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PSYCHO-PEDAGOGICAL PARTICULARITIES OF DEVELOPING CRITICAL THINKING IN PRIMARY SCHOOL STUDENTS

ABSTRACT
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CONCEPTUAL GUIDELINES OF RESEARCH

Topicality and importance of research

The major premise from which we start is that school must mean more than the transmission and accumulation of knowledge, but the formation of attitudes, values, behaviors and, above all, the formation of a style of thinking based on logic, the ability to use the information accumulated at the right time and in the right way. The training of critical thinking skills should be at the heart of the school, as a basic skill. Outside the school, we are not aware of the things around us as a separate subject, but rather as a complete sensory and cognitive experience that involves aspects of mathematics, language, art, science, practical skills etc. - that are mixed in a intra- and trans - disciplinary manner.

The fundamental question that researchers ask themselves is to what extent they can better prepare students to be able to integrate harmoniously into the conditions of the 21st century. School news shows that the acquisition of knowledge is important, though it is not a defining aspect, but rather it is important to form the ability to learn effectively and to think critically. The new information must be carefully and critically examined with the possibility of independent reflection on it and action in the direction in which this information becomes useful in relation to one's own needs and interests.

The modern approach to education is materializing the progessive adjusting of school objectives to the form of skills. As our society becomes more and more complex, it becomes clear that the students we educate must be able to solve high-difficulty problems, have the ability to critically examine conditions, and analyze alternatives by completing tasks such as making decisions in accordance to the presented reality. The ability of the individual to think critically is imperative to be developed and especially to be encouraged and realized in a learning environment that favors these aspects. The beginning of the child's schooling and the contact he/she has with his/her involvement in school activities create the necessary premises and conditions for the development of the child's thinking, involving him/her in an important process in the perception of the world around him. During the primary and secondary schooling period, the child accumulates a large volume of knowledge and develops, in this context, new ways of understanding and internalizing these aspects.

The reality of today's education shows us that the emphasis is on the formation of skills, on the formation of a critical thinking style, on the formation of communication and analysis skills. At a young age, the child is able to apply the rules of this type of thinking and is able to learn information about specific features, defining the objects he/ she comes in contact with, the phenomena and the people or situations with whom/ which he/ she interacts directly. From this perspective, students are encouraged to play an active role in the lessons, not just simple listening and mechanical assimilation of knowledge.

The researchers have long debated the issue of acquiring information as opposed to practical and conceptual knowledge. Those who argue that information is the most important usually believe that there is a certain set of information that, once properly learned, prepares children to function optimally as participants in

social life. Those who believe that practical experience and concepts are essential suggest that the information itself is not sufficient. It supports the idea that knowledge acquires meaning and value only when it is useful and is considered to be useful only if it is analyzed in conceptual terms and can be applied in a practical, creative but also critical way.

The use of appropriate methods of critical thinking in the educational process in different disciplines but also in extracurricular activities helps students in optimizing the ability to filter the information they receive from the teacher.

Under current conditions, the ability to select information and decide whether or not this information is important for the successful functioning of a constantly changing world is required. Thus, the subject of change will have to change himself by understanding the phenomena related to the reception of different information that relates to each other or can relate. Forming a critical thinking style requires the ability to put new ideas and knowledge into context, discovering the meaning of things you come in contact with for the first time, and the ability to reject information that is considered irrelevant or false. Thus, in the context of the formation of these skills, they will have to assign a meaning, from a critical perspective, through a creative but also productive way, of that information which they come into contact with during their life.

Training young generations to think critically, to be prepared to solve everyday problems, both individually and socially, is a solution in producing reforms and multidimensional adjustments in society.

The development of critical thinking is the highest form of human cognitive activity and progress is not possible without the activities of analysis and reflection. Approaching the formation of a critical, creative thinking style produces changes on a cognitive level by moving from a single perspective to several perspectives, but also on an emotional level, equally, by strengthening the social skills of interaction, of exposing personal idea and also to accept the ideas of the interlocutors.

The education reform involves the gradual replacement of the traditional methods used in the teaching-learning process with new teaching methods, known as critical thinking methods based on the principles of active learning. There is a need for a deeper involvement in stimulating and developing independent thinking skills, reorganizing teaching content by placing critical thinking at the center of the students' interests.

The description of the situation in the field of research and the identification of research problems

The analysis of the educational context demonstrates the overall picture of a “confusing” education system that does not focus on its essential objectives. The lack of guidance derives from several inconsistencies at the curricular level, the lack of training in the field of teachers and the general vision of education being unjustifiably insisting on the informal side to the detriment of the formal one. There is an overemphasis on the transfer of information and no emphasis is placed on character formation and beliefs. The analysis of the current situation shows that, at the moment, we are trapped in an education system that maximizes the importance of memorization, mechanical transfer of information and requires that information be memorized promptly by students to cope with various forms of testing. The

importance of memory is not denied, but memory is a lower cognitive ability compared to other abilities that are clearly superior such as critical thinking, imagination, creativity. There is an overemphasis on a type of school that looks a lot like a command system, an unjustified insistence on that asymmetry between students and teachers, in a relationship in which the teacher is considered a full authority and does not go on that line of partnership between the two factors.

The phenomenon of critical thinking has its origins in the traditions of Western philosophy, and as an academic subject its treatment includes an interval of 20-30 years which is a ”relatively new” approach. Making a foray into the history of critical thinking from its origins to the contemporary context, the theoretical landmarks have been established since antiquity by Socrates, Plato, Aristotle, continued in the Middle Ages by the ”quarrel of universals” – Thomas de Aquino, in the Renaissance by Machiavelli, Campanella and Francis Bacon, in modernity through the works of Descartes, Kant, Hobbes, Spencer, Darwin evolving through the demystification and critique of illusions suggested by Freud, Marx, Wittgenstein and Piaget. The important conceptual contributions on critical thinking have been made by four authors who made a rigorous analysis and studied the specific elements of critical thinking for their inclusion in training programs: Matthew Lipman, Robert Ennis, Richard Paul and Jacques Boisvert.

In *Romania*, researchers show a special interest in studying critical thinking in specialized articles and studies. Mielu Zlate contributed to the understanding of the mechanisms of cognitive processes through an extensive work: ”Psychology of cognitive mechanisms” (1999). Another valuable study appears in 2004 – ”Critical Thinking” through which the author Ioan Scheau made a guide in which he theoretically presented 50 methods classified in alphabetical order but also ways to apply them in practice adapted to the national curriculum. Another relevant study for research was the micromonography conducted by Gheoghe Clitan (2003) – ”Critical Thinking” which highlights two disciplines that are in philosophical debate: critical thinking and informal logic. Among the valuable journalistic publications we will mention the author Dan Pătroc who elaborated in 2016 a paper applied in the field of critical thinking - "Methods and techniques for developing critical thinking for primary and preschool education" making a brief presentation of the current context of the Romanian education.

In the *Republic of Moldova*, the field of critical thinking is a very well represented and intensively researched and studied topic, and the researched techniques and strategies have been integrated in curricular documents, guides and textbooks, organizing introductory courses in this field. There is a frequent organization of training to strengthen the professional skills of teachers in order to ensure a proficient educational process focused on the development of critical thinking and the formation of professional skills of students. A valuable study is ”Introduction to the methodology of developing critical thinking” published in 2003 adapted by the authors Tatiana Cartaleanu, Olga Cosovan, which presents the theoretical framework of critical thinking and strategies for its development. The same authors showed special attention in the study of critical thinking through the works: ”Training of professional skills through the development of critical thinking” (2017) and the latest publication in the field being ”Project and portfolio in training

critical thinking skills" (2021). Valuable articles were created by the authors Goraș-Postică Viorica and Vladimir Guțu in the pages of the journal of educational theory and practice: "Critical thinking – implications and applications in education and training" (2017).

The changes in education have focused so far on answering the question "how?" and not enough action was taken in the direction of "Why?" Under current conditions, education must be based on an innovative curriculum, adapted to the needs of students and adapted to the social dynamics of the 21st century. Is education relevant in the context of the changes of the 21st century? To what extent do they contribute to their harmonious integration into a world of ongoing challenges?

An important first step is to focus on developing critical thinking in children who do not promise spectacular results in the short term, but not even significant measurable results in the medium term. For the correct handling of information, it is necessary to apply a set of thinking skills that allow sorting the information efficiently and transforming it into meanings that in turn can be modified and quantified into practical behaviors. It is necessary to use extensively the methods of developing critical thinking starting with preschool and school education because at this age the attitude towards school is being formed.

We are witnessing an educational paradigm: there is a situation in which those who participate in critical thinking development programs have poor results in certain tests because they will refuse to reproduce a large amount of information received from teachers. In these conditions, it is necessary to completely rethink the way of assessing the students' progress in relation to their expectations. In the school environment, a first step we need to take into account is to identify students who are prone to critical thinking and to study the desire to follow reason through a systemic approach to problem solving, by showing constructive curiosity and unlimited confidence in reasoning.

Another issue that needs to be explored is the relationship between critical thinking skills and the tendency to think critically, which still has an empirical character. Studying this aspect, it is found in some students both elements in abundance, some possess the skills but do not have the necessary disposition for their application, some have the disposition but do not have strong abilities.

It is increasingly necessary for the teacher to display the behavior of perpetual questioning the students, using statements or knowledge that help them acquire cognitive habits which are vital to critical thinking. Questioning and verifying sources must be a constant way of thinking for both teachers and students. The advantages of promoting this thinking skill are numerous: correcting one's own reasoning errors due to misinformation, resistance to manipulation, discovering errors in case of following a conservative tendency.

Another necessary aspect in solving the difficulty of research is the study of the relationship between rational-emotional education and the formation and development of critical thinking. Thus, the ongoing investigation of the emotions behind the reasoning is of particular importance. In the background of strong emotional states, there is often a misinterpretation of reasoning that must be identified in due time in order to avoid such misjudgments.

The study of human thought is an object of application in the field of philosophy, analyzed as a whole together with the events of everyday life, while the exercise of abilities or skills of an intellectual nature are considered preferred tools of critical thinking.

The benefits of practicing and developing critical thinking skills are many, leading implicitly to cooperation, knowledge and persuasion. Logical skills lead to the extension of knowledge by reasoning in order to transfer their information and integrate it into the previous ones without creating stereotypes of thinking.

The important scientific problem addressed in the research aims to identify and capitalize on the particularities of the formation of critical thinking in primary school students through mechanisms of interconnection of psychological, pedagogical and methodological approaches in the priority context of the problem and the problem-situation.

The object of the research constitutes the process of developing critical thinking in young schoolchildren.

The purpose of the research: it consisted in establishing the conceptual, methodological bases the psycho-pedagogical particularities of developing critical thinking in primary school students.

The objectives of the research:

1. Analysis of theoretical approaches to the development of critical thinking and thinking in primary school students.
2. Establishing the particularities of manifestation and development of critical thinking in primary school students.
3. Substantiation of the conceptual landmarks for the development of critical thinking in primary school students focused on problem-situations.
4. Elaboration of a methodology for developing critical thinking in primary school students.
5. Experimental validation of the methodology for developing critical thinking in primary school students.

The theoretical research and implementation of the psycho-pedagogical experiment aimed to verify the **research hypothesis**: we assume that the development of critical thinking in primary school students will be effective under the conditions of the interconnection of psychological and pedagogical/ methodological approaches through the introduction of problem situations and their exploitation in varied learning contexts at an inter- and transdisciplinary level.

Scientific research methodology

The present research is based on a set of complex methods systematically organized and oriented towards achieving the proposed objectives. In this regard, the methods were classified as follows:

- *Theoretical:* the analysis of specialized literature from a pedagogical, psychological and methodological point of view on the topic of research and its exploitation.
- *Empirical*: the use of empirical data collection methods: organizing the set of cognitive skills by study subjects and including them in observation grids of students' behaviors based on them; the formative experiment focused on the cognitive stimulation and development of critical thinking of students in

primary education.

- *Statistics*: the use of statistical-mathematical methods using diagrams and tables.

The experimental sample for conducting the research was represented by 30 students aged 10-11 years, and the control group of 28 students, both groups belonging to the Petricani Vocational School, Neamț County, Romania.

The scientific novelty and the theoretical significance obtained emerges, first of all, from the description, analysis and demonstration of the specificity of the aspects related to the development of critical thinking in young schoolchildren from the perspective of the appropriate tools used in this regard that significantly contributed to the formulation of conceptual procedures and drawing clear directions of action. The brief presentation of the elements of novelty and originality covers the following aspects:

1. The theoretical substantiation of the approach to achieve the interaction of psychological, pedagogical/ methodological components of the development of critical thinking in young students;
2. The inter- and trans-disciplinary approach approach to issues related to critical thinking in the educational process;
3. Exploring active learning methods and techniques in relation to curricular content and combining them effectively;
4. Substantiation of the methodology for developing critical thinking in young students focused primarily on problems and situations – problem;
5. Elaboration of the taxonomy of the general variable at the inter- and trans-disciplinary level;
6. Deduction of the legitimacy of the formation of critical thinking in students through the interaction of the psychological approach and the pedagogical/ methodological approach, having as a mobile mechanism – the problem situation:
    - The process of training students' critical thinking skills is carried out efficiently under the conditions of the correlation of the psychological dimension and the pedagogical dimension – minimizing the importance of one of them does not produce the expected effects.
    - The intervention of the teaching staff is essential in the process of forming students' critical thinking and is carried out according to the development potential of their thinking.
    - The development of higher mental abilities does not occur naturally, but under the conditions of mediating the student's relationship with the world by guiding him, regulating and perfecting the actions performed.
    - Planning the critical thinking development process is done by estimating the progress of the students in order to ensure activities above the development level regarding their stimulation.

Developing the above mentioned ideas, the observations demonstrate the overwhelming importance of cognitive aspects and the idea that the contemporary school is not yet ready to develop these skills, only tangentially and at the same time teachers are not prepared to reorganize curricular content for the formation of practical intellentual skills.

The originality of the results focused on establishing theoretical landmarks and psycho-pedagogical circumstances for the development of critical thinking at a young age by creating that framework for manipulating the non-specific operation of cognitive abilities that develops on the specific - solving problems by unknown means favors intellectual uncertainty and causes these problematic situations to become a stimulating factor for intellectual development.

The research is all the more valuable as it was conducted at the age when the first independent, conscious thinking skills were formed - most research was carried out at advanced age levels and the results were much more conclusive because we had already worked on an intellectual background. Thus, the specific environment of cognitive dissonance was created, which appears as a non-conformity resulting from the confrontation of different opinions. It has been scientifically proven that through the evolution and development of learning strategies, information is intensely accumulated and the qualities of thinking are stimulated, contributing to significant progress in all levels of cognition.

Research in the field has shown that critical thinking skills cannot develop spontaneously just as a result of the student acquiring a large volume of knowledge. It is necessary the existence of thought learning programs, so that their training is done within the curriculum, by setting distinct objectives.

The scientific problem solved aims to identify and capitalize on the particularities of critical thinking formation in primary school students through mechanisms of interconnection of the psychological, pedagogical and methodological approaches in the significant context of the problem and problem-solving.

The epistemological basis of research was based on a number of theories. For philosophers, critical thinking was associated with logical reasoning and argumentation skills, an aspect that emerges from the identification, selection of arguments, use of argumentation techniques designed to meet the criterion of validity. The research was based on concepts, theories aimed at aspects related to the cognitive development of young children at school age. The theories of Matthew Lipman, Richard Paul, Jaques Boisvert have an important contribution to research.

Based on the theories and concepts described, the process of establishing the theoretical and methodological landmarks of critical thinking, the factors that constitute an impediment in its development and finding concrete solutions with applicability in practice for a training of students in accordance with the requirements of social dynamics.

The practical importance of results is given by the fact that the methodological approach to developing critical thinking can be adapted and applied to any age category, and the research highlighted aspects related to: the identification of intellectual particularities of children at small school age, the level of their manifestation in educational activity, the development and implementation in practice of the methodology to stimulate and develop thinking from a critical perspective. The empirical and experimental results can be considered a model for approaching the psycho-pedagogical particularities of school-age children and provide directions for action regarding the enhancement of cognitive aspects and, at the same time, a support for teachers in the design and management of educational activities.

The theoretical significance of research consisted in:

- redefining critical thinking, which represents an effective learning tool that contributes to the awareness of one's own thinking and involves a sequence of actions at the mental level aimed at evaluating alternatives, followed by the elaboration of reasonings, the formulation of reasoned opinions, ending with action and meta-reflection;
- the theoretical delimitation of the notions related to: thinking and critical thinking, of psycho-pedagogical particularities at early school age, highlighting the importance of problem-situations and their solution and the learning situations in which we apply them;
- identifying strategies for developing critical thinking in primary school students: cognitive, metacognitive, social-affective strategies;
- establishing the reference framework regarding the formation of critical thinking skills as an educational purpose, emphasizing its importance and the practical implications it has, favoring harmonious integration and specific preparation for the requirements of today's society which is in a continuous dynamic;
- conceptualization of the methodology for developing critical thinking at early school age from a psychological and pedagogical/methodological perspective;
- establishing the directions of action in the development of children's cognitive aspects: stimulating children's curiosity, establishing the interdependence between the quality of questions, the quality of thinking and the quality of answers, giving the necessary time to form the ability to think, focusing on issuing and supporting one's own ideas;
- updating the contents of school subjects related to solving situations - problem;
- approach of the formation of critical thinking in students through the interaction of the psychological approach and the pedagogical/ methodological approach having as a mobile mechanism – the problem situation.

The implementation of the research results was achieved at a theoretical level through publication in specialized scientific journals, in collections of conference materials being disseminated within the events organized in the academic environment at the international and national level, and at a practical level within the personal didactic activity in primary education within of the Petricani Vocational School institution in Neamț county – Romania, through the annual methodical activities of teaching staff gathered at the local level. 15 articles were published as sole author and 1 article in co-authorship whose results were approved and validated by publication at national and international scientific events as follows: National scientific conference with international participation ”Integration through research and innovation”, Chisinau, 2019; International Scientific Symposium dedicated to doctoral students, master's students and teaching staff: ”Aspects, orientations and perspectives of educational sciences in contemporary society”, Bacău, 2020; The national scientific conference with international participation ”Integration through research and innovation”, Chisinau, 2020; The international scientific conference ”Perspectives and Problems of Integration in the European Research and Education Area” – organized by the State University of Cahul ”Bogdan Petriceicu-Hașdeu”, Cahul, 2020; The international scientific conference ”Problems of the socio-

humanistic sciences and the modernization of education" – organized by the State Pedagogical University "Ion Creangă", Chisinau, 2020; The national scientific conference of doctoral students dedicated to the 75th anniversary of Moldova State University "Contemporary research and evaluation methodologies", Chisinau, 2021; The national scientific conference with international participation "Integration through research and innovation", Chisinau, 2022.

Publications on the topic: During the research, 15 articles were published as sole author, 1 scientific article with co-author, in specialized journals and journals indexed in the international database.

The volume and structure of the thesis: the thesis comprises 158 basic pages of which containe an introduction, 3 chapters, general conclusions, recommendations, bibliography with 200 cited sources, 6 appendices. The work includes 46 tables, 15 figures.

Keywords: critical thinking, creative thinking, problem, problem-situation, inter- and trans-disciplinary approach, active learning, evocation, meaning making, reflection, extension, school curriculum, curriculum updating, young schoolchildren, cognitive stimulation, cognitive development, cognitive training.

CONTENT OF THE DOCTORAL THESIS

In the **Introduction** were presented the topicality and importance of the studied topic. Also, the purpose and objectives of the research were presented, the originality and scientific validation of the results, the theoretical value and applicability in practice of the research, the public approval of the partial and final results.

In Chapter 1 **"*The analytical framework for the development of critical thinking in primary school students*"** we presented the issue of thinking and critical thinking from a psychological perspective, from a pedagogical perspective and analyzed the particularities of manifestation of critical thinking in early childhood and studying how to develop it. During the chapter, several approaches and theories were analyzed, the starting point or the basic theory being Piaget's. The theoretical approach of intellectual activity was presented in detail from the first concepts offered by the literature to modern concepts and the evolution of elementary psychic processes to complex ones. "Thinking is a psychic process of generalized and mediated reflection of the objective reality, of the essential properties and relations of objects and phenomens" [28].

By thinking, all the essential and essential properties and relationships present in the real world are processed. Beyond the individual, singular aspects of things, thinking processes everything that is common, but also generally reveals the qualities, the typical, constant features, characteristic of a class of phenomena, detaches their essential relations (regardless of the particular, individual way in which it manifests). Piaget focuses on the interaction between the child's native skills, which are generated as a result of his maturation and the interaction of the environment in which he lives. Piaget expresses the idea that the child is an active participant in his own developmental process and should not be considered a passive vessel that records the effects of his biological development and the effects of all

stimuli that come from outside and are imposed on him. Thus, the author sees the child as a curious scientist who conducts experiments of the world to see what happens, the result of these miniature experiments lead the child to develop ”theories” about how the world works, theories that he will name schemes that will be subject to change throughout life [46]

The child, in his evolution, reaches that level which allows him to capture those ”phenomena inaccessible to the senses, his thinking making a decisive turn, rising in the abstract, categorical plane” [42]. The main characteristic of logical thinking is invariance, and its surprise is manifested by the ability to coordinate the operations of thinking and their grouping within coherent systems. Within the mentioned systems, a reversible movement occurs, and the path from one operation to another is performed in the opposite direction, the reversibility being the psychological basis of admitting the invariance. This quality of thinking is one of the main benefits of thinking in the early school stage. Based on the acquisition of this quality, the child will be able to explain, argue but also justify the truth value of his judgments.

Paul Popescu-Neveanu, reactivating the notion of intellect, introduces the thought that he considers as ”a distinctive feature, the most important of the human psyche, defining for man as a subject of logical, rational knowledge” [47]. It produces substantial changes in the information with which it operates.

Definitions of thinking in general and critical thinking in particular have been recorded by various authors who have expressed and argued their views. The theoretical notions regarding the operations of thinking as well as its specificity at the young school age were presented. Also, the psycho-pedagogical peculiarities and the manifestation of critical thinking at the age of early schooling were analyzed and methods for its development were presented with concrete examples.

Formulating a conclusion on the theories and concepts presented, it can be stated that critical thinking is a complex cognitive process, of a higher type that involves specific skills. Cognitive skills are based on the dimensions of thinking that undergo a gradual evolution until they reach the highest form: the critical manifestation.

Analyzing the psycho-pedagogical peculiarities of the students, it can be stated that the young school age registers a progress of thinking which gradually turns into notional thinking. The main characteristic of thinking is given by its concreteness, because the whole mechanism of the thought process is based, however, on logical operations.

The training of schoolchildren from a critical perspective is a task with a high level of difficulty and does not take place at a certain age, in a given interval at a certain time. As Mihaela Voinea stated “in a dynamic and especially democratic society, when everyone has to assert themselves and everyone has their values, we have to overcome the dichotomous thinking right-wrong, true-false, right-wrong and try to think phenomena, people and facts” [58].

The critical thinking is specific to the functioning of a mind that requires a high degree of activism, flexibility and openness to change, innovation. Simultaneously with the development of critical thinking skills, there are important acquisitions in

terms of oral and written ability, but also coherent and convincing ideas in any context, in terms of autonomy in thinking, the habit of formulating or dismantling judgments, and the ability of constructive critical practice. Critical skills do not appear spontaneously, they are learned through practice and awareness of this practice, leading, in the end, to the acquisition of operations and mental procedures for information processing ending in the manifestation of appropriate and effective behaviors.

The conclusions formulated on the basis of the study of the specialized literature of the psychological approaches to the development of thinking through the analysis of the fundamental operations of thinking from a critical perspective, of the pedagogical/methodological approaches of thinking at a young school age, but also of the particularities of manifestation and the ways of development are benchmarks for the conceptualization of the methodology for the development of critical thinking in primary classes developed in the next chapter.

In Chapter 2 **"*Conceptual and methodological framework of the development of critical thinking in primary school students*"** we presented the issue of thinking and critical thinking from a psychological perspective, from a pedagogical/ methodological perspective and analyzed the particularities of the manifestation of critical thinking at a young school age and studying the ways of its development.

The elaboration of the conceptual and methodological framework of the development of critical thinking in primary school students had as a starting point the observance of the psycho-individual particularities of the students and of the ways of its manifestation. Critical thinking has been captured in two dimensions: social - according to which learning and working through cooperation strengthens human and pragmatic solidarity - according to which learning based on critical thinking offers the possibility of active involvement of students in the activity.

The psycho-individual particularities of the students are expressed in the form of a set of abilities as follows: the ability to formulate personal, original ideas; the ability to responsibly debate the ideas and solutions discovered; the ability to rationally select the solutions considered optimal and most possible solutions; the ability to solve problems efficiently in an optimal time.

The analysis of specialized studies in the field of critical thinking, the correlation of information and the understanding of the mechanisms of functioning at the cognitive level favored the elaboration of a brief definition according to which critical thinking is an effective learning tool that contributes to self-awareness. aiming at the evaluation of the alternatives, followed by the elaboration of the reasoning, the formulation of the reasoned opinions finalizing with the action and the meta-reflection.

The establishment of theoretical and operational benchmarks in order to develop the critical thinking of primary school students can be achieved by studying the psychological and pedagogical/ methodological dimensions based on the principles promoted and the values transmitted, based on the analysis and expansion of the school curriculum, the establishment of specific tools to achieve the

educational goals development of critical thinking. The interaction mechanisms of the two dimensions and the educational effects are presented in Figure 2.1.

The conceptualization of the development of critical thinking in primary school students is based on psychological and pedagogical/ methodological dimensions, didactic principles and educational values. There is an interdependence between the psychological and pedagogical/ methodological dimensions within the school curriculum by expanding the contents with an emphasis on stimulating operationalized critical thinking through effective tools and techniques. The interaction of these dimensions lead us to achieve the objectives imposed by the development of critical thinking in primary school students and help us to make it more efficient.

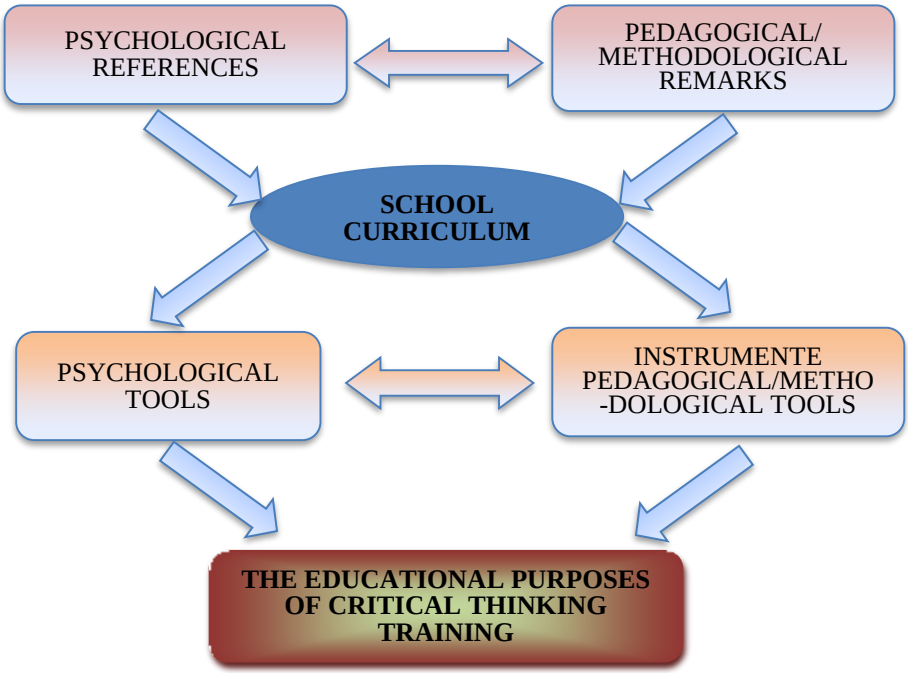


Fig.2.1. The concept of development of critical thinking in primary school students

Psychological landmarks are objectified by a series of operating principles that aim at the cognitive dimension by stimulating and developing it with an emphasis on the critical component.

The basic principles of developing critical thinking are:

- The principle of conscious application of cognitive processes;
- The principle of making sound cognitive judgments;
- The principle of conscious development of critical thinking (*see* Chapter 1).

Analysis of the psychological dimension leads us to conclude that the process of developing critical thinking is complex, very well coordinated and regulated by specific principles that begin with the active acquisition of information and end with the adoption of well-argued decisions. Critical thinking is also a product, that is, a point at which thinking reaches a natural way of interacting with ideas and information.

The pedagogical/methodological milestones refer to the efficient organization and coordination of the educational process through the prism of the main objective: the formation and development of critical thinking in primary school students. The responsibility for effective implementation rests with the teaching staff who design an educational approach based on the principles of training schoolchildren in the conditions of social dynamics in order to harmonious integration.

The psychological and pedagogical/ methodological dimensions are in a causal relationship with the school curriculum, submitting to it and influencing it at the same time. In the field of critical thinking, the current curriculum develops tangentially critical thinking skills in students, and schools need to integrate this major goal to a greater extent through changes in the curriculum. The development of critical thinking should be a primary goal in primary education. Under the current conditions, students are not sufficiently guided in the evaluation, processing and critical reflection of information.

The use of problematization has an impact on children's development, contributing significantly to the active training of the student in the subject of education, turning him into an active participant in acquiring new knowledge, stimulating all personality resources and mobilizing for satisfaction: cognitive, affective, aesthetic and action.

Authentic problem-based learning can be achieved using the following types of problem-solving: questions-problems, problems, and problem-situations.

The elaboration of the methodology for the development of critical thinking in primary school students focused on two main directions of action:

1. *Psychological approach* - capitalizing on the psychological mechanisms for developing critical thinking in primary school students: motivation, interest, attitudes.
2. *Pedagogical/ methodological approach* – capitalizing on the pedagogical/ methodological mechanisms of the development of critical thinking: updated curriculum, strategies, teaching methods.

The main objective of the research approach was to ensure the psychological impact on students of small school age by actively participating in an organized program for the development of critical thinking and measuring the results obtained based on behavioral, cognitive and attitudinal indicators.

Regarding the pedagogical/ methodological dimension of the ascertaining experiment, it has as its starting point the determining factors for promoting critical thinking in the educational process and finding solutions at the micro level of the school environment.

The pedagogical/ methodological approach from the perspective of the formation of critical thinking in students implies a general reorientation of the educational paradigm, but also of the curricular policies (Figure 2.2.).

This methodology is structured on two significant dimensions: the psychological dimension and the pedagogical/ methodological dimension. The two-dimensional approach allows us a complex vision on the development of critical thinking, the two aspects being interdependent: the efficient planning of the educational activity is done only in the conditions of knowing the individual and age particularities of the students, and the investigation of critical manifestations is done through a didactic strategy, well structured and determined by objectives set in accordance with the school curriculum.

Establishing the conceptual and methodological framework for the development of critical thinking in young schoolchildren was the scientific basis that allows us to experimentally validate the methodology for its development in primary school detailed in Chapter 3.

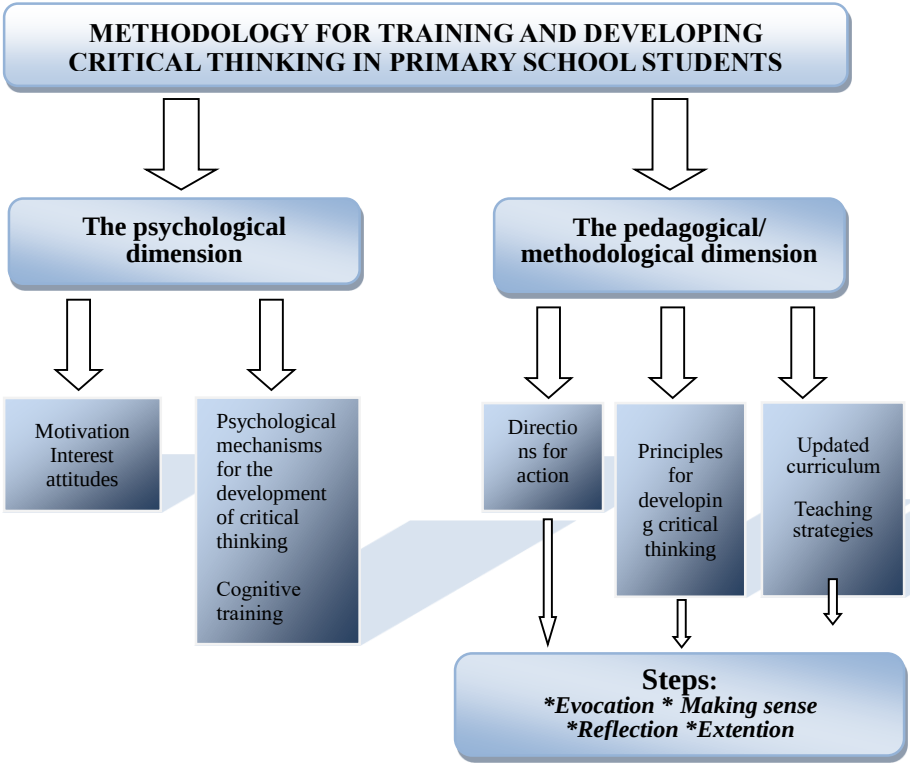


Fig.2.2. Methodology for training and developing critical thinking in primary school students

In Chapter 3 **"*Experimental validation of the methodology for developing critical thinking in primary school students*"** we presented the design of the psycho-pedagogical experiment and details the purpose of the experiment, the objectives of the investigation, the hypothesis on which the research is based, structuring the experiment in stages.

The theoretical approach and the implementation of the psycho-pedagogical experiment were aimed at verifying **the research hypothesis**: we assume that the development of critical thinking in primary school students will be effective under the conditions of the interconnection of psychological and pedagogical/ methodological approaches through the introduction of problem-situations and their exploitation in various learning contexts at inter- and trans-disciplinary level.

The aim of the experiment was to develop the critical thinking of young schoolchildren based on a scientifically developed and scientifically based development methodology.

The objectives of the experimental investigation were as follows:

- diagnosing the level of manifestation of critical thinking of primary school students;
- measuring the initial scores of aspects related to the fluidity, originality and flexibility of thinking (psychological plan);
- introduction of tasks specific to the development of critical thinking;
- creating educational situations that favor the spontaneous issuance of original individual judgments;
- adapting the scientific contents specific to the school curriculum from the perspective of developing critical thinking in students;
- involving the experimental sample in the process of developing critical thinking;
- capitalizing on critical manifestations through active involvement in solving problem situations;
- final analysis of the impact of the experimental methodology of the development of critical thinking in students (pedagogical/methodological plan).

The experimental sample involved: *experimental group* - 30 4th grade A students aged 10-11 from Petricani Vocational School - Neamț County, Romania; *control group* - 28 4th grade B students aged 10-11 from Petricani Vocational School - Neamț County, Romania.

The psycho-pedagogical experiment involved actions to create the necessary conditions and provide opportunities for the development of critical thinking development of young schoolchildren and was carried out in several stages as follows:

Stage I preexperimental (ascertaining) involves the initial assessment of the level of manifestation of critical thinking in primary school students. The counting of the level at which critical thinking is manifested was done with the help of the observation grids organized for all the study disciplines of the 4th grade and the data were recorded in the individual files to follow their evolution during the experiment. The level of the dimensions of thinking was also measured: flexibility, originality,

fluidity. The statistical analysis of the obtained data delimited the initial level of the research or the "starting point" existing in the pretest stage. The related actions took place over a period of 4 weeks - the initial stage experienced a slow evolution, without pressure on the subjects, of accommodation and harmonious integration to the requirements of the experiment and for a favorable mental preparation for obtaining significant results.

The second experimental stage aimed at applying in practice the methodology for developing critical thinking in the subjects in the experimental group. The development of this stage took place during the school year 2020-2021 within the teaching of school subjects and during 6 weeks within the special psychological training focused on the development of critical thinking. In planning the activities, the age peculiarities of the children were taken into account by avoiding their mental overload. This stage was considered the most extensive compared to the others. At the end of each activity, the observations regarding the participation of the subjects and the increase of the degree of efficiency of the process by eliminating the disturbing factors were recorded.

The third post-experimental stage consisted of repeating the application of the instruments from the initial stage and measuring the final results and recording the progress made.

The research tools were:

1. Observation grids designed on study disciplines.
2. "Cognitive training program for students in the experimental group" - the structure of sessions of the program is presented in Annex 3.
3. Another tool used was the "Imagination and Creativity Test" taken from the work "Creativity and Emotional Intelligence" - work developed by Mihaela Roco (Annex 6) which aims to measure thinking qualities and diagnose thinking qualities under the 3 defining aspects: flexibility, originality, fluidity.

Diagnosing the initial level of students' critical manifestations starts from the idea that the formation of the ability to think critically is not an accumulation of knowledge, notions that once learned can be used permanently in the same form, but a way of thinking about a certain thing at some point. Critical thinking is a mental process by which information is analyzed and evaluated and rigorously reflected on it, examining the evidence leading ultimately to one's own reasoning by judging the facts. The onset of complex cognitive processes has a well-established path: they begin with the accumulation of information and end with a decision.

The initial analysis of the level of manifestation of critical thinking of students takes into account several important aspects:

- ✓ aspects related to student's activity measured in behavioral indicators: expressing their own points of view, exchanging ideas with others, arguing their own ideas, asking questions to understand things, cooperating to accomplish tasks;
- ✓ aspects aimed at organizing and directing learning, facilitating and moderating the activity, offering help to students in understanding all aspects, accepting different points of view, expressing the role of learning partner;

- ✓ aspects aimed at how to achieve learning by capitalizing on one's own, heuristic experience, promoting collaborative learning, emphasizing the development of thinking by confronting others;
- ✓ aspects related to the evaluation method by measuring and assessing the capacities and emphasizing the qualitative elements.

At the level of educational practice, the diagnosis of the critical manifestation of students' thinking is based on the analysis of the cognitive abilities necessary in solving problem-situations: the ability to analyze problem situations; the ability to formulate personal, original ideas; the ability to responsibly debate the ideas and solutions discovered; the ability to rationally select the solutions considered optimal and the majority of possible solutions; the ability to solve problems efficiently in an optimal time.

These abilities represent sources for establishing specific indicators for detecting the level of manifestation of critical thinking in young school-age students: I1 – *identifying the problem;* I2 – *organization of information*; I3 – *generating solutions*; I4 – *decision on the solution*; I5 – *evaluation of the solution*.

The analysis of the presented capacities can be done only by creating educational situations that are based on solving problem situations at a inter/ intradisciplinary level depending on their specificity and approach.

The presentation of the initial level of cognitive abilities was outlined by an analysis by educational disciplines using different ways of solving situations - the problem depending on their type and the characteristics of the subject to be studied. The indicators presented were adapted to the study disciplines and contexts specific to the curricular contents and learning situations. For each subject, a set of cognitive skills has been established that must be formed during the educational activities and that guide the teacher's activity and orient it towards a main objective: the formation and development of critical thinking in students.

The summary of the initial results in the two experimental samples is made in the table below by study disciplines (Table 3.1.).

Table 3.1. Initial results regarding the manifestation of critical thinking in students by subject of study

School disciplines	Experimental group			Control group		
	Yes	***Partly***	***No***	***Yes***	***Partly***	***No***
Romanian Language and Literature	25,24%	44,76%	30%	29,08%	38,27%	32,65%
Mathematics	22,86%	32,38%	44,76%	26,02%	32,65%	41,33%
Natural Sciences	29,05%	36,19%	34,76%	31,63%	37,76%	30,61%
Civic Education	30,95%	33,81%	35,24%	32,65%	40,31%	27,04%
Geography	27,63%	36,67%	35,71%	32,14%	38,27%	29,59%
History	31,43%	36,67%	31,90%	31,12%	41,33%	27,55%

The initial analysis of the results by study disciplines showed that there are no significant differences between the two experimental groups, which indicates that there is a homogeneity of groups and this aspect is an advantage for the research undertaken. Educational situations based on problem solving are one of the ways to assess the level of manifestation of critical thinking in students because it has formative values that influence the development of students' personality by: easily capturing attention, triggering cognitive interest, mobilizing effort to solve it, strengthening students' cognitive structures, training creative skills.

The analysis of the dimensions of thinking was performed by recording the results transformed into scores - measurable and comparable results during the experiment: fluency of thinking, originality of thinking and flexibility of thinking, as well as specific skills of critical thinking.

The results recorded in the initial stage by the experimental group are statistically analyzed in Table 3.2.

Table 3.2. Initial scores of the dimensions of thinking in the experimental group

Descriptives	Fluidity pretest (EG)	Flexibility pretest (EG)	Originality pretest (EG)
N	30	30	30
Missing	30	30	30
Mean	33.1	32.8	15.1
Median	37.0	33.0	15.0
Standard deviation	9.95	9.07	5.16
Minimum	15.0	11.0	4.00
Maximum	47.0	49.0	22.0

There is an average of 33.1 in the size of the fluency of thinking, 32.8 in the flexibility of thinking and 15.1 in the originality of thinking. The standard deviation (SD) is 9.95, 9.07 and 5.16, respectively.

In the case of the control group, the results recorded are similar to those of the control group. Thus, the fluidity of thinking obtained minimum values of 15 up to maximum values of 47, the flexibility having minimum values of 11 oscillating up to the maximum value of 45, and the originality of thinking registering values between 4 and 21.

The scores obtained by the control group are summarized in Table 3.3. In the case of size, the fluidity of thinking was recorded an average of 32.1, the flexibility of thinking 32.0 and 14.4 in the case of originality of thinking.

Table 3.3. Baseline scores of the dimensions of thinking in the control group

Descriptives	Fluidity pretest (CG)	Flexibility pretest (CG)	Originality pretest (CG)
N	28	28	28
Missing	32	32	32
Mean	32.1	32.0	14.4

Median	35.5	32.5	14.0
Standard deviation	10.2	8.87	4.87
Minimum	15.0	11.0	4.00
Maximum	47.0	45.0	21.0

The training experiment was organized on the initial diagnosis obtained. The formative experiment we propose has as main objective the formation of critical thinking at the age at which the first manifestations of conscious cognitive activity appear, the first reasonings that have a major role in its harmonious intellectual formation.

The organization and implementation of the methodology for developing critical thinking in primary school students took into account the curricular, didactic component and the impact of the educational factors involved: social, pedagogical, psychological/ methodological. The formative experiment aims at the intellectual needs of young school children, the need to assert themselves, to think independently, to make their own value judgments, to have the satisfaction of valuing one's own person.

The selection of subjects was made according to the criteria of age and individual characteristics of students. The investigative approach was carried out on an experimental group consisting of 30 students belonging to the 4th grade A and a control group consisting of 28 students of the 4th grade B. Both research groups belong to the Petricani Vocational School - Neamț County, Romania. The subjects come from rural areas and are normally physically and mentally developed in age-specific parameters.

The results provided by the initial diagnosis of the level of manifestation of critical thinking in primary school students were the starting point in the methodological organization of the activity of stimulation and development of these aspects in the experimental samples. The general planning framework and the development of the research activities focused on the concept of situation-problem with applicability in practice at the level of school subjects, at the level of curricular contents, at the level of didactic and sequential design. The application of the research methodology through the related activities was done on the experimental group and the degree of activation of the students and its maintenance at a high level was followed. The investigative approach has undergone changes depending on the response actions of the subjects, aiming to capitalize on their maximum potential.

The disciplines involved in the development of the cognitive training program were: language and communication, mathematics, natural sciences, civic education, visual arts and practical skills. The sessions aim at involving students in the analysis of the given problem situations, emphasizing the stimulation and motivation in finding the most varied solutions and identifying the consequences arising from their adoption.

Throughout the cognitive training sessions, the behavior of the subjects and the degree of involvement were followed by stimulating and maintaining interest. Thus, some activities were dynamically reorganized according to the stated aspects in order to prevent the lack of involvement of students in the experiment. If it is found that

the proposed activity is of low interest, it has been replaced or improved.

Simultaneously with the sessions, the students were involved in solving some worksheets that are designed in such a way as to stimulate cognitive activity, to involve the child in this extensive process of mental evolution. Annex 4 presents examples of activities that have made a significant contribution to their intellectual development and to stimulating interest in problem solving.

The organization of the psycho-pedagogical experiment favored the accumulation of statistical data from the initial and final stage. The scores obtained were stored in a database and then interpreted using graphs and tables.

Descriptively analyzing the scores of the variables proposed for the study, important data were obtained regarding the targeted indicators. The general trend of the formulated variables was studied, and the statistical interpretation was performed using the Jamovi program.

The summary of the final results of the two experimental samples throughout the research process is made in the table below by study disciplines of study. There is a significant progressive evolution of the experimental group by comparing the initial results with the final ones and the results obtained by the two experimental samples.

Table 3.4. Final results regarding the manifestation of critical thinking in students on study subjects

School disciplines		Experimental group			Control group		
		Yes	***Partly***	***No***	***Yes***	***Partly***	***No***
Romanian Language and Literature	pretest	25,24%	44,76%	30%	29,08%	38,27%	32,65%
	posttest	61,74%	20,91%	17,35%	34,65%	36,10%	29,25%
Mathematics	pretest	22,86%	32,38%	44,76%	26,02%	32,65%	41,33%
	posttest	47,56%	34,01%	18,43%	29,67%	35,09%	35,24%
Natural Sciences	pretest	29,05%	36,19%	34,76%	31,63%	37,76%	30,61%
	posttest	57,22%	26,53%	16,25%	33,41%	39,27%	27,32%
Civic Education	pretest	30,95%	33,81%	35,24%	32,65%	40,31%	27,04%
	posttest	56,73%	28,07%	15,20%	36,28%	45,29%	18,43%
Geography	pretest	27,63%	36,67%	35,71%	32,14%	38,27%	29,59%
	posttest	54,53%	33,13%	12,34%	35,62%	37,78%	26,60%
History	pretest	31,43%	36,67%	31,90%	31,12%	41,33%	27,55%
	posttest	62,03%	24,77%	13,20%	35,71%	39,78%	24,15%

There are significant differences between the two stages of testing in the experimental group - results obtained in the initial stage are visibly improved in the final stage. In the case of the control group, the values do not undergo significant changes, which indicates that there is no progress in the level of cognitive skills by study disciplines.

Analysis of differences by study disciplines of the results obtained by the experimental group is presented in Table 3.5. and was performed statistically using the t test for paired samples in the two stages of the research. The value of the significance threshold for all disciplines has values <0.05 which indicates a statistically significant link.

Table 3.5. Comparative results of the manifestation of critical thinking in students by subject in the experimental group

Paired Samples T-Test					
			statistic	**df**	**p**
***Romanian Language* pretest**	***Romanian Language* posttest**	Student's t	-9.22	2.00	0.012
***Mathematics* pretest**	***Mathematics* posttest**	Student's t	-8.03	2.00	0.015
***Natural Sciences* pretest**	***Natural Sciences* posttest**	Student's t	-13.41	2.00	0.006
***Civic Education* pretest**	***Civic Education* posttest**	Student's t	-11.55	2.00	0.007
***Geography* pretest**	***Geography* posttest**	Student's t	-6.25	2.00	0.025
***History* pretest**	***History* posttest**	Student's t	-7.99	2.00	0.015

The analysis of the differences in the case of the control group is performed in Table 3.6. It is found that the value of the significance threshold has values p> 0.05 which denotes a statistically insignificant link.

Table 3.6. Comparative results of the manifestation of critical thinking in students by subject to the control group

Paired Samples T-Test					
			statistic	**df**	**p**
***Romanian Language* pretest**	***Romanian Language* posttest**	Student's t	-1.71	2.00	0.230
***Mathematics* pretest**	***Mathematics* posttest**	Student's t	-1.87	2.00	0.203
***Natural Sciences* pretest**	***Natural Sciences* posttest**	Student's t	-2.28	2.00	0.150
***Civic Education* pretest**	***Civic Education* posttest**	Student's t	-2.08	2.00	0.173
***Geography* pretest**	***Geography* posttest**	Student's t	-2.10	2.00	0.170
***History* pretest**	***History* posttest**	Student's t	-1.64	2.00	0.242

The measurement of the results obtained in the case of the psychological dimension: flexibility of thinking, fluency of thinking, originality of thinking, training program was followed to the extent that they were associated in terms of intensity, in terms of direction and significance.

The summary of the results obtained at the dimensions of thinking is represented in Table 3.7. Analyzing the results at the experimental group it is observed that in the initial stage the lowest value of the average was in the case of the originality dimension Mean = 15. 1, and the highest in size scores fluency of thought Mean = 33.1. In the final stage, the same dimensions are maintained but with higher scores: Mean = 20.6 in the case of originality and Mean = 43.9 in the case of fluidity.

Table 3.7. Dimensions of pretest and posttest thinking in the experimental group

Descriptives						
	Fluidity **pretest (EG)**	***Flexibility*** **pretest (EG)**	***Originality*** **pretest (EG)**	***Fluidity*** **posttest (EG)**	***Flexibility*** **posttest (EG)**	***Originality*** **posttest (EG)**
N	30	30	30	30	30	30
Missing	30	30	30	30	30	30
Mean	33.1	32.8	15.1	43.9	41.1	20.6
Median	37.0	33.0	15.0	46.0	43.0	20.5
Minimum	15.0	11.0	4.00	23.0	15.0	9.00
Maximum	47.0	49.0	22.0	62.0	56.0	29.0

The summary of the results recorded by the control group is presented in table 3.8. It is found that in the initial stage the lowest value is obtained by the originality of Mean thinking = 14.4, and the highest value is the fluidity of Mean thinking = 32.1. In the final stage, the lowest value is recorded by the same variables: Mean = 14.8, respectively Mean = 32.4.

Table 3.8. Dimensions of pretest and posttest thinking in the control group

Descriptives						
	Fluidity **pretest (CG)**	***Flexibility*** **pretest (CG)**	***Originality*** **pretest (CG)**	***Fluidity*** **posttest (CG)**	***Flexibility*** **posttest (CG)**	***Originality*** **posttest (CG)**
N	28	28	28	28	28	28
Missing	32	32	32	32	32	32
Mean	32.1	32.0	14.4	32.4	32.2	14.8
Median	35.5	32.5	14.0	35.5	33.0	14.0
Minimum	15.0	11.0	4.00	15.0	11.0	4.00
Maximum	47.0	45.0	21.0	47.0	45.0	23.0

In the analysis of the differences aiming at the level of thinking dimensions in the two stages of the experiment at the two experimental samples, the statistical method t test for paired samples presented in table 3.9. was used and the degree to which active involvement in the cognitive development program influences research variables was studied. Thus, the scores obtained in the pretest stage and the posttest stage were analyzed and it was found that the value of the significance threshold $p < 0.001$ which indicates that there is a strong statistical link, and the experimental approach had a positive impact with major changes. at the cognitive level.

Table 3.9. T test for paired samples for pretest and posttest thinking size level

Paired Samples T-Test					
			statistic	**df**	**p**
Fluidity **posttest (EG)**	***Fluidity*** **posttest (CG)**	Student's t	13.0	27.0	< .001

***Originality* posttest (EG)**	***Originality* posttest (CG)**	Student's t	18.4	27.0	< .001
***Flexibility* posttest (EG)**	***Flexibility* posttest (CG)**	Student's t	12.1	27.0	< .001

The results obtained in the case of developing ***the flexibility of thinking*** determined important changes in the participating students of the experimental group on the three levels: intellectual, behavioral and attitudinal. The developed aspects observed during the instructive-educational activity in the period after the experiment are the following:

- the number of students' questions increased;
- increased the speed of finding solutions to any problem presented;
- developed the ability to admit that they made a mistake in solving a problem and to find another suitable solution;
- easily approaches new strategies in dealing with any dilemma;
- giving up inefficient strategies and finding ways to solve them in another way that will give the desired results;
- shows interest in any proposed challenge;
- perceive the changes around them simply and easily;
- quickly find alternatives for intellectual development;
- increased the ability to adapt and find the right solutions.

The development of ***the originality of thinking*** dimension results in a series of major changes in the behavior of the subjects participating in the experimental group. In the period following the experiment it was observed that:

- the pleasure of thinking of new ways with a degree of originality has intensified;
- dissatisfaction of the subjects in terms of solving problems in a conventional way and finding better ways;
- creating the new as a product of inventiveness with personal moral value;
- highlighting one's own person by exposing various original solutions as a result of one's own thinking;
- change of attitude towards processes;
- increasing the degree of nonconformism in thinking;
- openness to new experiences with cognitive originality.

From the aspect of the dimension, ***the fluidity of thinking*** in the period subsequent to the development of the experiment were observed in the educational activity progresses at behavioral level, progresses expressed as follows:

- finding a large number of ideas in a relatively short time;
- increasing the ability to associate images, words;
- improving vocabulary by constructing meaningful verbal constructions;
- increasing the capacity to issue a large number of hypotheses to a given problem;
- frequent manifestations of initiative to change and restructure the real.

Correlating the results obtained on the two psychological and pedagogical/ methodological dimensions, it was found that there is a causal link, interdependence, mutual influence: the introduction of teaching tasks to stimulate and develop critical thinking in school subjects has increased the level of manifestation of thought dimensions (flexibility, originality, fluidity), on the one hand, and raising the level of thinking dimensions brought important changes in the critical approach to problem-solving, on the other hand.

The success of the educational act is achieved only in the conditions of the two-dimensional treatment of the activity of stimulation/ cognitive development and the formation of a critical thinking style. Focusing the educational approach on one of the dimensions will minimize the effects of intellectual change. Research has shown that a bilateral approach is beneficial to capitalize on the maximum potential of students in the process of developing critical thinking related to the psycho-pedagogical peculiarities of students.

The analysis on ***the psychological and pedagogical/ methodological dimension*** of the ascertaining experiment provided us with important information related to the efficiency of the methodology for stimulating/ developing critical thinking in primary school students. Experimental results have shown us that a scientifically grounded and rigorously organized strategic planning according to the psycho-individual and age peculiarities of the learners favors important acquisitions cognitively and in the sphere of developing the process of developing critical thinking. The psyho-pedagogical experiment highlighted the complexity of this topic and the efficiency of the methodology developed and applied with observable and measurable results that indicate progress at the intellectual level. This methodology can be a point of reference in the psychological and pedagogical treatment of the activity of stimulation and development of critical thinking with long-term effects throughout the schooling period but also in the subsequent period.

Based on the scores recorded by the experimental samples, the level of manifestation of critical thinking was analyzed by correlating the results from the pretest and posttest stage. The statistical processing of the data with the help of the t-test for paired samples revealed, in the case of the experimental group, a threshold of significance with values of $p<0.05$ in the case of all disciplines, an aspect that demonstrates a significant positive relationship. The control group registered values of $p>0.05$ which denotes a statistically insignificant relationship for the research. The experimental analysis of the values of the dimensions of thinking (flexibility, fluidity, originality) was carried out using the same statistical method by correlating the scores of the samples from the research stages of It was found that the experimental group registered a significance threshold <0.001 which leads us to conclude that there is a connection strongly significant statistic. Consequently, the experimental approach produced positive effects and significant progress in the formation and development of higher intellectual skills and demonstrated that the student capable of critical thinking will face the cognitive challenges required by the tumult of information and the increased rate of its use characteristic of the contemporary era.

In the **"General conclusions and recommendations"** the final conclusions on the conceptual and experimental approach carried out were presented, the main scientific results of the research being synthesized, which were analyzed from the perspective of the intended purpose and objectives.

1. The present research contributes to the development of the educational theory and practice of the cognitive field with all its aspects and implications, and through the theoretical-methodological-experimental substantiation, the importance of the development of critical thinking at the age when the first logical operations of thinking are formed has been highlighted. The paper presents a new approach, a new direction of current education emphasizing the importance and proper place of critical thinking in the broad process of cognitive development.
2. The research activity of the theme was solved with the identification of the psycho-pedagogical peculiarities of the development of critical thinking of students of small school age:
   - active involvement of students in their own training process;
   - frequent manifestations of critical thinking and a developed spirit of observation;
   - continuous exploration of the environment and discovery of own solutions to various problems;
   - detachment from what he already knows and adopting personal opinions and arguments;
   - the use of problematization and the exercise of free will;
   - disposability towards an intrinsic motivation by giving confidence in personal potential, in one's own value;
   - taking risks and expressing a strong tolerance in the face of frustration;
   - contribution through own forces to the achievement of educational objectives;
   - elaboration of personal meanings, intellectual products, original, unique materials.
3. Relating the experimental results to ***the purpose*** *and* ***objectives of the research***, the following aspects were found:
   1) The research approach was based on the study of specialized literature with a view to a thorough theoretical approach to the development of thinking and critical thinking – the selection of relevant information for our topic constituted the functional mechanism in establishing the psychopedagogical peculiarities and the directions of manifestation of critical thinking in young schoolchildren.
   2) The theoretical research framework directed the establishment of conceptual benchmarks in a complex approach that targeted the two dimensions: psychological and pedagogical/ methodological and cognitive mechanisms correlated with didactic principles and educational values highlighting the relationship of interconnection and causality.
   3) The elaboration and substantiation of the critical thinking development methodology was carried out on the basis of educational factors and the curricular component in the context of the application of the problem and problem-situations.

4. The results of the psychopedagogical experiment highlight the functionality of the psychological and pedagogical/ methodological mechanisms that complement each other and are interrelated, leading to the confirmation of the hypothesis and demonstrating the solution of the scientific problem. The increase in the level of cognitive acquisitions and the intensification of specific manifestations of critical thinking were the indicators that determine the effectiveness of the development methodology and validate it. The correlation of psycho-pedagogical dimensions constituted a complete and complex approach and was realized through the application in the educational process of an effective strategy to stimulate and develop critical thinking focused on the problem and problem-situations.
5. ***The values*** transmitted through the content of the work were synthesized in a series of general conclusions presented as follows:
   a) The analysis of the theoretical aspects of the manifestation of critical thinking in primary education highlighted several levels of approach, namely: from a psychological point of view and from a pedagogical/ methodological point of view. This phenomenon was studied against the background of the educational crises facing current education, in terms of personality dynamics, but also within social structures.
   b) The analytical framework of the studied problem allowed the clear delimitation of the aspects aimed at critical thinking in young schoolchildren from the perspective of its components and highlighted the importance of its development.
   c) The scientific approach was based on a theoretical argumentation of specialized literature by presenting the points of view of different authors who studied aspects related to critical thinking. The incursion into the history of the problem of thinking was made by exposing, in parallel, the cognitivist theories and their argumentation.
   d) The main objective of the educational process was emphasized: the formation of interactive-creative learning skills by training the child's intellectual effort and the need for early training to be consolidated by enhancing the formative effect embodied in higher intellectual acquisitions. The total involvement of the student transforms him from an object of training into an active participant in his own training.
   e) The long-term benefits of critical thinking are presented in the form of attitudinal and behavioral indicators that lead the child to take a position based on strong substantiation and logical argumentation and logical analysis of the arguments of others. All these aspects allow him to have control over the information he manipulates by interrogating, reconfiguring, adapting and rejecting it.
   f) The praxeological approach to developing the dimensions of thinking was constituted as a procedural coordinate that pursued the integral approach to learning from the perspective of the two factors involved: teacher and student in the context of formal and informal education by increasing intellectual performance. Seen from this perspective, critical thinking is an active and interactive knowledge process that takes place simultaneously at

several levels. It is clearly goal-oriented, but can be considered a creative process in circumstances where the goals are not clearly delineated. Critical thinking is about creatively integrating ideas, reconceptualizing information, and reframing concepts.

g) The cognitive stimulation methodology of the research subjects represents a theoretical and applied construct and an explanatory way of putting into practice and carrying out activities that enhance this dimension. The main objective was to create educational situations that favor the premises for the development of intellectual skills, solving problem situations and perfecting the training of children.

h) The psycho-pedagogical experiment that focused on the psychological dimension of the research demonstrated its usefulness and efficiency through an active involvement of the subjects, stimulating the desire for knowledge, to expose one's own ideas without being considered ridiculous. Research is a starting point, rendering a new vision, reconsidering as a valuable individual generating ideas. The participants in the experiment developed a positive attitude towards school, developed self-confidence, improved communication skills, a deeper involvement in solving problem situations. Intellectual performance has increased as well as subjects' involvement and facing obstacles of any kind.

i) The pedagogical/ methodological approach demonstrated that there are a number of inconsistencies between the current curriculum and the contents of learning by subject. A rigorous approach from the teaching staff reduces these gaps. A change of general vision of the education process is required, a reorganization, redesign, resizing of learning from the perspective of training critical thinking with an emphasis on the formal aspect at the expense of the informal one.

j) Learning is considered effective only when students experience different thinking patterns, specific to different disciplines, then apply them in other contexts and finally understand their purpose for their own lives. Critical thinking is not just a simple intellectual game without consequences, and the hours spent in the classroom are considered potential openings for decision-making, discovery and self-realization.

6. The analysis of the theoretical approaches and the results of the psychopedagogical experiment allowed us to deduce the following ***laws*:**

- The process of training students' critical thinking skills is carried out efficiently under the conditions of the correlation of the psychological dimension and the pedagogical dimension – minimizing the importance of one of them does not produce the expected effects.
- The intervention of the teaching staff is essential in the process of forming students' critical thinking and is carried out according to the development potential of their thinking.
- The development of higher mental abilities does not occur naturally, but under the conditions of mediating the student's relationship with the world by guiding him, regulating and perfecting the actions performed.
- Planning the critical thinking development process is done by estimating the progress of the students in order to ensure activities above the development level regarding their stimulation.

7. ***The solution of the important scientific problem*** in research emerges from the theoretical-scientific and applied value of the research and the enhancement of the psycho-pedagogical values. The psycho-pedagogical particularities of critical thinking training were identified and capitalized on the background of the interactions between the components involved in the context of the use of problems and problem-situations.
8. The research results confirm the research hypothesis and demonstrate the solution of the scientific problem. Based on the conclusions formulated and the research results, we formulated a series of ***recommendations***:

For teachers:

- ✓ Children are able to think critically about their level of development - the success of this aspect depends on the didactic mastery of the teacher to plan the school activity from the perspective of the development of intellectual capacities.
- ✓ A reorganization of the current curriculum and school contents is required in the center of school interests, being the formation of the skills to think practically, pragmatically by introducing requirements for solving problem situations.
- ✓ Focusing on competences and long-term training objectives – training as responsible and independent thinking individuals capable of making value judgments and adopting the decision they consider most appropriate.
- ✓ Participation in training programs on issues related to school curriculum and critical thinking development.
- ✓ The daily introduction in the organization of the educational process of the learning tasks that are based on solving problems/ problem-situations.
- ✓ Stimulating students to express their ideas, opinions, encouraging them in this sense and eliminating communication barriers that could disrupt their natural expression.
- ✓ The development of critical thinking must be a constant and continuous concern in order to form valuable individuals who can be integrated into society with a great capacity for adaptability.

For Methodists and Trainers:

- ✓ Constant concern for the organization of training programs in the field of critical thinking and the involvement of a large number of learners.
- ✓ Diversification of the area of development of professional skills of teaching staff through training programs on cognitive development topics.
- ✓ Monitoring of training programs through activities supported by participating teaching staff.
- ✓ Capitalizing on the feedback of the participants in the training programs and adjusting them according to the specific educational needs.
- ✓ Foundation of critical thinking development programs as a source for future innovative educational programs to widen the scope of action.

For students:

- ✓ Expressing one's opinions and supporting them with arguments.
- ✓ Manifestation of a positive attitude regarding school activity with deep involvement in solving school tasks.
- ✓ Permanent request for additional explanations from teachers and requesting arguments according to which they support the stated information.

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ADNOTARE

Balercă Vasilica, "*Particularitățile psihopedagogice de dezvoltare a gândirii critice la elevii claselor primare*", teză de doctor în științe ale educației, Chișinău, 2023

Structura tezei: Lucrarea cuprinde introducere, trei capitole, concluzii generale și recomandări, bibliografie cu 200 surse, 158 pagini text de bază, 6 anexe. Lucrarea conține 46 tabele și 15 figuri. Rezultatele cercetării s-au concretizat în 15 (14 ca unic autor, 1 în coautorat) articole științifice publicate în reviste științifice și/ sau prezentate în cadrul conferințelor internaționale și cu participare internațională.

Cuvinte-cheie: gândire critică, gândire creativă, problemă, situație-problemă, abordare inter- și intra-disciplinară, învățare activă, evocare, realizarea sensului, reflecție, extindere, curriculum școlar, reactualizare curriculară, școlari mici, stimulare cognitivă, dezvoltare cognitivă, antrenament cognitiv.

Domeniul de cercetare: Teoria generală a educației.

Scopul cercetării a constat în stabilirea bazelor conceptuale, metodologice și a particularităților psihopedagogice de dezvoltare a gândirii critice la elevii claselor primare.

Obiectivele cercetării au fost: (1) analiza abordărilor teoretice a dezvoltării gândirii și gândirii critice la elevii claselor primare; (2) stabilirea particularităților de manifestare a gândirii critice la elevii claselor primare; (3) fundamentarea reperelor conceptuale de dezvoltare a gândirii critice la elevii claselor primare axate pe situații-problemă; (4) elaborarea unei metodologii de dezvoltare a gândirii critice la școlarii mici; (5) validarea experimentală a metodologiei de dezvoltare a gândirii critice la elevii claselor primare.

Noutatea științifică și semnificația teoretică este determinată de: (1) fundamentarea teoretică a demersului de realizare a interacțiunii componentelor psihologice și pedagogice/ metodologice a dezvoltării gândirii critice la școlarii mici; (2) abordarea inter- și intra-disciplinară a aspectelor legate de gândirea critică în procesul educațional; (3) explorarea metodelor și tehnicilor de învățare activă în raport cu conținuturile curriculare și combinarea eficientă a acestora; (4) Fundamentarea metodologiei de dezvoltare a gândirii critice la școlarii mici axate prioritar pe probleme și situații-problemă; (5) elaborarea taxonomiei criteriilor generale la nivel inter- și intra-disciplinar privind dezvoltarea formării critice la elevi; (6) deducerea legităților de formare a gândirii critice la elevi prin interacțiunea demersului psihologic și a demersului pedagogic/ metodologic, având ca mecanism mobil – situația-problemă.

Problema științifică soluționată vizează identificarea și valorificarea particularităților de formare a gândirii critice la elevii claselor primare prin mecanisme de interconexiune a demersurilor psihologice, pedagogice și metodologice în contextul prioritar al problemei și situației-problemă.

Valoarea aplicativă a cercetării: aplicarea practică a metodologiei de dezvoltare a gândirii critice a elevilor în învățământ primar constituind un model aplicativ pentru cadrele didactice și reorganizarea conținuturilor învățării care stimulează stilul de gândire critică a elevilor. Rezultatele cercetării pot fi aplicate în dezvoltarea curriculară pentru învățământul primar.

Implementarea rezultatelor științifice s-a realizat la nivel teoretic prin publicarea în reviste științifice de profil, în culegeri ale materialelor conferințelor fiind diseminate în cadrul manifestărilor organizate în mediul academic la nivel internațional și național, iar la nivel practic în cadrul activității didactice personale din învățământul primar în cadrul instituției Școala Profesională Petricani din județul Neamț, România, prin intermediul activităților metodice anuale ale cadrelor didactice reunite la nivel local.

ANNOTATION

Balercă Vasilica, "*Psycho-pedagogical particularities of developing critical thinking in primary school students*", doctoral thesis in education sciences, Chisinau, 2023

Thesis structure: The research paper includes an introduction, three chapters, general conclusions and recommendations, a bibliography with 200 sources, 158 pages of basic text, 6 appendices. The paper contains 46 tables and 15 figures. The research results are 15 (14 as sole author, 1 in co-authorship) scientific articles published in scientific journals and/or presented at international conferences with international participation.

Keywords: critical thinking, creative thinking, problem, problem-situation, inter- trans-disciplinary approach, active learning, evocation, meaning making, reflection, extension, school curriculum, curriculum updating, young schoolchildren, cognitive stimulation, cognitive development, cognitive training.

The field of the research: General theory of education.

The purpose of the research: it consisted in establishing the conceptual, methodological bases and the psycho-pedagogical particularities of developing critical thinking in primary school students.

The objectives of the research were: the analysis of theoretical approaches to the development of thinking and critical thinking in primary school students; establishing the particularities of the manifestation of critical thinking in primary school students; substantiating the conceptual benchmarks for the development of critical thinking in primary school students focused on problem situations; elaboration of a methodology for the development of critical thinking in young schoolchildren; experimental validation of the methodology for developing critical thinking in primary school students.

The scientific novelty and the theoretical significance is determined by: (1) the theoretical foundation of the approach to achieve the interaction of the psychological and pedagogical/ methodological components of the development of critical thinking in young schoolchildren; (2) the inter- intra-disciplinary approach of the aspects related to critical thinking in the educational process; (3) exploring the methods and techniques of active learning in relation to the curricular contents and their effective combination; (4) substantiating the methodology for developing critical thinking in young schoolchildren focused primarily on problems and problem situations; (5) elaboration of the taxonomy of the general variable at the inter- trans-disciplinary level; (6) the deduction of the legitimacy for training of the students' critical thinking skills through the interaction of the psychological approach and the pedagogical/ methodological approach, having the problem situation as a mobile mechanism.

The scientific problem solved aims to identify and capitalize on the particularities of training critical thinking in primary school students through mechanisms of interconnection of psychological, pedagogical and methodological approaches in the priority context of the problem and the problem-situation.

The applicative value of the research: the experimental validation of the methodology for the development of critical thinking in primary education, constituting an applicative model for teachers and the reorganization of learning contents with tasks that stimulate the critical thinking style, creating the premises for optimal integration to the requirements of a dynamic society.

Implementation of the scientific results: in the personal didactic activity at the primary school level at Vocational School in Petricani, Neamț County, Romania, during the annual methodical activities of the teaching staff gathered at the local level.

АННОТАЦИЯ

Балеркэ Василика, «*Психолого-педагогические особенности развития критического мышления у младших школьников*», диссертация на соискание ученной степени доктора педагогических наук, Кишинэу, 2023

Структура диссертации: Работа включает введение, три главы, общие выводы и рекомендации, библиографию из 200 источников, 158 страниц основного текста, 6 приложений. Диссертация содержит 46 таблиц и 15 рисунков. По результатам исследования было опубликовано 15 научных статей (14 в качестве единственного автора, 1 в соавторстве) в научных журналах и/ или представленных на международных конференциях.

Ключевые слова: критическое мышление, творческое мышление, проблема, проблемная ситуация, предметный и межпредметный подход, активное обучение, постановка задач, реализация смысла, рефлексия, развитие, школьный куррикулум, актуализация учебных программ, младшие школьники, когнитивная стимуляция, когнитивное развитие, когнитивный тренинг.

Область исследования: Общая теория воспитания.

Цель исследования: разработка концептуальных, методологических основ и установление психолого-педагогических особенностей развития критического мышления у младших школьников.

Задачи исследования: (1) анализ теоретических подходов к развитию критического мышления у учащихся начальных классов; (2) установление особенностей проявления критического мышления у младших школьников; (3) обоснование концептуальных ориентиров развития критического мышления младших школьников, средствами проблемных ситуаций; (4) разработка методики развития критического мышления у младших школьников; (5) экспериментальная проверка методики развития критического мышления у учащихся начальных классов.

Научная новизна и теоретическая значимость определяется: (1) теоретической обоснованностью подхода к достижению взаимодействия педагогического/ дидактического и психологического компонентов развития критического мышления младших школьников, (2) междисциплинарным подходом к аспектам, связанных с критическим мышлением; (3) использование методов и приемов активного обучения, детерминированных содержанием учебных программ; (5) разработка таксономии общих критериев развития критического мышления учащихся на предметном и межпредметном уровнях; (6) выявление закономерностей развития критического мышления детей младшего школьного возраста средствами психологии и педагогики/ методологии, имеющих в основе проблемные ситуации.

Решенная научная проблема связана с выявлением и учетом особенностей формирования критического мышления у младших школьников посредством механизмов взаимосвязи психологических и педагогических/ методических подходов, опирающихся на разрешение проблем и проблемных ситуаций в учебном процессе.

Практическая значимость исследования: практическое применение методологии развития критического мышления в начальном образовании в качестве прикладной модели для учителей и реорганизации содержания обучения с точки зрения стимулирования критического мышления учащихся. Результаты исследования могут быть использованны в процессе развития куррикулума для начасльных классов.

Внедрение результатов иследования: в собственной педагогической деятельности в начальных классах професиональной школы Петрикань, жудеца Нямц, Румыния, в рамках методических объединений педагогических кадров на местном уровне.

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