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Characteristics of Developing Students' Cognitive Interest in Mathematics

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Abstract: This article discusses the theoretical foundations, methodological approaches, and practical methods for developing students' cognitive interest in mathematics. To achieve this goal, it analyzes the effective use of pedagogical technologies, enriching the subject with modern tools, and encouraging students' active participation in the educational process.

Keywords: Cognitive interest, critical thinking, interactive teaching, problem-based learning, interactive technologies, student interest, creative approach.

Introduction Mathematics is one of the main subjects of education, which is of great importance not only for imparting exact knowledge, but also for developing students' thinking skills, forming their ability to analyze, creatively approach and solve problems. Today's requirements require not only memorizing mathematical formulas, but also applying them in life, and approaches aimed at finding innovative and creative solutions to complex problems. Developing students' cognitive interests in effective teaching of mathematics is the most important part of this process.

Cognitive interest is a form of personal motivation that ensures the student's internal desire to learn, intellectual research and active participation in the learning process. This interest is important not only in the educational process, but also for the personal and professional development of students . Cognitive interests provide a deep assimilation of knowledge, create an opportunity to put theoretical concepts into practice, and direct students to personal creative research.

Formation of cognitive interests in mathematics education requires a number of pedagogical and psychological processes. Effective use of interactive learning methods, real-life examples, mathematical quests and problem-based learning methods is necessary to arouse the interest of students and involve them in the active learning process. Through modern pedagogical approaches, it is possible to increase students' interest in mathematics and make them active participants.

Cognitive interest is a multifaceted object of scientific knowledge. Located at the crossroads of psychological research, didactics and educational theory, it has a rich history of its development.

Modern pedagogy considers cognitive interest not only as students' interest in academic subjects, but also understands it more broadly: as interest in life, history, culture, etc. I.G. Shaposhnikova emphasizes that cognitive interest arises from the needs of the individual, which in turn affects the moral development of the individual [5].

Cognitive curiosity is a social quality of a person that encourages him to become more deeply acquainted with new facts, phenomena, events, and theories in any area of reality, to change them in accordance with his needs, ideas, and goals.

In psychological and pedagogical research, cognitive interest is defined as a child's need for knowledge that directs them to the surrounding reality. Under the influence of cognitive interest, children strive to discover new aspects of science, and to establish deeper connections and relationships between various phenomena.

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Research on cognitive interest issues is based on the personal-activity approach and reveals a number of important features of this phenomenon:

1. Its carrier can only be a person.
2. Its manifestation is focused on various spheres of human activity.
3. It is not an innate characteristic of a person, but is formed in the social conditions of his existence. As L.S. Vygotsky emphasized, a child's interests arise from contact with the outside world; their development is particularly influenced by the attitude of people around them [1].

Cognitive interest is one of the most important motives in education. In the general structure of motivation for cognitive activity, this motive is perceived by the student earlier than others, he can, without hesitation, indicate whether a school subject is interesting or not, whether a lesson is interesting or not for him.

Scientists consider cognitive interest:

- as a synthetic combination including intellectual, emotional and volitional factors (L. A. Gordon, A. G. Kovalev, V. N. Myasishev, S. L. Rubinshtein, etc.);
- as a tendency (B. I. Dodonov, A. V. Zaporozhets, A. V. Petrovsky, etc.);
- as a person's selective direction (V. B. Bondarevsky, G. I. Shukina, etc.);
- as an expression of individual needs (B. G. Ananev, L. I. Bojovich, A. N. Leontev, etc.);
- as an expression of emotional attitude (V. N. Myasishev, S. L. Rubinstein, etc.);
- as a motive for educational activity (L. I. Bojovich, G. I. Shukina, etc.);
- in the context of the development of the motivational sphere (A. K. Dusavitsky, A. K. Markova, N. G. Morozova, etc.);
- as an integrative quality of a person (O. V. Naumenko, F. K. Slavina, etc.).

Cognitive interest is an integral structure of the individual. As a general phenomenon of interest, it has a very complex structure, consisting of both individual mental processes (intellectual, emotional, regulatory), and the objective and subjective relations of the individual with the world, expressed in relationships. Some researchers study the psychological essence of interest, while others consider cognitive interest as a motive or attitude of the individual.

A number of researchers are studying cognitive interest as an important tool for learning. This aspect of cognitive interest is also considered in many didactic studies devoted to the problem of educational activation.

Cognitive interest is one of the elements of a person's structure and one of the indicators of his mental development, and has a significant impact on the formation of a person as a whole. A person's desire to expand his knowledge, to penetrate into the essence of the surrounding reality phenomena, increases his value as a person. Interest in knowledge in a specific subject area serves as a reliable guide in the ever-increasing flow of information, bringing it closer to the values accumulated by humanity [2].

Methodology The methodology in the article emphasizes the integration of modern pedagogical strategies to foster students' cognitive interest in mathematics. It begins with creating an enriched educational environment that combines theoretical and practical approaches. Teachers employ interactive teaching methods such as problem-based learning, mathematical quests, and real-life examples to make lessons engaging and relevant. These methods are complemented by fostering emotional and intellectual connections to the subject, ensuring that students perceive mathematics as both useful and stimulating.

To implement these strategies effectively, the teacher's role is critical in organizing activities that stimulate curiosity and intellectual effort. This includes designing tasks that present challenges, encourage exploration, and promote independent thinking. Moreover, maintaining a positive emotional

climate in the classroom and fostering meaningful communication between students and teachers are essential for sustaining interest and motivation. The methodology also highlights the importance of extracurricular activities, which provide opportunities for creative and research-oriented learning, further deepening students' engagement.

Structured exercises tailored to the developmental needs of students are pivotal in this approach. These include preparatory tasks, reinforcement activities, and assessments that test both theoretical understanding and practical application. The methodology advocates for gradually increasing the complexity of tasks to align with students' evolving skills and interests. By integrating these elements, the approach ensures that cognitive interest in mathematics not only initiates but also sustains and grows, fostering long-term intellectual development and a positive attitude toward learning.

Results Cognitive interest is the most important type of general interest.

Therefore, it is characterized by all the characteristics of interest as a psychological education and at the same time stands out for its own field and direction.

To form cognitive interest, initial conditions are necessary, because without them, the teacher's work is doomed not to success, but to failure. Thus, N.G. Morozova identifies the following conditions (initial conditions) for the formation of cognitive interest:

1. creation of favorable objective material conditions for office equipment, etc.;
2. preparing the "mental ground" - gathering preliminary knowledge, skills and qualifications;
3. preparation of the "moral ground" - formation of a positive attitude to education and school in students:

a) fostering an emotional-positive attitude towards education - creating positive experiences associated with everything that comes with mastering a particular subject, department, or topic;

b) forming a conscious attitude to the doctrine - understanding its practical importance, development prospects [4].

G.I. Shukina defines the following conditions for the formation of the student's cognitive interest in the educational process [7]:

1. Maximum reliance on active mental activity of students. The following are important for this:

- cases of solving cognitive problems; - cases of active research, assumptions, considerations;
- cases of mental stress;
- cases of inconsistency of judgments, a clash of different positions, in which you need to determine this yourself, make a decision, and take a certain point of view.

2. Conducting the educational process at the optimal level of student development. At the same time, the teacher should be constantly engaged in teaching students a wide range of skills and competencies in their field. For example, in teaching mathematics , skills that require calculations, precise calculations, the use of a ruler, compasses in depicting drawings, geometric shapes, figures, etc., and skills related to spatial imagination are of great importance.
3. The emotional climate of education is a positive emotional tone of the educational process. Here, a successful emotional climate of education and teaching is associated with two main sources of student development - activity and communication - that create the tone of the student's personal mood. Both of these sources are not isolated from each other, they are constantly interconnected in the educational process. This situation connects the entire complex of educational functions - enlightening, developing, educating, and directly and indirectly affecting interest.
4. Positive communication in the learning process. Communication between students and teachers creates various relationships, the indirect effect of which is a great interest in learning. The desire

to communicate with peers and with the right teachers can be a strong motivation for learning in itself, and at the same time helps to strengthen cognitive interest.

Discussion After creating the necessary conditions for the formation of cognitive interest, N.G. Morozova suggests the stages of its development:

1. episodic experiences - there is no real interest in science yet. “Interest in science is, firstly, the attitude of students to science in educational activities, to its content. Secondly, when there is interest, all mental actions are active. Thirdly, the attitude is intellectual and is manifested in cognitive, mental actions. Fourthly, these actions have an emotional color (cognitive joy, pride in success)” [4]. Students enjoy learning new things directly, with interest.
2. emotional and cognitive attitude to science - interest, desire to learn more about science (and beyond the learning process). "Interest that arises in the mind and precedes knowledge of the object."
3. personal orientation - a change in lifestyle under the influence of cognitive interest. That is, interest is not only an external condition of the importance of what is perceived, but also an internal principle of material selection in the process of perception [4].

The cognitive interests of adolescents are characterized by activity and mobility. All the efforts of the teacher aimed at forming any ideas or concepts in children will fail if the students are not interested in the subject of their thinking.

The main rules that a teacher can follow in the formation of children's cognitive interests:

- gradual transition from natural interests to vaccine interests;
- The object offered to children for study should not be completely new or already familiar to them;
- it is desirable to concentrate the material, to "group it around a single core".

Any form of the student's independent activity helps to master the operational side of teaching, provided it is properly organized pedagogically. It is necessary to consistently complicate the content, form and methods of training necessary for their implementation in independent work.

The uniqueness of independent work as a generator of cognitive interest is also that it is designed for each age of students, and that they are able to solve the problems of verbal, emotional and motor development of students.

N.G. Morozova identifies the following ways of forming cognitive interest:

1. Teacher's activity. To arouse and develop interest, it is necessary to organize the activity in a unique way. In his work, the teacher uses the method of research and discussion and problem-based presentation of the material.
2. Methods of organizing students' activities. From a psychological point of view, the following conditions are common to all lessons that arouse students' interest: the emergence of a contradiction between known and reported new facts; "getting" students used to the task; awakening a need and a desire to satisfy it.
3. Organization of extracurricular and extracurricular activities. This work has a creative, research and research character [4].

During the lesson, cognitive interest is unstable and subject to fluctuations. Research conducted by G.I. Shchukina has shown that the dynamics of cognitive interest in lessons can vary:

1. Gradually increasing cognitive interest from beginning to end. This type of dynamics of cognitive interest in the lesson is considered the most successful, because students are amazed by the lesson and the break.
2. The “fading” nature of cognitive interest. This is the most unfavorable characteristic of cognitive interest in the lesson, because after 5-10 minutes of the lesson, interest gradually disappears.

3. Staged dynamics of cognitive interest. Interest here is unstable and therefore does not act as a general motive for activity. Such dynamics of cognitive interest in the classroom indicates that they are somewhat amorphous, insufficiently stable.
4. Apparent culmination and decline points of cognitive interest. This type of dynamics of students' cognitive interest in the lesson indicates that it is not stable enough, which requires external management, and indicates that internal motivation is not yet sufficient [8].

The formation of cognitive interest in teaching mathematics means putting the student himself in such conditions and situations to carry out activity by forming and developing the necessary motivations for learning, taking into account his past experience, individuality and inner aspirations.

Conclusion In our opinion, an indispensable condition for the formation of cognitive interest in teaching mathematics in students of grades 5-9 is an enriched subject-spatial environment, where the system of exercises and assignments is important:

1. Exercises designed to study the material, acquire skills and competencies (preparation, test, model, scheme designed to perform actions according to a given algorithm, etc.).
2. Exercises designed to strengthen the learned material.
3. Control assignments designed to test the skills of in-depth assimilation of theoretical knowledge and their practical use.

Cognitive interest in mathematics has the following characteristics: it often manifests itself in primary school age and largely determines the student's mastery and the manifestation of his abilities throughout the entire education. At the same time, a qualitative transformation of knowledge, skills and abilities into conceptual thinking occurs in the process of its development.

In this regard, the teacher must not only correctly form the cognitive interest of students, but also qualitatively support it in the future, that is, so that interest in mathematics not only does not fade over time, but also grows stronger.

The pedagogical conditions for the formation of cognitive interest in teaching mathematics in grades 5-9 are not expressed. The question of the reasons for the lack of interest in mathematics among students needs to be clarified. The question of ways and methods for the formation of cognitive interest in teaching mathematics (especially in the classroom) among students has not been sufficiently developed.

Having considered the concept of interest, cognitive interest, their essence, methods of formation of cognitive interest, we can conclude: cognitive interest is a special attitude of a person to what surrounds him, which means a desire to comprehensively and deeply study the important features of the surrounding reality. This undoubtedly affects the development of memory, creative imagination, attention, and thinking, and is also a strong incentive for the development of valuable personal characteristics such as determination to the goal, purposefulness, striving to achieve the desired result.

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