of the surrounding world are used. In Russian psychology, such a concept is quite often the

image of the world, which is described as a certain set or multilevel ordered system of human representations about the world, oneself, and other people, refracting through itself any external influence (Smirnov, 1985). In foreign psychology, based on the ideas of E.C. Tolman (1948), the concept of a cognitive map is more often used as a kind of subjective representation of the surrounding world (Davydova, 2022; Dautov, 2018; Dautov, 2021).

We assume that visual activity at the school of arts, characterizing the visual educational environment, can act as a factor influencing the development of the image of the world and imaginative thinking of younger schoolchildren, contributing to the development of imaginative thinking of students and certain types of worldview. We also assume that the level of imaginative thinking for the dominant types of the worldview in the visual educational environment may be higher compared to the subdominant ones.

The purpose of our research was to study the features of the image of the world and imaginative thinking of younger schoolchildren in a visual educational environment.

Methods

Sample

The sample consisted of students from the Children's Art School (60 people) and secondary school No. 3 in Rostov-on-Don (60 people). A total of 120 primary school age students participated in the study. In art school, a child learns various types of fine arts: painting, graphics, sculpture, works of decorative and applied art. In secondary school, visual activities are not so constant and purposeful.

Methodological tools

The methodological tools are presented by the following methods:

- The projective method of the "Picture of the world" (Romanova, Potemkina, 1991). The "Picture of the world" method involves the allocation of five main types of drawings:

The "Planetary" picture of the world is an image of the globe, other planets of the solar system – a cognitive picture of the world, in the form of generally accepted normative knowledge acquired at school;

A "Landscape" picture of the world – in the form of an urban or rural landscape with the presence of people, animals, trees, flowers, etc. – according to self-reports - the desired picture of your environment;

The "Immediate environment" worldview includes the environment around oneself, one's home, as it really is, or situational, unexpected images, a lamp, a burning candle coming from a person's feelings are possible;

A "Mediated or Metaphorical" picture of the world that conveys a complex semantic content presented in the form of a complex image;

"Abstract, schematic", characterized by laconism of construction, in the form of some abstract image, sign, symbol (Romanova, Potemkina, 1991).

- The test "Assessment of imaginative thinking" (Rogov, 2014). The test "Assessment of imaginative thinking" allows us to identify the level of development of conceptual thinking, the ability to operate with images of objects and the method of classifying them to a certain class of concepts. Depending on the points received, the level of thinking development is estimated as: average (20-36 points), above average (37-40 points), high – more than 40 points (Rogov, 2014).

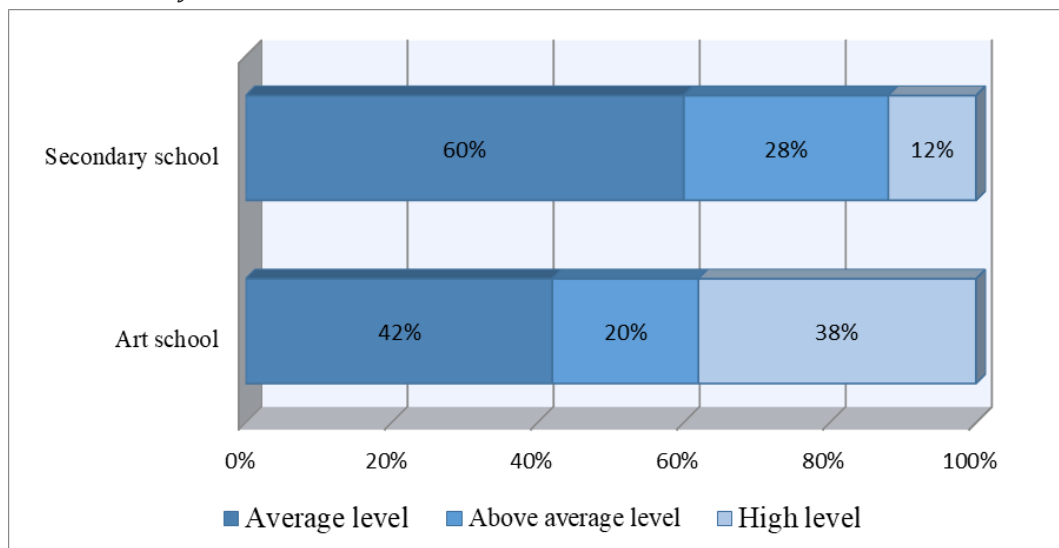
Methods of mathematical statistics (descriptive statistics, Pearson Chi-criterion, Mann-Whitney U-criterion, analysis of variance) were used in processing the results of the study. The analysis of the results was carried out using the computer program for statistical data processing "SPSS 23.0 for Windows".

Results

The study of imaginative thinking showed that younger schoolchildren are generally characterized by an average (61 people), above average (29 people) and a high level (30 people) of the development of imaginative thinking (Figure 1).

Figure 1

Features of the imaginative thinking of younger schoolchildren studying at the School of Arts and at the secondary school



This indicates that elementary school students successfully implement the main function of imaginative thinking, transform existing images, create new ones and operate

on them in the process of solving problems. The results of the study using the method of "Assessment of imaginative thinking" are presented in Table 1.

Table 1

The levels of imaginative thinking of younger students studying at the School of Arts and the secondary school

The level of imaginative thinking	The School of Arts			The secondary school		
	The number of students, people.	%	Average value (points)	The number of students, people	%	Average value (points)
Average	25	42	30,08	36	60	29,33
Above average	12	20	37,67	17	28	38,12
High	23	38	43, 65	7	12	43,42

Figure 1 shows that younger students from the School of arts are characterized by a higher level of development of imaginative thinking than the secondary school students: 58% of the School of arts students have a level of development of imaginative thinking above average (38% of students – high level, 20% – above average), while this indicator is typical for 40% of the secondary school students (12% – high level, 28% – above average).

The use of the Mann-Whitney statistical criterion allowed us to establish that there are significant differences in the level of development of imaginative thinking in younger schoolchildren studying at School of arts and the secondary school ($U = 1307,500$, $r \leq 0.01$).

Table 2

Differences in the level of development of imaginative thinking of schoolchildren studying at the School of arts and the secondary school

Variable	The School of Arts for children	The secondary school	Mann Criterion–Whitney U	The Significance of Differences
Imaginative thinking	36,8	33,49	1307,500	0,010**

Note. ** *The level of statistical significance is $p \leq 0.01$*

The analysis of the features of the images presented by schoolchildren in the drawings of the "Picture of the World" method made it possible to identify four pictures of the world: "Planetary", "Landscape", "Immediate environment" and "Indirect" (Figure 2, Table 3).

For younger students studying at the School of Arts and the secondary school, a "Landscape" picture of the image of the world is characteristic. The "planetary" picture of the world, the picture of the "Immediate Environment" and the "Mediated" picture of the world are depicted less often by younger schoolchildren. It should also be noted that the "Abstract" (or schematic) picture of the world is not presented. The results obtained are quite consistent with the basic patterns of mental development of younger schoolchildren, showing the predominant development of visually effective thinking (Obukhova, 1995; Tikhomirov, 2002), the period of specific operations (Kraig, Bokum, 2019; Piaget, 2004).

The results of the study of the image of the world of younger schoolchildren are presented in Table 3. The "planetary" picture of the world (the image of the globe, other planets of the solar system) is typical for 7% of the School of Arts students, and for 15% of the secondary school students. These students have a predominant cognitive picture of the world, in the form of generally accepted normative knowledge acquired at school.

Figure 2

Features of the image of the world of younger students of the School of Arts and the secondary school

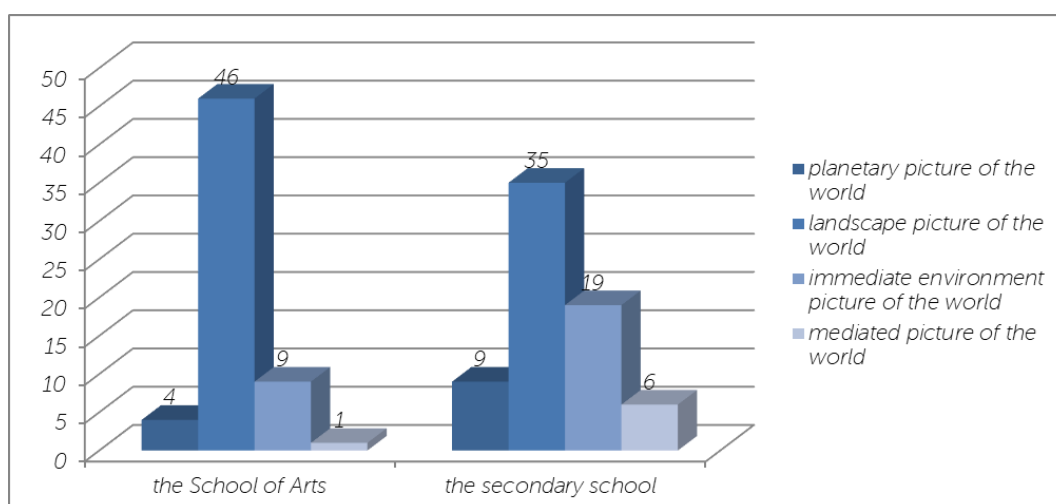


Table 3

Features of the image of the world of primary school children

The picture of the world	The School of Arts		The secondary school	
	The number of students	%	The number of students	%
Planetary	4	6,7	9	15,0
Landscape	46	76,7	35	58,3
Immediate environment	9	15,0	10	16,7
Mediated	1	1,7	6	10,0

A "landscape" picture of the world (in a form of an urban or rural landscape with the presence of people, animals, trees, flowers, etc.) is typical for 76% of primary school students of the the School of Arts, and for 58% of the secondary school students. For most younger students, it is important to build the desired picture of their environment. The "immediate environment" (the situation around oneself, one's home, as it really is, or situational) is typical for 15% of primary school students of the School of arts and 17% of the secondary school students. An "indirect" or metaphorical picture of the world, conveying a complex semantic content presented in the form of some complex image, was depicted by 1 student of the the School of Arts, and 6 students of the secondary educational school.

The calculation of Pearson's Chi criterion allowed us to establish the existence of a tendency towards the significance of differences in the landscape picture of the world among younger schoolchildren studying at the Children's School of Arts and the secondary school ($\chi^2 = 7,041, 0.05 \leq r \leq 0.1$).

The next step in our analysis was to study the features of imaginative thinking in schoolchildren with different types of worldview. The average values of the level of development of imaginative thinking of the younger schoolchildren with a different image of the world are presented in Table 4.

Table 4
Imaginative thinking of younger students with a different image of the world

The picture of the world	Children's Art School		The picture of the world	
	The number, people	The average value of imaginative thinking	The number, people	The average value of imaginative thinking
Mediated	1	47,00	6	37,67
Planetary	4	32,50	9	30,78
Immediate environment	9	36,56	10	31,00
Landscape	46	37,00	35	34,14

For schoolchildren who have depicted indirect and landscape pictures of the world, a higher level of development of imaginative thinking is characteristic.

To identify the connection between the imaginative thinking of younger schoolchildren with a different image of the world, a one-factor analysis of variance (ANOVA) was conducted, the results of which are presented in Table 5.

Table 5

The significance of differences in the imaginative thinking of younger schoolchildren with a different image of the world according to the results of the analysis of variance

Nº	World view	The number of people	The average value of imaginative thinking	The significance of differences between the groups
1	Mediated	7	39,00	(Fisher variance analysis)0,049*
2	Planetary	13	31,31	
3	Immediate environment	19	33,63	
4	Landscape	81	35,77	

Note. *The level of statistical significance $r \leq 0.05$

The Fisher analysis of variance allowed us to establish significant differences between the groups in terms of imaginative thinking ($F = 2.695$, $r \leq 0.05$). Schoolchildren depicting landscape and mediated worldviews are characterized by a higher level of imaginative thinking than schoolchildren depicting a planetary picture and a picture of the immediate environment.

Discussion

The analysis of the results obtained according to tables 1-2 indicates that the solution of tasks based on visual material, the transformation of situations in terms of images is performed by the students of the School of Arts more effectively than by students of the secondary educational schools. Imaginative thinking is a complex, multidimensional, multifunctional education (Obukhova, 1995; Tikhomirov, 2002), which is of great importance for the mental development of a person at all stages of his\her ontogenesis. The development of imaginative thinking among younger students of the Children's Art School is at a higher level than among students of secondary school.

The results obtained, firstly, correspond to classic theories (Vygotsky, 2005; Kraig, Bokum, 2019; Obukhova, 1995; Piaget, 2004): at primary school age, thinking becomes the dominant function in the mental development of younger schoolchildren, determining the functioning of consciousness and the development of the child's personality, intellectualization of mental functions occurs, in which thinking has a system-forming character, mediating the development of other mental processes (Vygotsky, 2005). At this age, the processes of detecting contradictions intensify (Krasnoryadtseva, 2012), intellectual emotions develop (Tikhomirov, 2002), and various types of thinking crystallize (Kraig, Bokum, 2019; Obukhova, 1995; Piaget, 2004).

Our results highlight the fact that visual-imaginative thinking is one of the main forms of thinking in primary school age. In the process of learning at school, younger schoolchildren acquire concepts (Vygotsky, 2005; Davydov, 2001; Piaget, 2004), thinking becomes arbitrary, reflexive, verbal-logical, from empirical it is transformed into theoretical (Davydov, 2001), but imaginative thinking continues to play an essential role in educational activities and the life of schoolchildren (Davydov, 2001; Tikhomirov, 2002).

The results presented are consistent with the Boldt & Strub (2023) study, which showed the importance of experience and abilities to draw and to visual activity for the development of divergent thinking.

An attempt to study the features of the image of the world (Table 3) showed that for younger schoolchildren studying at the School of Arts and the secondary schools, a "Landscape" picture of the image of the world is characteristic. The "planetary" picture of the world, the picture of the "Immediate environment" and the "Mediated" picture of the world are depicted by the younger schoolchildren less often. It should also be noted that the "Abstract" (or schematic) picture of the world is not represented. The results obtained are quite consistent with the basic patterns of mental development of younger schoolchildren, showing the predominant development of imaginative thinking (Obukhova, 1995; Tikhomirov, 2002), the period of specific operations (Kraig, Bokum, 2019; Piaget, 2004).

In existing studies of the image of the world, it has been shown that the image of the world differs due to different cultural and historical conditions of their formation (culture,

language, nationality, society) (Mochalova, 2015; Belousova, Pishik, 2006), as well as due to various psychological factors (personal, age, environmental, etc.) (Naryshkin, 2005, Poddyakov, 2003). There are works devoted to the study of the peculiarities of the image of the world of student youth (Belousova, Pishik, 2006; Tushnova, 2015). Some characteristics of the image of the world of teenagers were revealed in the works (Mamaichuk, Krainyukov, 2014; Tushnova, Mochalova, 2017). At the same time, according to Poddyakov A. N. (2003) and Krainyukov S. V. (2019), the problem of the image of the world of younger schoolchildren requires close study.

The presented results allow us to assert that the dominance and high level of representation of the "Landscape" picture of the world is characteristic for students of the Art School. We believe that such a vision of the world has been formed through constant visual activities, educational visualization strategies, constant observation of the outside world, the practice of creating images of surrounding objects and phenomena, and imaginative practice.

The next aspect of our analysis led us to understand that the schoolchildren who prefer a Landscape picture of the world have a higher level of imaginative thinking. In other words, the landscape picture of the world of younger schoolchildren suggests a higher level of development of imaginative thinking.

Thus, in the conditions of a visual educational environment, there is a more intensive development of imaginative thinking and an image of the world, which is characterized by a vision of the world as a concretized reality filled with objects and phenomena.

Conclusion

Thus, the analysis of the development of the world image and imaginative thinking of younger schoolchildren studying at the Children's Art School and the Secondary School showed the influence of the visual educational environment on the development of thinking and worldview:

1. For younger students studying at both the Children's Art School and the secondary school, there is a predominance of average, above average and high levels of development of imaginative thinking. At the same time, it was revealed that there are significant differences in the development of imaginative thinking: younger schoolchildren from the Children's Art School are characterized by a higher level of development of imaginative thinking than for secondary school students. In other words, solving problems in images, based on visual material, transforming situations in terms of images, is performed by the students of the Art school more effectively than by the students of the secondary school.
2. For younger students studying at both the Children's Art School and the secondary school, the predominant development of the "Landscape" picture of the world is characteristic. In second place is the "Planetary" picture of the world. The

"Immediate environment" and "Indirect" worldview are represented to a lesser extent, but the "Abstract" (or schematic) worldview is not represented at all in younger schoolchildren, which corresponds to the age level of development.

3. There are significant differences in the choice of a landscape picture of the world: schoolchildren of the Children's Art School more often chose a "Landscape" picture of the world, for students of the Art school building the desired picture of their environment is more typical than for students of the secondary school.

4. The analysis of variance allowed us to establish significant differences between groups of schoolchildren with different types of worldview in terms of imaginative thinking and the existence of a connection between the features of the worldview and the development of imaginative thinking: for schoolchildren depicting "Landscape" and "Mediated" worldviews, a higher level of imaginative thinking is characteristic.

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Conflict of Interest Information

The authors have no conflicts of interest to declare.