CURRENT RESEARCH JOURNAL OF PEDAGOGICS (ISSN: 2767-3278)

VOLUME: Vol.07 Issue01 2026
DOI: - 10.37547/pedagogics-crjp-07-01-23
Page: - 106-108
RESEARCH ARTICLE OPEN ACCESS

Methods For Developing Spatial Imagination In Primary School Students

Mamasaidova Muhabbat Abdusalom qizi

Associate Professor at the Department of Primary Education Methodology, Doctor of Philosophy (PhD) in Pedagogical Sciences at Fergana State University, Uzbekistan

Received: 05 December 2025 **Accepted:** 27 December 2025 **Published:** 31 January 2026

ABSTRACT

This article is devoted to the scientific and theoretical foundations, practical and methodological ways, and the possibilities of modern educational technologies for developing spatial imagination in primary school students. It substantiates, from a scientific perspective, the effectiveness of visual instruction, hands-on activities, game-based methods, and ICT tools in fostering spatial imagination.

Keywords: Spatial imagination, point, GeoGebra, shape, right, left, up, down, dimension, perception, space, volume.

INTRODUCTION

In the primary education process, spatial imagination plays an important role in students' intellectual development, mathematical thinking, logical analysis skills, and creativity. Spatial imagination is the mental process of representing objects' shape, size, relative position, direction, and movement. This skill increases young learners' observation, cognitive flexibility, and ability to analyze problem situations. Many researchers emphasize the invaluable role of spatial representations in personal development. In particular, the level of development of spatial imagination serves as an important factor for building a holistic picture of reality and for processes such as understanding one's "self" in space and in the world.

For example, primary school students with poorly developed spatial imagination may demonstrate errors in writing and reading: writing letters in reverse ("mirror writing"), placing elements in a text chaotically, or failing to maintain correct lines and spacing, which can lead to dysgraphic difficulties. Thus, developing spatial imagination from preschool and early primary age is a necessary condition for a child's intellectual growth and readiness for learning.

Neuropsychological approaches, in discussing hemispheric specialization (lateralization), generally show that the right hemisphere plays a leading role in spatial-perceptual processes. However, especially during learning activity, cooperation between both hemispheres is important: the left hemisphere supports verbal expression of spatial concepts and logical analysis, while the right hemisphere forms direct visual-spatial representations. These findings imply for educational psychology that, in developing spatial thinking, it is necessary not only to provide children with visual material, but also to create opportunities to explain it verbally and discuss it.[1]

Typically, spatial imagination in primary school students is formed through the following components:

1. Visual perception: Students develop representations of shapes, colors, and sizes, as well as the ability to sense and distinguish different directions. They also begin to acquire skills in differentiating shapes. For example, they can distinguish a rectangular parallelepiped from a cube.

2. Visual–practical thinking: Through practical

actions with objects, students acquire new knowledge—for example, assembling, cutting, placing shapes, or making paper models. These skills are also formed through the "Technology" (craft/design) subject taught in primary school. In addition, it is advisable to develop them in preschool children through building various objects with LEGO.

3. Model-building skills: The ability to represent real-life objects through schemes, drawings, or mock-ups—for example, creating houses, towers, or animal shapes using cardboard or LEGO blocks. In this process, students are introduced to 3D shapes. They are expected to create small models based on what they see and feel. Such components should first be formed with objects containing few elements and then developed gradually from simple to more complex.

4. Mental transformation (mental rotation, turning, scaling): The ability to imagine rotating, turning, enlarging, or changing the position of shapes and objects mentally. For example, rotating a cube by 90° and imagining its other sides.

5. Spatial logical thinking: The student analyzes relationships among objects in space and takes location into account when solving problems—for example, finding a way through a maze or assembling a mosaic correctly.[2]

To develop spatial imagination in primary school students, it is necessary first to form basic concepts such as right, left, up, and down, because these notions strengthen children's understanding of space. Usually, it is advisable to develop them through practical exercises. For example, one student comes to the board. The teacher gives the student a book in the right hand and a pen in the left hand, and then addresses the class with the following questions:

1. What do you see in your friend's right hand?

2. In which hand is the book?

3. What is in the left hand?

The difficulty of this task lies in the fact that the student standing at the board faces the rest of the class. Because the student is positioned opposite to the classmates, the student's right hand may appear like the left hand from the students' point of view. If, even in this situation, students answer the questions correctly, it can be concluded that the concepts of right and left have been formed properly.

To check how well the concepts up and down are formed, each student is given a sheet of white paper. They are asked to divide the sheet into four equal parts with a pencil and then draw a house in the upper-right part, a flower in the lower-left part, a dog in the lower-right part, and a book in the upper-left part. Through this exercise, it becomes possible to identify at the same time the level at which students have formed the concepts of up and down, as well as their general level of spatial representation.

One of the most effective methods for developing spatial imagination in primary school students is the "Kartolog" method. This method is mainly implemented in four stages.

Stage 1. First, students create a "map" of the place where they are standing. That is, if the student is in the classroom, they describe in sentences what is on their right, what is on their left, what is in front of them, and what is behind them. The same activity can also be done with a friend: for example, the student can say what is on the friend's right, left, front, and back.

Stage 2. This stage is also called the "classroom stage" or the "building stage." Here, students create a map of their classroom environment. For example, they describe what is located to the right side of the classroom (e.g., the cafeteria), what is on the left side (e.g., other classrooms), what is "above" (e.g., the principal's office), and so on.

Stage 3. This is called the "school building" stage. At this stage, students create a map showing the location of their school. This can also be assigned as a drawing task. Students can complete this stage by imagining what buildings are near the school building.

Stage 4. This is the final stage. Here, students describe the area where they live, taking into account which regions are near it. In other words, students must not only know the concepts of right, left, up, and down, but also have information about the region (province) where they live and about neighboring regions.

Using this method consistently throughout lessons guarantees highly effective results.

In addition, to develop spatial imagination, it is recommended to use the following methodological approaches:

1. Visual modeling method — creating models of figures using Polydron, LEGO, cardboard shapes, as well as software such as GeoGebra.

2. Transformational method — strengthening spatial thinking by rotating, turning, reflecting shapes across an axis, and transforming them by 180° or 90°.

3. Constructive method — assembling new figures from existing elements and using polyhedral models.

4. Comparison and analysis method — analyzing shapes based on characteristics such as size, sides, angles, and direction/orientation.

5. Didactic games — increasing students' interest through games such as "Mysterious Figure," "Find Your Place," "Choose the Rotated Shape," and "Find the Symmetry."

6. A system of exercises and tasks — tasks of different levels aimed at transforming shapes, finding axes of symmetry, and identifying elements of 3D shapes. [3,4]

The role of information technologies in developing spatial imagination is invaluable. For example, as noted above, GeoGebra technology also guarantees effective outcomes. GeoGebra is an interactive program that integrates geometry, algebra, and statistics, and it helps develop students' spatial imagination, logical thinking, observation skills, independent activity, and practical competencies. The main essence of the method is that students discover mathematical concepts through direct manipulation.

GeoGebra is important for studying geometric figures (point, segment, straight line, perimeter and area of shapes), for teaching arithmetic topics, and for developing spatial imagination. The teacher prepares a GeoGebra model suitable for the topic or creates it together with students during the lesson. Students then move shapes, change parameters, observe results, and draw conclusions.

The GeoGebra method is an effective tool for improving primary school students' mathematical literacy, developing their spatial imagination, and organizing engaging lessons. This method encourages students to learn independently, conduct experiments, and draw their own conclusions.

CONCLUSION

In conclusion, developing spatial imagination in primary school students plays an important role in their later mathematical preparedness and overall intellectual development. A learning process oriented toward developing spatial imagination helps students identify interdisciplinary connections, perceive the environment correctly, and form skills for practical work with shapes and measurements.

REFERENCES

1. T. Qodirov, M. Mamatov Boshlang‘ich ta’limda matematika o‘qitish metodikasi. – Toshkent: Fan va texnologiya, 2015. – 240 b

2. M. Mavlonov, R. Xudoyberganova Pedagogik texnologiyalar va pedagogik mahorat. – Toshkent: Noshir, 2019. – 180 b.

3. R. Xudoyberdiyev Matematika darslarida fazoviy tasavvurlarni rivojlantirish usullari // Boshlang‘ich ta’lim. – 2022. – №4. – B. 32–38.

4. N. Yusupova Boshlang‘ich sinf matematika ta’limida ko‘rgazmalilikning ahamiyati // Ta’lim jarayoni. – 2021. – №2. – B. 41–46