COGNITIVE INTEREST AS A KEY INDICATOR OF ADOLESCENT PERSONALITY DEVELOPMENT

INTRODUCTION

In the context of the digital transformation of all spheres of human society and state institutions, the problem of personality development is currently becoming especially relevant. In this context, the question naturally arises: what can be considered the most universal indicator of dialectical changes in an individual. Psychologist N.A. Menchinskaya, a Russian scientist, proposed to consider the presence of cognitive interest in a person as such an indicator (BOZOVIC and WEISER, 2015). Actually, as evidenced by observations and analysis of sociological data, an interest in knowledge allows a person not only to create an individual educational trajectory at a young age, but also to remain in demand and competitive in society in his adulthood. This results from the fact that cognitive interest as a personal education dialectically interconnects with thinking, memory, attention, speech, and emotions. In Russian didactics, pedagogical tools for determining the level of students' knowledge in various subjects are fairly well developed. However, these results are not enough to record and assess the level of personality development. Our research has revealed a contradiction between the need to develop diagnostic parameters in modern pedagogical research and the underestimation of cognitive interest as an indicator of personality development. The search for ways to resolve this antagonism determined this research objective.

MATERIALS AND METHODS

To achieve the research objective, the following methods and approaches were applied: theoretical methods:

- analysis of scientific literature on this topic allowed clarifying the multidimensional nature of the concept of “cognitive interest”;
- generalization and systematization of scientific ideas of domestic and foreign scientists, resulting in singling out dialectical connections of epistemic curiosity with thinking, memory, attention, speech, and emotions;
- modeling – a new conceptual model of the dialectic of cognitive interest was built as the basis for the design of the process of its learning;
- empirical methods:
  - follow-up of the participants in the educational process, talks with children, and questioning of schoolchildren helped find out the influence of cognitive interest on the level of memory, attention and speech;
  - approaches;
- the synergistic approach helped clarify the content of the category of “cognitive interest” as an individual’s integrative education;
- the technological approach made it possible to develop technological procedures for updating the synergy of cognitive interest in any scientific field with other cognitive processes that determine the individual’s intellectual characteristics.

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This study was conducted by the authors over ten years. The experiment involved fourteen-year-old adolescents studying in grades 7-8 at secondary educational institutions of the city of Yelets, Lipetsk region of the Russian Federation without preliminary selection. The total number of participants was 250. Mathematics was considered as the scientific area being the foundation of the research.

**LITERATURE REVIEW**

A historical source analysis allows stating that scientists have been dealing with this problem for a very long time. Thus, the outstanding Czech humanist teacher Yan Amos Comenius back in the 16th century pointed out that learning should be interesting (MELNIKOV, 2015). According to the famous Russian scientist of the 19th century K.D. Ushinsky, the child’s interest in learning contributes to the effectiveness of the cognition process (DONTSOV and MOSKVITINA, 2017).

The issue of defining this concept as a personal education is fundamental in the studied context. German psychologist J.F. Herbart (19th century) viewed interest as a manifestation of inner activity. The scientist introduced the concepts of “involuntary and voluntary types of attention” into the psychological lexicon, investigated their role in awakening cognitive interest. It is especially significant that J.F. Herbart was the first to consider interest in knowledge as a pedagogical goal, earlier it was only a condition for mastering knowledge (HERBART, 2020). Currently, this provision is acquiring special relevance. Swiss psychologist, one of the founders of child psychology Ed. Claparede, regarded the satisfaction of needs (intuitive and spiritual) as the driving force for the emergence of interest (CLAPAREDE, 1918).

The scientist’s work initiated the study of the problem of cognitive interest as a stimulus for mental activity. In Russia, the outstanding psychologist and teacher P.F. Kapterev is the founder of educational psychology. He interpreted interest as the desire for a certain activity related to the subject. The scientist considered the person’s innate genuine properties as the primary basis for the development of interests, as well as cultural influences, that is, the environment, the purposeful impact of the school, and the content attractiveness (KAPTEREV, 2021).

It is necessary to note the multidimensional nature of research on cognitive interest conducted by Russian scientists in the second half of the 20th century. It was found that an interest in knowledge is a strong motive for learning. Researchers distinguish educational and cognitive motives, broad cognitive motives, and motives for self-education (MARALOV et al., 2020). However, cognitive interest cannot be reduced only to motive, since interests, including epistemic curiosity, are part of the motivational sphere of the individual. The interests of a person represent a fairly large integration: material, social, political, professional, related to labor, aesthetic, sports-oriented, cognitive, and others, for example, cognitive interest in mathematics. Thus, the latter is an element of this set, and is characterized as something subjective (RYMANOVA, 1999) (Figure 1).

**Figure 1.** Cognitive interest in Mathematics in the system of personal interests

![Diagram](source: Rymanova (1999))
The famous Russian scientist G.I. Shchukina (2006) was the first to pay attention to the cognitive interest as a teaching tool. This was the beginning of the scientific understanding of the methods, techniques, and the dialectic factors of cognitive interest. Research in the field of acmeology allowed considering the interest in knowledge as an important quality of the personality. Summarizing the above, it is clear that there is no single point of view regarding the definition of this category.

Foreign scientists also consider cognitive interest in different ways: interest in the field of emotions (SILVIA, 2006); the relationship of subject knowledge, interest, and memory (CHAN et al., 2019); the interaction of the studied category with motives, needs, and will (BOEKAERTS and BOSCOLO, 2002); the way of its development (BARRON, 2006); situational interest, as a particular manifestation, its structure (KNOGLER et al., 2015), differences of curiosity and interest (GROSSNICKLE, 2016) are studied. It is noted that there is a traditional point of view in defining this concept as a favorable attitude to a certain aspect of reality, whereby its study and the affective variables of the personality remain beyond scientific areas (BOEKAERTS and BOSCOLO, 2002).

There is now a fresh impetus to study interest in knowledge, and the range of thematic research is rather wide. Thus, scientists from New Zealand (HODIS and HODIS, 2020) study the motivation patterns, find out the general and difference between them, taking into account motivational and communicative factors, as well as the relationship between different components of the individual’s motivational sphere: motives, success, beliefs, and perception. Everything is exemplified by mathematics (HODIS and HODIS, 2020). We consider this work important in terms of further clarifying the influence of the above components on cognitive interest.

American researchers consider a model of interest and a tool for measuring it, based on the K. A. Renninger and S. Hidi’s methodology (KNEKTA et al., 2020). Scientists distinguish four phases: the first phase is triggering situational interest, the second phase is keeping situational interest, the third phase corresponds to the emerging individual interest, and the fourth phase is a well-developed individual interest. The latter is characterized as “a psychological state and a relatively stable propensity for reengineering with a certain class of content over time” (RENNINGER and HID, 2017).

European scientists significantly contributed to the development of the theory of the development of interest in knowledge. So researchers from Greece consider the influence of game on the dialectic of cognitive interest, as well as its relationship with student achievement (TRUJILLO-TORRES et al., 2020). Italian scholars are studying the role of the personal factor in epistemological interest (SILVIA, 2006).

The work of researchers from Asian universities seems to deserve special attention (WONG et al., 2020). They, like Russian scientists, believe that interest develops in activity. The proposed theory is called the “interest loop”. Three strategic components are considered, the central points of which are the concepts: “curiosity” for arousing interest, “flow” for immersion in interest, “meaningfulness” for expanding interest. Russian scientists’ studies on the development of cognitive interests among students of higher educational institutions have recently appeared (BAYBAKOV and CHUDINA, 2017).

Summarizing the above, it is obvious that dualism in the approaches to studying this problem is the driving force for the current research. However, despite a sufficient number of works on this topic, the authors of this article believe that today there is a strong need to clarify the basic concept, as well as the need to develop conceptual provisions that will effectively organize work at school related to the child’s personal development.

RESULTS AND DISCUSSION
Analysis of different points of view on the research problem allowed the authors to define cognitive interest as “a personality’s integrative education, which determines its selective orientation and addresses the cognition of one or several scientific areas, their subject side (content), as well as the process of activity” (RYMANOVA, 1999). This view, as well as the
systematization of the international scientific potential on this issue, was the conceptual basis for building a model of the dialectic of interest in knowledge (Figure 2).

**Figure 2.** Authors’ conceptual model of the dialectic of cognitive interest

![Diagram of cognitive interest model](image)

**Source:** Search data.

Cognitive interest arises in the reality surrounding the child, in relations with relatives, teachers, and peers, in the educational and training environment. The latter is not only the source of interest, but also cognitive needs, as well as cognitive motives, which, in turn, influence interest. These regularities are obvious, since interests, needs, and motives are integral components of the individual’s motivational sphere. Interest in cognition as a motive is expressed through cognitive motives, the material representation of which is objectives. The studied category is a powerful teaching tool, as a result of which the activity becomes productive and acquires a cognitive character. Moreover, it has a specific feature: cognitive interest appears in it twice as a motive for action and a motive for activity. As a personality quality, interest in cognition is manifested through cognitive activity and cognitive independence. Note that the conceptual model in Figure 2 demonstrates a dualistic nature of most of the connections.

This configuration allows raising cognitive interest, which, according to the authors, is the management of personality development in the pedagogically organized system, aimed to improve epistemological skills manifesting in social life. This process is based on the corresponding pedagogical principles:

- **the principle of conformity to nature** underlies the dialectic of interest;
- **the principle of humanization** allows turning the student from the object of education to the subject of learning;
- **the principle of democratization** requires the organization of educational activities based on a personality-oriented approach;
- **the principle of taking into account the individual features** of children indicates the need to create conditions to realize unique personality features in the process of educating cognitive interest;
- **the principle of pedagogical optimism** alleges that it is pedagogically expedient to always rely on the children’s positive qualities, to let them experience the joy of even small successes;
- **the principle of purposefulness** states that educating cognitive interest is associated with the organization of activities for a specific purpose, on a specially selected content.
- **the principle of unity and integrity of the educational process** which reflects the interactive feature of cognitive interest.
Figure 3. Dialectical connections of cognitive interest (the author’s idea)

Source: Search data.

For ten years the authors have been studying the issue of the influence of interest in knowledge on thinking, attention, memory, speech, and emotions. The results of the study allow us to conclude that the implementation in the educational school process of the concept of the development of cognitive interests, developed on the basis of the proposed model, contributes to revealing the child’s intellectual capabilities. Dialectical connections between the most important components of a person’s individuality are shown in Figure 3.

As Figure 3 demonstrates, cognitive interest is in a dialectical relationship with attention, memory, thinking, speech, and emotions. Different types of attention characterize certain stages in the development of epistemological interest. Analysis of this dialectical connection allows adjusting the process of educating cognitive interest. In turn, the latter requires individual’s focus of attention on the object or activity of interest to achieve the set goal. Research shows that a person remembers better what is interesting to him. The opposite is also revealed: the stronger the individual is in comprehending some fact, phenomenon, or research subject, the more actively various types of memory are included, which results in long-term memory. Interest in knowledge activates thought processes. As a result, the ability to analyze, systematize, and clarify cause-and-effect and logical connections between the objects of study develops. On the other hand, the conclusions obtained contribute to immersion in interest. The interest that has gripped a person requires a release. A person tries to convey to others everything that worries him. At the same time, correctly constructed, reasoned speech contributes to the emergence and further development of cognitive interest. The scientific potential accumulated in the field of dialectics testifies that there is a one-to-one correspondence between epistemological interest and the emotional sphere. Thus, cognitive interest contributes to the development of a person’s intelligence.

Educating cognitive interest as a controlled process is carried out on the basis of the concept developed by the authors, the applied aspect of which is reflected in the program including six modules.

I. The first module functions as input diagnostics. The task is to find out the level of cognitive interest in each student in a specific scientific field, for example, mathematics. To do this, you can use the criteria proposed in the table. Further, it becomes possible to assess the epistemological interest of a particular grade team as a whole.
Table 1. Characteristic features of levels of cognitive interest (the authors’ study aid)

| Levels of epistemological interest | Criteria |
|------------------------------------|----------|
|                                    | Aptitudes | Activity | Intensity | Attitude towards difficulties | Display of interest |
| High                               | A constantly arising desire to deal with issues of interest, even in free time | Very high cognitive activity and, as a result, high productivity and efficiency | Increased enthusiasm, satisfaction with the activity | Self-confidence and commitment to overcoming emerging problems | in-depth interest in understanding the problem |
| Average                            | Awareness of the need to complete the task under the influence of external factors | Emerging cognitive activity requiring constant motivation from adults | Task self-fulfillment depends on external motivation stimuli | Overcoming difficulties with a tutor supervision | Interest arises under the influence of external factors |
| Low                                | Lack of inclination towards proposed activities | Cognitive inertia | Self-sufficiency is low (at the level of cheating) | Reluctance to overcome difficulties | Lack of interest |

Source: Search data.

II. The second module is motivational and value-based and is designed to strengthen motivation in the epistemological aspect. The emphasis is on strengthening the role of cognitive motives in the motivational sphere. As a result, educational and cognitive motives, broad cognitive motives and motives of self-education develop. In this case, the motive is seen as a stimulus to action. Note that interest in knowledge develops only in activity.

III. The third module is epistemological. The teacher is offered a wide range of methods and teaching aids focused on the dialectic of interest in the knowledge of a particular scientific field. The authors’ pedagogical and professional experience allows stating that the greatest effect in the education of the schoolchildren’s cognitive interest is resulted through such methodological techniques as:

- the content component relevance and novelty;
- updating of previously studied information;
- use of historical information;
- showing the practical value of the studied material and the need for knowledge;
- an entertaining aspect;
- use of the method of comparison and analogy when learning material;
- development and use of didactic modules;
- setting various cognitive tasks;
- algorithms compilation and use;
- acquaintance with advanced scientific achievements;
- the creation of various problem situations;
- the use of modeling method;
- discussions in training;
- practical, research, and creative work;
- a differentiated and individual approach in training and others.

To design the process of developing interest in knowledge in any scientific area in a particular lesson, the authors conditionally distinguish three phases: the phase of the emergence of interest, the phase of active interest and the phase of consolidation of interest. For each of
them, the teacher selects the appropriate techniques, means and methods, taking into account the characteristics of the given grade team.

IV. When designing the educational process, the dialectic module allows adjusting the mutual influence of cognitive interest and attention, memory, thinking, speech, and emotions. Note that the implementation of the program of dialectic of epistemological interest inevitably entails the development of other intellectual components of the personality.

V. The second diagnostic module is intended for finding out the research outcomes. In this case, not only the level of interest in knowledge is assessed, but also the degree of development, for instance, of attention or memory, depending on the tasks that the teacher set in the fourth module. Thus, this stage of the program characterizes the achievement or non-achievement of the planned results.

VI. The correction module helps build work on correcting possible negative points found out during the subsequent troubleshoot, and make the necessary changes in the epistemological and dialectical modules.

Based on the proposed program, the design of the future educational process is carried out; for convenience, it can be presented in the form of an information technology map (ITM) having the form, presented in Table 2.

Table 2. Information technology map (the authors’ study aid)

| Content of cognitive learning activities | Organization of cognitive learning activities | Methodological tools | Dialectic of interest | Development of the intellectual sphere (for instance, attention) |
|------------------------------------------|-----------------------------------------------|----------------------|----------------------|---------------------------------------------------------------|
| ...                                      | ...                                           | ...                  | ...                  | ...                                                           |

Source: Search data.

It should be noted that when preparing for the lesson, teachers develop an information technology map, relying on their professional experience, taking into account the age and individual features of a certain grade team. For clarity, the trajectory of the cognitive interest “behavior” at a particular lesson, for example, in Mathematics, based on the program and technology developed by the authors, can be presented in the form of a graph, as in Figure 4.

Figure 4. Designing epistemological interest in class (the authors’ idea)

Source: Search data.

This figure shows the future educational process draft. It is evident that at one of the stages of the lesson, there was a decrease in interest. The situation must be corrected. How to do this? The teacher should decide. Obviously, it is possible to activate the content of the educational and cognitive activity of schoolchildren or revise the methodological tools. Note that this approach allows making the process of educating epistemological interest more ...
technological. A similar method can be used to design other development programs, for example, attention. The authors tested the effectiveness of the proposed didactic tools regarding the mutual influence of cognitive interest and attention.

To identify the level of cognitive interest, an independent work on the topic “Linear function” was proposed as part of an algebra course learning, including assignments of reproductive, productive, reflexive, and heuristic types, as well as questions that allow finding out the student’s personal attitude to the studied material in mathematics in general. Evaluation of the effectiveness of work aimed at the dialectic of epistemological interest was carried out as follows:

- 2 points – the task was completed correctly,
- 1 point – there are minor errors, but the line of reasoning is correct;
- 0 points – the task was not completed or the line of reasoning is incorrect.

The calculation of the level of cognitive interest, taking into account the input diagnostics and the final one, was carried out according to the formula developed by the authors:

\[ x = \frac{a_0}{a} \]  

where \( a_0 \) is the number of points scored by each student during independent work, \( a \) is the maximum possible number of points.

The level of interest was determined according to the following scale:

- more than 0.8 means a high level,
- from 0.5 to 0.8 – an average level,
- from 0.3 to 0.5 – a low level,
- less than 0.3 – a critical level.

The calculation of the integral indicator of the level of cognitive interest of the experimental group was carried out according to the formula developed by the authors:

\[ I_i = \sum_{i=0}^{n} \frac{x_i}{100} \]  

where \( n \) is a number of children with an appropriate level of cognitive interest, \( x_i \) is the level of interest of each student in this group.

To find out the level of focus of attention, the authors also developed a technique that modified the existing guidelines [1]. For example, students were asked to complete tasks on the topic “Linear function”: to determine the values of the function for the corresponding values of the argument. Based on the results of the assignment, both the number of mistakes made and the time spent for the task solution were analyzed. A three-level scale for assessing the level of focus of attention was applied:

- A high level corresponds to 10 examples during 2 minutes 5 seconds without errors;
- an average level corresponds to 10 examples for 2 minutes 35 seconds with 2 errors;
- a low level corresponds to 10 examples for 2 minutes 45 seconds with 5 errors;
- a very low level corresponds to 10 examples for 2 minutes 55 seconds with 6 errors.

To determine the integral indicator of focus of attention, a formula similar to formula (2) was used:

\[ B_i = \sum_{i=0}^{n} \frac{y_i}{100} \]  

where \( n \) is the number of children with an appropriate level of attention span, \( y_i \) is the level of focus of attention of each student from this group.

The results of the performed diagnostics are presented in Table 3.
Table 3. Diagnostic results

| Components of the individual’s intellectual sphere | Cognitive component levels |  |
|---------------------------------------------------|-----------------------------|---|
|                                                   | low | average | high |  |
|                                                   | before | after | before | after | before | after |  |
| Epistemological interest                         | 0.873 | 0.672 | 0.562 | 0.691 | 0.373 | 0.490 |  |
| Focus                                             | 0.764 | 0.631 | 0.433 | 0.532 | 0.331 | 0.413 |  |

Source: Search data.

Comparing the results of the carried out work, we can state that the authors’ educational technology has a positive effect. Similarly, one can conduct experiments to clarify the mutual influence of interest and other components of the individual’s intellectual sphere.

DISCUSSION

This research allows us to state the following:

1. World science has accumulated a large theoretical and practice-oriented potential in the study of epistemological interest. However, the changes currently taking place in the educational space demanded certain adjustments to the content of this category. The carried out theoretical study allowed finding out its characteristic features. Based on a synergetic approach, a model of dialectics of epistemological interest is proposed, which helps structure the process of its encouraging.

2. In the framework of the experimental work, the connections of interest in cognition with other processes that characterize the individual’s intellectual development are highlighted. Namely, the dialectical connections of interest with attention, memory, thinking, speech, and emotions have been clarified. Moreover, these relations reveal a one-to-one correspondence.

3. The results of the theoretical research were the conceptual basis of educational technology aimed to design the development of the schoolchildren’s personality during the didactic process. The methodological tools are based on the authors’ program. Technological procedures for designing—in the latter are carried out through the construction of an information technology map, which makes the epistemological interest development a dialectically controlled process.

4. The results of diagnostics allow us to speak about the effectiveness of the developed technology. In the process of educating epistemological interest, other cognitive components of the intellectual sphere of the individual develop, in particular, attention. The teacher’s activity moves to a qualitatively new innovative level (RYMANOVA, 2015, 2016).

CONCLUSION

Based on technological and synergistic approaches, the authors clarified the content of the category of “cognitive interest”. A conceptual model of the dialectics of interest was built, which formed the basis for its learning; the principles that are the basis of this process were identified. The presented design is theoretically substantiated, which allows its methodical testing. During the study, based on the proposed model of dialectic of epistemological interest, the authors developed a technique for raising interest in the educational process, which is universal, since it can be used in the study of any subject area.

The results of experimental work, as well as empirical methods, allowed finding out the effectiveness of the authors’ approach for solving the studied problem. Observations of fourteen-year-olds showed that by the end of the school year they began to make fewer mistakes due to lack of attention when solving mathematical problems, and such changes amounted to + 15%. Memory improved in 20% of schoolchildren; 23% of students started building their speech more reasonably and emotionally charged. Thus, cognitive interest is a powerful engine for an individual’s development. The theoretical and applied aspects outlined above formed the basis of the methodological concept of educating the cognitive interest in schoolchildren.
In the future, further improvement of technological procedures for embedding development programs in the educational process and the development of methodological tools in order to increase the effectiveness of the developed educational technology can take place.

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Cognitive interest as a key indicator of adolescent personality development

Interesse cognitivo como indicador-chave do desenvolvimento da personalidade adolescente

El interés cognitivo como indicador clave del desarrollo de la personalidad adolescente

**Resumo**
O objetivo da pesquisa é mostrarm novas possibilidades de compreensão do interesse cognitivo como um dos indicadores de desenvolvimento da personalidade. A partir de uma análise sistemática, os autores esclareceram o conteúdo da categoria de “interesse cognitivo”. Foi proposto um modelo conceitual da dialética de interesse pelo conhecimento. Foram revelados os princípios que fundamentam o processo de sua aprendizagem. Nesse terreno, foi desenvolvida a tecnologia educacional. Observações de longo prazo dos sujeitos do processo educativo, conduzidas pelos autores, permitiram determinar as conexões dialéticas do interesse cognitivo com o pensamento, a atenção, a memória, a fala e as emoções. O modelo proposto da dialética de interesse pelo conhecimento é conceitual, pois a partir dele, o processo de captação de interesse é construído como um sistema didaticamente pensado para a gestão do desenvolvimento das crianças, contribuindo para o seu crescimento pessoal, um dos componentes do qual é a tecnologia educacional.

**Palavras-chave:** Interesse cognitivo. Dialética de interesse em conhecimento. Memória. Atenção. Tecnologia educacional.

**Abstract**
The research objective is to show new possibilities for understanding cognitive interest as one of the indicators of personality development. Based on a systematic analysis, the authors clarified the content of the category of “cognitive interest”. A conceptual model of the dialectic of interest in knowledge was proposed. The principles that are the foundation of the process of its learning were revealed. On this ground, educational technology was developed. Long-term observations of the subjects of the educational process, conducted by the authors, allowed determining the dialectical connections of cognitive interest with thinking, attention, memory, speech, and emotions. The pro-posed model of the dialectic of interest in knowledge is conceptual, since based on it, the process of raising interest is built as a didactically thought-out system for managing children's development, contributing to their personal growth, one of the components of which is educational technology.

**Keywords:** Cognitive interest. Dialectic of interest in knowledge. Memory. Attention. Educational technology.

**Resumen**
El objetivo de la investigación es mostrar nuevas posibilidades para entender el interés cognitivo como uno de los indicadores del desarrollo de la personalidad. A partir de un análisis sistemático, los autores aclararon el contenido de la categoría de “interés cognitivo”. Se propuso un modelo conceptual de la dialéctica del interés por el conocimiento. Los principios que son la base del proceso de su aprendizaje fueron revelados. Sobre este terreno, se desarrolló la tecnología educativa. Las observaciones a largo plazo de los sujetos del proceso educativo, realizadas por los autores, permitieron determinar las conexiones dialécticas del interés cognitivo con el pensamiento, la atención, la memoria, el habla y las emociones. El modelo propuesto de la dialéctica del interés por el conocimiento es conceptual, ya que a partir de él, el proceso de aumento del interés se construye como un sistema didácticamente pensado para la gestión del desarrollo de los niños, contribuyendo a su crecimiento personal, uno de sus componentes es la tecnología educativa.

**Palabras-clave:** Interés cognitivo. Dialéctica de interés en el conocimiento. Memoria. Atención. Tecnología educativa.