KONSTANTIN
PRESLAVSKY
UNIVERSITY
SHUMEN

ШУМЕНСКИ УНИВЕРСИТЕТ
"ЕПИСКОП КОНСТАНТИН ПРЕСЛАВСКИ"

FACULTY OF PEDAGOGY

DEPARTMENT OF "PRESCHOOL AND PRIMARY EDUCATION"

VALENTINA VELICHKOVA GEORGIEVA

THE ROLE OF CONSTRUCTIVE ACTIVITIES FOR THE DEVELOPMENT OF COGNITIVE ACTIVITY OF PRESCHOOL CHILDREN IN THE CONDITIONS OF PROJECT-BASED TRAINING

ABSTRACT

of a dissertation

for the award of the educational and scientific degree "Doctor"

Doctoral program: PRESCHOOL PEDAGOGY

Professional direction: 1.2. PEDAGOGY

Field of higher education: 1. PEDAGOGICAL SCIENCES

Scientific supervisor: Prof. Yordanka Peycheva, PhD

SHUMEN

2025

The dissertation work was discussed and directed for public defense at the extended council of the "*Preschool and Primary Education*" department at the Faculty of Pedagogy at the “Konstantin Preslavsky” University of Shumen.

The dissertation, developed in four chapters, has a volume of 253 standard pages - 151 main text and 102 pages of appendices. It is illustrated with 40 tables, 35 figures and 3 block diagrams. The numbering of the figures and tables in the abstract correspond to the ones in the dissertation work. The bibliography includes 112 information sources in Bulgarian and other languages.

The public defense of the dissertation work will take place on 04.12.2025 at 11 a.m. in room 211 of the Faculty of Education of "Konstantin Preslavsky" University of Shumen or online if necessary.

The materials for the defense are available in the department of "*Development of the academic staff*" of "Konstantin Preslavsky" University of Shumen, Rector's office, floor 1, room 107 and on the university's website.

INTRODUCTION

The dynamics of modern life confronts us with the need to quickly adapt to new situations, the ability to make independent decisions and take the initiative in order to move forward adequately into the future.

The system of preschool education in the Republic of Bulgaria has been implementing reforms and innovations for years in order to meet the current needs of society. Programs and strategies aimed at increasing the quality of educational institutions, ensuring the effectiveness of the process of teaching and education, improving the qualifications of teachers, as well as achieving satisfaction of the parent community are being prepared.

A current trend in modern education at the European and national level is the activity of students. It is fundamental in the concept of implementing a competency-based approach in the educational policy of our country, but it is established as an unsolved problem to date.

The economic and social changes in society that have occurred in recent decades outline two key aspects in this regard: interaction with a "new generation" of children and the increasing number of multi-directional functions of the teacher, defined by regulations and rules. This determines the challenges for modern educators to uncover conditions for the development of children's cognitive activity, which plays a key role in their overall development.

The present dissertation work sets out the idea of effectively overcoming the problems associated with the activity of children in the learning process and their adaptation in the rapidly changing, dynamic environment. The presented educational model for pedagogical interaction in a project-oriented environment is essentially an innovative solution with a holistic expression for the implementation of the competency-oriented approach based on active learning.

The relevance of the work is based on the importance of project-based learning in recent years, which has begun to be used as an effective educational tool for the development of cognitive activity, based on the principle of the activity approach.

The dissertation study proves its effectiveness as a form of organization in kindergarten and reveals the role of constructive exercises in increasing the cognitive activity in children aged 6-7 years.

CHAPTER ONE

THEORETICAL ANALYSIS AND PROBLEM STATUS

In the first chapter of the dissertation work, broken down into four main sections, the following most important aspects of the study of the theoretical sources and their analysis are discussed:

Section 1.1. comments on the contemporary aspects of preschool education in Bulgaria.

Basic normative documents and legal basis in preschool education are presented and analyzed. The key competencies for preschool children are derived as a condition for improving their personal development from the National Qualification Framework of the Republic of Bulgaria.

Emphasis is placed on the *competence approach* in preschool education (by examining the etymology of the terms *competence* and *competency*). Basic theoretical propositions of a number of contemporary authors regarding the competency approach are presented (Angelov, Radev, Gyurov, Vatsov, Kotseva – Hristova, Andreeva, P. R. Petrov, P. D. Petrov, Delibaltova, Chavdarova, Tsankov and Genkova, Savova, Peycheva, etc.).

The same section also discusses the specifics of bilateral pedagogical interaction as an innovative approach in preschool education. Emphasis is placed on the possibility of personal choice regarding partnerships, means, organization, planning, pace of work, and degree of personal involvement.

Essential for the specificity of the objectives of the dissertation research is the presented essence of project-based learning in preschool age in section 1.1.3. Here, information related to development tasks and research activities is systematized, a classification of projects by type and structure is derived, the stages of project work and the role of participants in the process are presented in detail, as well as the forms of assessment.

From the facts and conclusions presented in this section, it can be concluded that the application of the project method proves to be a particularly effective opportunity to achieve a number of goals. Through it, knowledge and skills are acquired by working for an extended period of time to investigate an authentic question or real life problem. New knowledge is acquired independently or with the support of an adult, with the final result of the activity being a creative product. The new role of the teacher is brought out and opportunities for partnership relations with the parent community are presented.

Section 1.1.4. presents the role of the STEM approach as a component of project-based learning. Its essence is clarified and the possibilities are outlined within a single situation to achieve a greater volume of expected results in a shorter time, when the teacher's goal is to integrate more educational areas into one activity.

Section 1.2. presents psychological and pedagogical aspects of cognitive activity.

In the context of the specifics of the dissertation work, *cognitive ability* will be understood as the child's ability to perform thought processes, through which it acquires certain knowledge, masters skills and solves problems. This section clarifies what *cognitive activity* is influenced and conditioned by. It is defined as the child's manifestation of vigorous (rapid) development when performing mental operations and processes that lead to the acquisition of certain knowledge and skills, the formation of relationships prompted by certain goals, tasks, needs and interests in order to solve a specific problem.

In view of this non-comprehensive but in-depth theoretical review of cognitive processes, some key aspects important for the improvement of work with children of preschool age have been identified.

The components of the cognitive sphere are defined and presented in three categories: sensory cognition (sensation and perception), abstract cognition (thinking and imagination), and transition from sensory to abstract cognition (imagination), which are directly related to the development of the cognitive activity of preschool children in the conditions of project-based learning.

Speech and communication are considered as related cognitive processes and their influence on cognition is outlined.

The motivational sphere of the personality has been examined to outline the aspect of activity manifestation. “Motivation is a mediating link between the vital need for an action (activity) and the action itself (behavior) which a person demonstrates. It is the basis of human communication and any cognitive activity, including thinking, labor, creative, educational, gaming, sports, social-organizational, artistic-aesthetic” (Desev, 2021, p. 316). Given the provided example, an overview of the motivation for achievement, for learning activity, as well as the types of learning motives is presented.

The above section also presents and analyzes the features of the cognitive sphere of 6–7-year-old children. The cognitive activity of the child in preschool age is most often provoked by its interests and needs.

The overview information presented in the section presents the theoretical basis for determining objective criteria and indicators for the assessment of cognitive activity in children, taking into account the age characteristics of the preschool period.

Section 1.3. presents psychological and pedagogical aspects of preparing the child for school.

The preparation of the child for school requires a thorough understanding of the psychological and pedagogical aspects that shape school readiness. This understanding, on the one hand, refers to the essence and manifestations of readiness - what it is expressed in and which components make it up, and on the other it refers to being familiar with the preparation process in preschool age, through which the child's successful transition to a school environment is supported.

Various authors and their statements regarding their views on the preparation of children for school are cited (Veleva, Ivanova, Bizkov).

According to the regulations on preschool education, *the preschool age allows for the development of certain conditions which assist the overall development of the child*. This suggests that readiness as a result of preparation should encompass all aspects of the child's personality (*the child's physical, cognitive, linguistic, spiritual-moral, social, emotional and creative development*), as well as provide information about his or her self-assessment skills and motivation for learning.

It is noted that to date in Bulgaria there is no single framework adopted for assessing a child's school readiness that would be used as a standard by all preschool institutions. In the context of the dissertation research, the developed *holistic model for monitoring and tracking the achievements and progress in the development of 6-7-year-old children in the context of project-based learning* can be used as a tool to assess the school readiness of children. The model is compatible with the state educational standard, meets the key competencies set out in it, builds on traditional forms of assessment and focuses on the overall development of the child, by distinguishing eight main components, namely: cognitive, communicative, motor, practical, motivational, social, emotional and metacognitive.

Section 1.4. examines the role of constructive activity in enriching the cognitive and practical experience of 6–7-year-old children.

An analytical overview of the theories and views on learning development (Vygotsky, Kay, Piaget) based on the activity and constructivist approach has been made. Emphasis is placed on the constructive activities, as being some of the most significant and interesting during preschool age. Practice shows that their high emotional charge proves to be a powerful tool for motivation and has a positive effect on children's development. Approaches to construction and technology education are based on a range of learning theories.

In a contemporary context, E. Buzov's views on constructive activity are also presented - "The direction, conditionally called "constructivist", gets its name from the fundamental theory on which it is based. In it, the idea of using constructive activity is perceived as a natural and child-friendly way of studying. This concept is based on constructivism as a theory of learning." In it, the idea of using constructive activity is perceived as a natural and child-friendly way of studying."

In this section, significant attention is also paid to the essence of *construction and technology* training in kindergarten, and practical benefits for children from the implementation of constructive activities in the process of pedagogical interaction. Here, the competences laid down in the State Educational Standards for the fourth group in kindergartens in the educational direction *construction and technology* are presented and analyzed. The author's concepts of Ivanov and Kalinova, Petrov and Atanasova, Tsvetkova and Gaidova are cited, which shed light on the theoretical formulation of the role of constructive activity in children's development.

The presented integrative links of the constructive activity open a wide scope in the educational activity in preschool education and are a prerequisite for the achievement of

effectiveness in education. The curricula that are developed for the preparatory groups focus on integration in terms of the internal content for each educational field, integration between individual educational fields and ensure continuity with the educational content for the first grade. This approach is also embedded in the philosophy of the model developed in the present dissertation.

CHAPTER TWO

RESEARCH METHODOLOGY, METHODS AND ORGANIZATION

The second chapter of the thesis work consists of four sections:

Section 2.1. covers the methodological basis of the study.

The *methodological basis* of the research in the dissertation work is the modern trends in preschool education, which focus on productive activities in practice. This provokes interest in studying more in-depth mechanisms of children's cognition and implementing strategies to support cognitive activity.

The *main position* of the present study is reduced to the understanding that through an innovative strategy in project-based learning, which by its nature implies the creation of a significant final product for a longer period of time, the *cognitive activity* of 6-7-year-old children is increased. Determining the *impact of constructive activities on children's cognitive activity* allows both aspects to be considered in parallel in the context of the study.

Cognitive activity is a broad term that includes all processes related to the development of thinking skills, attention, logical reasoning, memorization and problem solving. Within the framework of the dissertation, cognitive activity is measured by indicators related to the child's cognitive, motivational and social-emotional development, as well as the degree of independence in the performance of practical and cognitive tasks.

The constructive activities in project-based learning are associated with: the productive activity of the children, which implies understanding, making sense of and applying the knowledge acquired from the various educational directions in their practical-applied activity. The material nature of the product provokes the interest and motivation of the children of the studied age group and activates the cognitive sphere. In their quest to create the desired object, they more effectively solve problems and overcome difficulties that arose in the process of activities, their motivation for creativity is higher. To prove the stated facts, indicators related to motivation and the practical application of knowledge and skills are measured.

In section 2.2. the main scientific concepts of the dissertation study are presented and defined.

The following concepts are defined: *competency approach, holistic approach, development components, cognitive activity, productive activity, constructive activity*.

Section 2.3. specifies the goal, tasks, subject, object and hypothesis of the study.

The aim of the research in the dissertation work is to create a stimulating, competence-oriented educational environment by developing an innovative model of pedagogical interaction that ensures the application of the acquired knowledge and skills in the conditions of practical-applied activity.

The objectives of the study to achieve the set goal are:

1. Conducting a theoretical analysis of specialized information sources in order to clarify basic concepts and outline the methodological basis and tools of the study.

2. Analysis of the educational content for kindergarteners in the fourth group and outlining the didactic possibilities for organizing an educational environment in which conditions are created to stimulate the cognitive activity of children.

3. Creation and testing of an educational model for pedagogical interaction in terms of project-based learning, which ensures practical applicability of the knowledge acquired in educational areas through various constructive activities and active participation in thematic projects.

4. Development and testing of a toolkit for monitoring the achievements of 6-7-year-old children in key areas of their cognitive development.

5. Measurement and analysis of the results of the experimental training.

The subject of the study is the cognitive activity of 6–7-year-old children in the process of the educational model of pedagogical interaction.

The object of the study is the achievements of children from the preparatory group participating in the study, acquired while implementing project-based learning.

Research hypothesis - ***if conditions are created for active mental activity, creative development and purposeful practical application of knowledge in the conditions of PBL, the level of cognitive activity of children will increase.***

Section 2.4. Research methodology.

2.4.1. Methods

To solve the main tasks and achieve the goal of the research, a complex methodology was used, which includes the following **methods**:

• Theoretical methods:

- Analysis of literary sources

In connection with the first and second research tasks, a study of literary sources by Bulgarian and foreign authors was carried out in the following directions:

- current issues in preschool education;

- competence-oriented training;

- innovative practices in preschool;

- strategies for implementing project-based learning in kindergarten;

- psychological and pedagogical aspects of the cognitive activity and factors that influence it;

- educational content for kindergarteners in the fourth group and opportunities for constructive activities to develop cognitive activity;

- methods for conducting diagnostic procedures to establish achievements.

Synthesis and systematization – it comes down to summarizing data from the studied literary sources to formulate the main methodological aspects of the dissertation work: integrative content, active role of the child in the process of constructing knowledge, connection with cognitive and practical experience, as well as formative assessment of the learning process, through which a logical structure of the didactic-technological model for increasing the cognitive activity of 6–7-year-old children is achieved (Fig. No. 6).

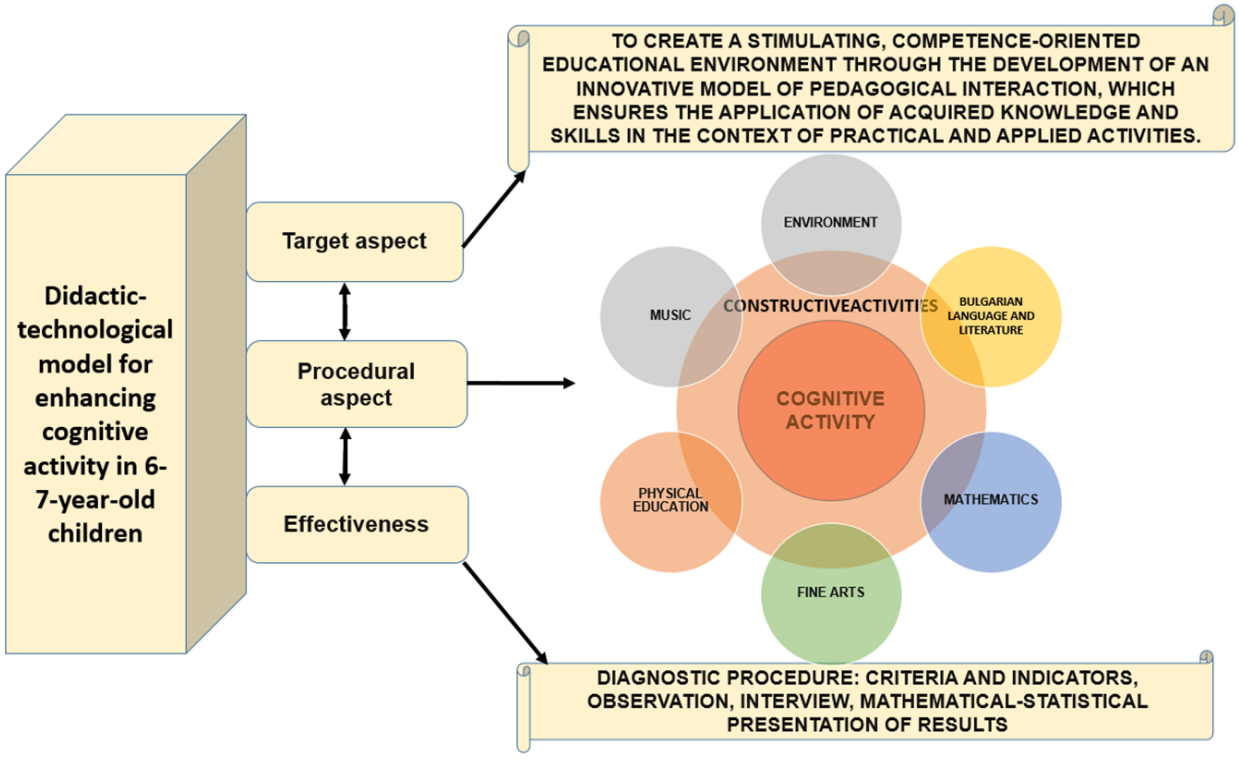

Fig. No. 6. ***Didactic-technological model for increasing cognitive activity in 6–7-year-old children***

➢ Modeling – “Modeling is a leading cognitive method in all sciences and is applied at all stages of scientific knowledge. Modeling has a heuristic potential for transforming the abstract into visible and accessible, the complex into simpler, and abstract objects into accessible for research and understandable by researchers” (Galabova, D., N. Delcheva, 2016).

In connection with the third research task, based on researched scientific literature, an experimental model was developed for project-based training of children from a preparatory group. In order to organize an educational environment that stimulates cognitive activity, the educational content for the fourth group and the possibilities of constructive activities for developing competences from all educational fields are analyzed, as a result of which the thematic content from the educational field "Environment" is restructured and systematized into four global areas - Nature, Safety, Health and Society, which serve as the basis for project development. The goals of the other educational fields are implemented in an integrated manner in the individual stages of the project work. The tasks are determined comprehensively, depending on the topic and the ultimate goal of the project, the individual needs of the group at the specific moment, and follow the principle of systematicity and consistency for the school year.

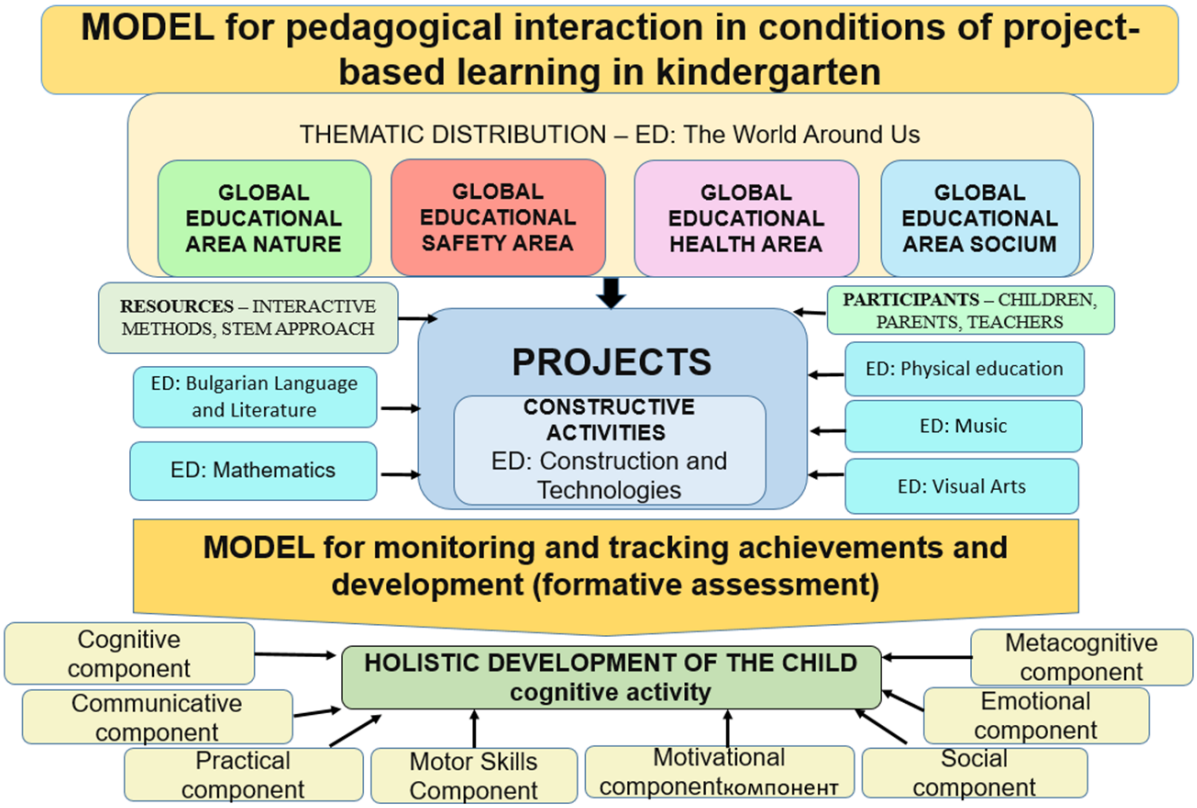

Fig. No. 7. ***Model for project-based learning with preschool children***

The model ***(fig. 7)*** is integrative and emphasizes the active role of the child in the educational process, stimulating independent research and creative activity, creating conditions for cooperation and communication between all participants. Through thematic projects, children acquire cognitive skills related to real problems close to their lives, while simultaneously developing competencies from all educational fields, experiencing situations through game and role models. The diverse constructive and work activities help children to understand the relationship between knowledge and practice and to realize the benefits for their own development. Through this approach to modeling an educational model, not only the acquisition of knowledge and skills is achieved, but also the formation of positive attitudes towards learning, active participation in group activities and independent solving of practical tasks.

The structure and application of the educational model are presented in detail in the third chapter. Goals, tasks, need for creation, distribution of thematic content, methodology implementation, tools for monitoring children's progress are reflected, and examples of implemented projects are given. The developed model serves as an instrument for conducting the pedagogical experiment and forms the basis of the empirical part of the study.

• Empirical methods:

- Pedagogical experiment - the formative experiment was conducted in the period

from September 2020 to May 2021, during which the effectiveness of the innovative model for pedagogical interaction in PBL conditions was investigated.

- Observational methods - direct pedagogical observation is used as the main tool

for purposeful examination and recording of processes, manifestations and conditions of children during the experimental training. Through it, a qualitative survey of the object is ensured for the collection and reporting of data, which serve to analyze the achieved results and establish the entry and exit levels of the experimental (EG) and control (CG) groups. Self-observation as an observational method is expressed in systematic reflexive processes that occur in children during the educational process. The model offers an opportunity for continuous comparison of their own performance, as well as forming a position for personal achievements and progress. The result of self-observation is tracked in an indicator of *reflection* and *self-reflection,* assigned to a criterion for measuring cognitive skills, which takes into account children's self-assessment of personal achievements and progress in the process of acquiring knowledge and skills.

- Diagnostic methods: the research includes discussion, observation, analysis of children's

production and analysis of interaction in the team.

To track the children's achievements, a model for complex assessment is used, which ensures objectivity in reporting the results. It focuses on the entire learning process and portrays a

comprehensive view of the child. A set of criteria and indicators has been selected (***Table № 3***) that take into account:

- motivation for participation;

- the children's activity and cognitive experience;

- oral expression skills;

- the skills for independent reproductive and research activity;

- the skills to transfer knowledge in new contexts;

- the socio-emotional factor;

- the ability for self-assessment and ways of self-management of learning activity.

A diagnostic **toolkit** has been developed for the complex evaluation of the model:

Checklist for monitoring ***(App. No. 4 and App. No. 8)***, which reflects motivation, attention, independence in the performance of tasks, interaction in the team;

Individual card for discussion and reporting of cognitive processes and speech expression ***(Appendix No. 5 and Appendix No. 9)***;

Individual protocol for summarizing the results of the performed diagnostic procedure ***(Attachment No. 6 and Attachment No. 10)***;

System of tasks and questions for establishing the entry/exit level ***(Table No. 6 and Table No. 7)***;

Specialized tables for evaluating the children's achievements during a diagnostic procedure ***(Appendix No. 11)***.

- Mathematical and statistical methods - calculation and comparison of the arithmetic average (Av), calculation of standard deviation (SAv), calculation of difference, and comparative analysis.

2.4.2. Criteria and indicators. Diagnostic procedure.

The main diagnostic tool for this study is a sample of the author's *holistic model for monitoring and tracking the achievements and progress in the development of 6–7-year-old children in conditions of PBL (Appendix No. 2)*, consistent with the State Educational Standards (SES) for the fourth group.

In order to assess the entry and exit level of both groups, diagnostic procedures are carried out to establish the cognitive activity of the children and the factors that influence it.

The determined criteria and indicators were selected based on the theoretical statements for increasing the cognitive activity of preschool children and are presented in table No. 3.

Table No. 3

Criteria and indicators for the diagnostic procedure

CRITERION 1: COGNITIVE DEVELOPMENT		
Indicators	**Monitoring indicators**	**Method**
1. Reproduces knowledge (memory)	Demonstrates knowledge of specific educational areas. Recalls learned information, answers questions correctly.	Conversation/ Observation
2. Understands concepts, categories and relationships (thinking)	Explains the meaning of concepts and terms; describes relationships and relationships between categories; illustrates understanding with examples.	Conversation
3. Analytical thinking - classifies, compares, summarizes (thinking)	Analyzes, classifies and compares objects or phenomena; makes conclusions, assessments and generalizations based on given characteristics.	Conversation
4. Flexible and creative thinking	Asks questions, suggests ideas and more than one solution, changes approach/strategy, thinks up new ways.	Observation Conversation
5. Reflection and self-reflection on achievements	Expresses an opinion on his/her own performance, identifying his/her strengths and weaknesses.	Conversation
6. Attention	Stability and distribution of attention, working in a	Observation

	focused and consistent manner.	
CRITERION 2: MOTIVATION		
Indicators	**Monitoring indicators**	**Method**
1. Curiosity and interest	Asks questions, actively participates in activities to learn, understand or explore.	Observation
2. Persistence in the face of difficulties	Does not give up in the face of difficulties, completes tasks started.	Observation
3. Initiative	Takes action independently, suggests ideas or solutions without waiting for external intervention from an adult.	Observation
CRITERION 3: APPLICATION OF KNOWLEDGE AND SKILLS		
Indicators	**Monitoring indicators**	**Method**
1. Expresses himself clearly and correctly when sharing ideas, opinions, events.	Conveys brief, simple information, using correct grammatical categories when constructing his sentences and demonstrating clear pronunciation.	Conversation Observation
2. Independence in performing cognitive tasks	Performs the set didactic tasks independently and correctly.	Observation

3. Independence in performing practical tasks	Demonstrates independence and responsibility in performing practical tasks.	Observation
4. Quality and precision of execution	Completes tasks correctly, with good coordination and precision.	Observation
CRITERION 4: SOCIAL-EMOTIONAL INTERACTION		
Indicators	**Monitoring indicators**	**Method**
1. Listens and considers the opinions of others	Maintains dialogue by showing understanding.	Observation
2. Demonstrates tolerance and respect.	Maintains good relationships within the team, cooperates when needed.	Observation
3. Demonstrates a positive attitude towards the activity	Remains calm in the face of failure or difficulty; seeks a solution, maintains a good mood and attitude, reacts adequately to the situation.	Observation

The indicators under Criterion 1: *Cognitive development* assess knowledge, how information is processed and the awareness of one's own achievements. The indicators under Criterion 2: *Motivation* assess the application of knowledge and skills. Indicators under Criterion 3: *Application of knowledge and skills*, which evaluate activity and motivation, as well as indicators under Criterion 4: *Socio-emotional interaction*, which evaluate interaction in the collective, were selected as factors that influence the process.

The diagnostic procedure uses the System for establishing the entry/exit level of control and experimental groups (Table No. 6 and Table No. 7). The system is made up of tasks and questions that are in line with the requirements of the Preschool and School Education Act (PSEA) and reflect a set of competencies (knowledge, skills and attitudes).

The indicators for assessment by indicators are established in a three-level scale (Table No. 4), depending on the specifics of the criteria. Each level carries the corresponding number of points (1–3), according to the level of proficiency, independence, and frequency of occurrence.

Table No. 4

Indicators and assessment scale

Indicators for Assessment / **Criteria**	**1**	**2**	**3**
Criterion 1: **Cognitive Development**	***Level 1***	***Level 2***	***Level 3***
Criterion 2: **Motivation**	Insufficient	Sufficient	Significant
Criterion 3: **Application of Knowledge and Skills**	Can't cope	Can cope with some help	Can cope on my own
Criterion 4: **Socio-Emotional Interaction**	Insufficient	Sufficient	Significant

The indicators for assessing the indicators under Criterion 1: *Cognitive development* have their own specifics, which are presented in Table No. 5.

Table No. 5

Indicators for assessing Criterion 1

Criterion 1: *Cognitive development*			
Indicator	***Level 1***	***Level 2***	***Level 3***
1. Reproduces knowledge	Names basic objects, objects or phenomena. (recognizes, points out and names).	Demonstrates a wider range of knowledge by linking different objects and phenomena and their characteristics	Demonstrates rich knowledge from several educational fields. Gives examples and justifies answers.

		within the topic.	
2. Understands concepts, categories and relationships	Knows basic concepts and categories, understands simple relationships.	Connects concepts and categories, shows understanding of more complex relationships.	Analyzes and explains relationships between categories, shows overall understanding and gives examples with new contexts.
3. Analyzes, classifies, compares, summarizes	Groups and classifies by basic characteristics.	Makes comparisons and summaries with explanations.	Creates more complex analytical connections, draws conclusions and summaries, gives evaluations and examples.
4. Demonstrates creative and flexible thinking	Proposes a single solution or idea.	Proposes multiple solutions, changes approach with guidance.	Has innovative ideas, changes strategies, and creates new solutions.
5. Reflection	Answers in general terms, does not specify.	Answers by giving one or two examples.	Can give a precise explanation and examples.
6. Concentrates and maintains attention	Works with focus for a short time.	Moderate attention, needs prompting.	Sustained attention, independently follows the task.

• To establish the entry level, a standard pedagogical situation on the topic "Wonderful House" is conducted ***(Appendix No. 3)***. The system of tasks and questions that are set to establish manifestations according to the selected criteria and indicators is presented in **Table. No. 6** and follows the sequence of activities.

Table No. 6

A system for establishing the entry level of the control and experimental groups

A system of tasks and questions to establish the entry level **Pedagogical situation on the topic "Wonderful House"**		
CRITERIA AND INDICATORS	**ACTIVITY**	**METHOD**
C1 – I1, I6 C2 – I1	**Conversation:** emotional attitude, motivation for participation, updating knowledge	**Observation**
C1 – I4, I6 C2 – I1, I2, I3 C4 – I2, I3	**Team Game:** ***Let's Build a Castle!***	**Observation**
C1 – I6 C2 – I2 C3 – I3, I4 C4 – I3	**Independent constructive task on the topic:** ***"Wonderful House"***	**Observation**
C1 – I6 К3 – П1	**Conversation** Permanent monitoring parameters	**Conversation**
C1 – I1, I2, I3, I4	**Task 1.** If you had a magic wand, what would you change on the road? What do you see wrong in the picture?	**Conversation**

C1 – I3	**Task 2.** How many pedestrian crossings are there? How many pure white cars are there? Which ones are more?	**Conversation**
C1 – I1, I2, I3 C3 – I2	**Task 3.** What foods do you like to eat? Which of them would you serve on the table in your house? Name them and tell us why?	**Conversation**
C1 – I1, I2, I3 C3 – I2	**Task 4.** Solve the puzzle! Imagine that from one of the windows of your house, you see these animals! Who are they? Where do they live? Can you name other species that do not live in the forest? What do we call them?	**Conversation**
C1 – I1, I2, I3	**Question 5.** Can you name the plants in the picture? Can you guess what season this is happening in?	**Conversation**
C1 – I1, I2, I3	**Task 6.** Imagine that when you look out the other window of your house, you see these people and cars! Who is doing what? Who is helping us with what? Name the cars that will respond in case of need? How can we look for them?	**Conversation**
C1 – I1, I2, I3, I4	**Task 7.** Imagine that this flag is fluttering on the roof of your house. What colors would you paint it with if you wanted to show which is your Homeland? What is its name? If you had to tell something about it to your friend from abroad, what would it be?	**Conversation**
C1 – I1, I2, I3, I5	**Task 8.** Show us how you feel today! Tell me why! Are you	**Conversation**

	happy with yourself? How did you manage to make the house? What did you do to build the castle? Did you learn anything useful that will help you in other games?	

The above-mentioned diagnostic procedure includes the following stages and activities:

- Conversation - the children are introduced to the topic; knowledge is updated and ideas about various types of residential buildings are clarified; the interest and curiosity towards professions related to design, architecture and construction is provoked to encourage initiative in the upcoming group game and independent practical task. By examining reproductions on the same topic by different artists, the initiative and the proposal of non-standard solutions are encouraged.

During the conversation, manifestations are observed according to the indicators: reproduces knowledge, stability of attention, curiosity and interest (the results are reflected in the Observation Checklist).

- Team construction game - children are challenged to build an attractive castle from constructors

During the game, manifestations of the following indicators are observed: persistence of attention, flexible and creative thinking, curiosity and interest, persistence in the face of difficulties, initiative, listening and taking into account the opinions of others, tolerance and respect, as well as the positive attitude towards the activity (the results are reflected in the Observation Checklist).

- Independent construction activity – making a model of a house using a template; technological operations: cutting, folding, assembling, gluing. Practical skills are monitored through observation.

The following indicators are taken into account: persistence of attention, persistence in the face of difficulties, independence in the performance of practical tasks, positive attitude. The results are reflected in the Monitoring Checklist ***(Appendix No. 4)***.

- Individual discussion - the child is involved in an imaginary situation through the model he has made and his cognitive abilities are established.

The following indicators are monitored through the conversation: (the child) reproduces knowledge; understands concepts, categories and dependencies; analyzes, classifies, compares, summarizes; demonstrates creative and flexible thinking; reflection and self-reflection; independence in performing cognitive tasks; concentration and persistence of attention; clear and correct expression when sharing ideas, opinions, events. The tasks and questions for each indicator are presented in the previous table. The results are reflected in an Individual card for reporting cognitive processes and speech expression ***(Appendix No. 5).***

The data from the Checklist and the Individual Card are reflected, with a final assessment being made in an Individual Protocol for summarizing the results of the conducted incoming diagnostic procedure ***(Appendix No. 6)***.

• In order to establish the baseline level of both groups, a project on the topic "My First Encyclopedia" is being conducted ***(Appendix No. 7)***.

Through observation, manifestations of social-emotional interaction between children, the motivation and practical application of knowledge are recorded. The results are reported in the Monitoring Checklist ***(Appendix No. 8)***.

To monitor cognitive processes and speech expression, an individual interview is conducted with each child. The results are reflected in the Individual report card (Appendix No. 9).

After summarizing, a final assessment is made, which is reflected in an Individual Protocol for Summarizing the Results ***(Appendix No. 10)***.

The system of tasks and questions, which are set to establish events according to the selected criteria and indicators, is presented in ***Table No. 7*** and follows the sequence of implementation of the project activities.

Table No. 7

System for establishing the baseline level of the control and experimental groups

A system of questions and tasks to establish a baseline **Project on the topic "My First Encyclopedia"**		
CRITERIA AND INDICATORS	**ACTIVITY**	**METHOD**
C1 – I1, I4, I6 C2 – I1, I3 C4 – I1, I3	Initiating the project, motivating participation in the activities	**Observation**
C1 – I1, I4, I6 C2 – I1, I3 C3 – I1 C4 – I2, I3	Group game: ***"Discover the first letter of your teammate's name!"*** (discovering and recognizing letters of the alphabet, social-emotional interaction in the	**Observation**

	team, flexible thinking when determining game strategies)	
	SHEET 1: Making a cover	
C1 – I1, I4, I6 C2 – I2, I3 C3 – I3, I4 C4 – I3	Cognitive task: ***Cut out a name tag and stick it on.*** ***Draw your own portrait! Decorate as desired!*** (cut, stick, draw, decorate)	**Observation**
	SHEET 2: "Road Safety"	
C1 – I6 C2 – I1 C3 – I2	Cognitive task: ***Find ten mistakes in the picture!*** (detecting wrong behaviors on the road)	**Observation**
C1 – I6 C2 – I2 C3 – I3, I4 C4 – I3	Practical task: ***Apply a pedestrian crossing!*** (applying)	**Observation**
C1 – I1, I2, I3	Discussion: ***How many mistakes did you find? Count them!*** ***Why do you think this behavior is wrong?*** ***Are there other situations that you think are wrong?***	**Interview**
	SHEET 3: "Healthy Eating"	
C1 – I6 C2 – I1, I2 C3 – I2, I4 C4 – I3	Cognitive tasks: ***Choose healthy foods! Complete the row of geometric shapes to draw a colorful tablecloth!***	**Observation**

	(selection of healthy foods, completing a serialization row)	
C1 – I6 C2 – I2 C3 – I3, I4 C4 – I3	Practical tasks: ***Appliqué a healthy plate! Complete the row of geometric shapes to draw a colorful tablecloth!*** (cutting out elements, appliquéing a healthy plate, drawing geometric shapes in a given order)	**Observation**
C1 – I1, I2, I3	Conversation: ***Why did you choose these foods for your plate? Name the geometric shapes on the tablecloth!***	**Conversation**
	SHEET 4: "Nature"	
C2 – I2 C3 – I2, I4 C4 – I3	Cognitive task: ***Put the puzzle together!*** (putting together a puzzle)	**Observation**
C1 – I6 C2 – I2 C3 – I3, I4 C4 – I3	Practical task: ***Apply the puzzle!*** (applying)	**Observation**
C1 – I1, I2, I3	Conversation**: *Name the animals in the picture! Where do they live? What other types of animals do you know? What plants do you recognize?*** ***In what season do you think this happens?***	**Conversation**
	SHEET 5: "Professions and means of transport"	
C1 – I6 C3 – I2, I4	Cognitive task: ***Connect correctly!***	**Observation**
C1 – I1, I2, I3	Conversation:	**Conversation**

C3 – I1	***Who does what? When do we seek help from these people? How can we call them in case of need? Name the vehicles! What other types do you know?***	
	SHEET 6: "National Identity"	
C1 – I6 C3 – I3, I4	Cognitive task: ***Color the flag of Bulgaria!***	**Observation**
C1 – I1, I2, I3 C3 – I1	Conversation: ***If you had to tell something about your Homeland to a friend from abroad, what would it be?***	**Conversation**
	SHEET 7: "Reflection"	
C3 – I2	Cognitive task: ***Draw a circle to show how you feel today!***	**Observation**
C1 – I1, I2, I3, I5 C3 – I1	Discussion: ***Are you happy with your book?*** ***What can you do better than before?*** ***Could you make something similar?*** ***What would it be?***	**Discussion**
C1 – I1, I3, I6 C2 – I3 C3 – I2, I4 C4 – I3	**Constructing an encyclopedia** (constructing a model of a book – analyzing parts, punching, binding)	**Observation**
C1 – I5 C2 – I3 C3 – I1, I2 C4 – I3	**Presentation of encyclopedias to the group** (oral presentation of personal opinion, presentation of own product, expression of self-evaluation)	**Observation**

The diagnostic procedure includes the following steps and activities:

- Project initiation and planning – the children's interest and curiosity in constructing an encyclopedia are provoked, they are motivated to express ideas when specifying stages and activities.

The following indicators are recorded through observation: reproduces knowledge, flexible and creative thinking, attention, curiosity and interest, initiative, listening and considering the opinions of others, manifestation of a positive attitude towards the activity (the results are reflected in the Observation Checklist).

- Team play - through a game for tolerance, the children discover the names of their teammates, come up with strategies, share, learn about letter recognition and acquire materials to make their book cover.

The following indicators are observed: persistence of attention, flexible and creative thinking, curiosity and interest, persistence in the face of difficulties, initiative, listening and taking into account the opinions of others, tolerance and respect, as well as the positive attitude towards the activity.

Project implementation: to construct the book (encyclopedia), various cognitive and practical tasks (described in the previous table) are performed in seven worksheets with different topics (Sheet No. 1: Making a cover for the encyclopedia, Sheet No. 2: "Safe behavior on the road", Sheet No. 3: "Healthy nutrition", Sheet No. 4 "Nature", Sheet No. 5 "Professions and means of transport", Sheet No. 6 "National identity", Sheet No. 7 "Reflection" - ***Appendix No. 7***).

Through observation and individual discussion on each topic, the indicators are tracked according to all the criteria reflected in detail in the previous Table. No. 7.

Constructing the encyclopedia – there are evidential skills for analyzing the received parts, arranging them in a sequential order, counting skills, concentration and independence in assembling the elements to obtain a book, correct execution of the technological operations of punching and binding, as well as satisfaction with the activity.

The manifestations are reported in the Observation Checklist and refer to the following indicators: reproduction of knowledge, analytical thinking, attention, initiative, independence in performing practical tasks, quality and precision of performance, positive attitude.

Presentation of the encyclopedia to the group – through observation, the following indicators are monitored: reflection and self-reflection, initiative, clear and correct expression, independence in the performance of cognitive tasks, positive attitude. The results are noted in the Monitoring Checklist ***(Appendix No. 8)***.

- Individual discussion – after finalizing the project, an individual examination of each child is conducted to track all indicators under Criterion 1: Cognitive development, as well as indicator 1: Expresses clearly and correctly when sharing ideas, opinions and incidents, defined in

Criterion 3: Application of knowledge and skills. The results are reflected in the Individual report card ***(Appendix No. 9)***.

The data from the Checklist and the Individual Card are reflected by placing a final assessment in an Individual Protocol for summarizing the results of the conducted diagnostic procedure ***(Appendix No. 10)***.

The results of the entry and exit diagnostics are reflected in Specialized tables for evaluating children's achievements in entry and exit diagnostics ***(Appendix No. 11)***.

2.5. Organization of the study

The research in the current dissertation is conducted with 50 children aged 6–7 years in three stages:

Determining stage – covers the time from February 2019 to September 2020, in which the issues in the dissertation work are specified, based on information sources, and the educational model is developed. At the end of the period (September), the CG and EG were determined, with which a diagnostic procedure was carried out to track the entry level of the children.

The control group includes 25 kindergarteners in the fourth group from the "Konche vihrogonche" kindergarten in the city of Shumen.

The experimental group includes 25 kindergarteners in the fourth group from the "Sturche" kindergarten in the city of Shumen.

Formative stage – covers the period from September 2020 to May 2021, during which project-based learning is implemented with the EG.

Control stage - covers the period from May 2021 to February 2022, during which the exit diagnostics are conducted, the empirical data are processed, and an analysis of the qualitative and quantitative research of the achievements of children from both groups is carried out.

CHAPTER THREE

A CONCEPTUAL FRAMEWORK OF A MODEL FOR PEDAGOGICAL INTERACTION IN THE CONDITIONS OF PBO TO INCREASE COGNITIVE ACTIVITY IN 6-7-YEAR-OLD CHILDREN

In this chapter, the following are presented in sequence: An educational model for pedagogical interaction in a project-oriented environment and a Holistic model for tracking the achievements and progress in the development of 6-7-year-old children.

Sections 3.1. to 3.4. present and justify a developed educational model for pedagogical interaction in a project-oriented environment to increase cognitive activity, comprehensively outlining the strategy for implementation, its structure, as well as the goal, tasks and expected results.

The presented educational model for pedagogical interaction in a project-oriented environment outlines a different view of the organization and implementation of the educational process in kindergarten, which is based on the understanding of cardinal changes and the opportunity to address a number of challenges facing preschool education in Bulgaria, including:

- low cognitive activity in children;
- difficulty concentrating and low motivation;
- poor development of language culture and limited communication skills;
- shifting the focus from game-based cognitive activity to educational activity;
- shifting the focus of the pedagogical work - from quality interaction with the children to
- the PR of the educational institution;
- overload of pedagogical specialists with administrative activities;
- lack of effective connections and cooperation between the kindergarten and the family;
- low trust in educational institutions in Bulgaria;
- the need for a stimulating, open and adaptive educational environment that meets the

- individual needs and interests of modern children, encourages the parental community to actively participate and provides sufficient freedom for the teacher to take a creative and flexible approach in their pedagogical practice.

According to the recommendation of the Ministry of Education and Culture for improving the quality of preschool education, in recent years, current trends aimed at the implementation of PBL have been outlined. Researched information sources establish their limited implementation – within one or several educational fields. There are no clearly structured models and methodological guidelines that would unify and make sense of the overall concept of organizing the educational content and tracking the children's achievements to a higher degree. The identified shortcomings create prerequisites for difficulties for teachers to use the full potential of PBL for integration and comprehensive development of children.

In response to the above-mentioned issues, the following are proposed:

- ✓ AN INTEGRATIVE EDUCATIONAL MODEL FOR PEDAGOGICAL INTERACTION IN THE CONDITIONS OF PBL, which places the child at the center of the educational process and stimulates his active, practically oriented and social interaction;
- ✓ A HOLISTIC MODEL FOR MONITORING AND TRACKING THE ACHIEVEMENTS AND PROGRESS IN THE DEVELOPMENT OF 6-7-YEAR-OLD CHILDREN IN THE CONDITIONS OF PBL with an adaptive structure and oriented towards their overall development.

The main goal of their creation is to increase the cognitive activity, motivation and concentration of children by involving them in various project activities that promote the practical application of acquired knowledge from various fields, to provoke the activity of children to get to know, recreate and enrich their ideas about the surrounding world, as well as to objectively present the results achieved in the conditions of PBL.

The innovative strategy for an integrated educational process is presented in section 3.1.2, where the parameters for ensuring pedagogical effectiveness and the conditions for regulatory compatibility are outlined.

Project work is considered as the main strategy for organizing pedagogical interaction. In it, the goals of preschool education are realized in a way that meets modern trends and the needs of "new" children. In contrast to the traditional practice, where competencies are achieved by conducting pedagogical situations for each educational direction, in the model they are achieved through thematically organized projects that integrate competencies from all educational directions and the overall development of the child is achieved. A block diagram is presented for illustration (Fig. #9)

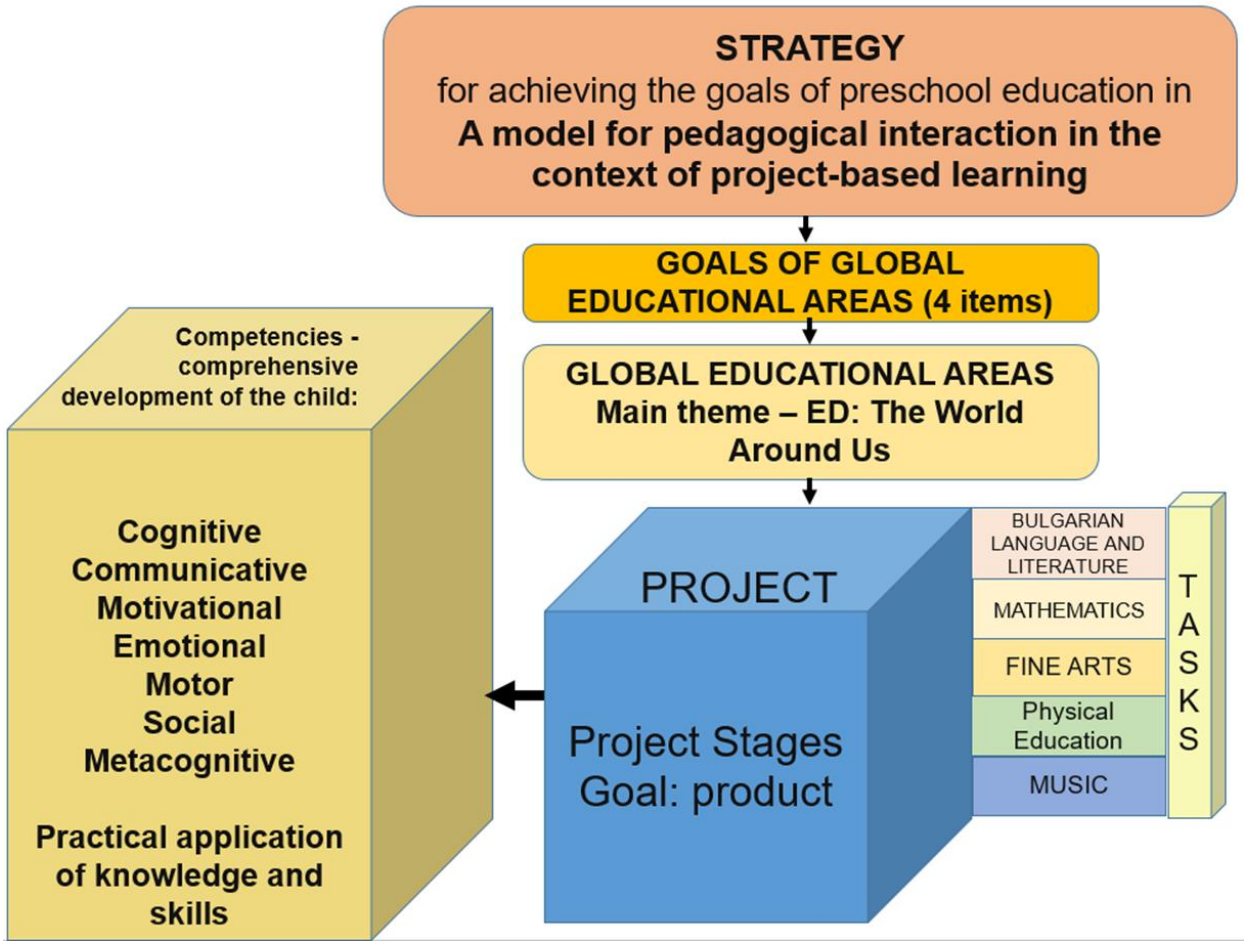

Fig. No. 9 Strategy for implementing the goals of preschool education in the Model for pedagogical interaction in the conditions of PBL

In the educational model, the **thematic content** is organized by distinguishing four global educational fields from the UN Environment: Nature, Health, Safety and Society. For each global area, a thematic focus, scope of content and goal are provided (presented in Table 8 of the dissertation). The broad scope and specificity of the thematic content necessitates that each global area be divided into thematic modules that specify a narrower focus within the area.

For Global Educational Field (GEF) Nature, modules aimed at mastering competences related to plants, animals, inanimate nature and ecology are allocated. Modules I and my health and Healthy nutrition are allocated for GEF Health. Two modules are dedicated to GEF Safety: To move safely on the road (aimed at the educational content of BDP) and How to protect oneself during disasters (aimed at carrying out evacuations according to the regulation of the fire safety institutions and the security plan, which are preceded by practical-applied activities and role-playing games). For greater specificity and specification of topics, a different number of thematic lines have been allocated to the modules.

In section 3.3.5, the principles for thematic and project organization of the model are presented in detail.

Figure No. 10 illustrates the general form of the principle of thematic organization.

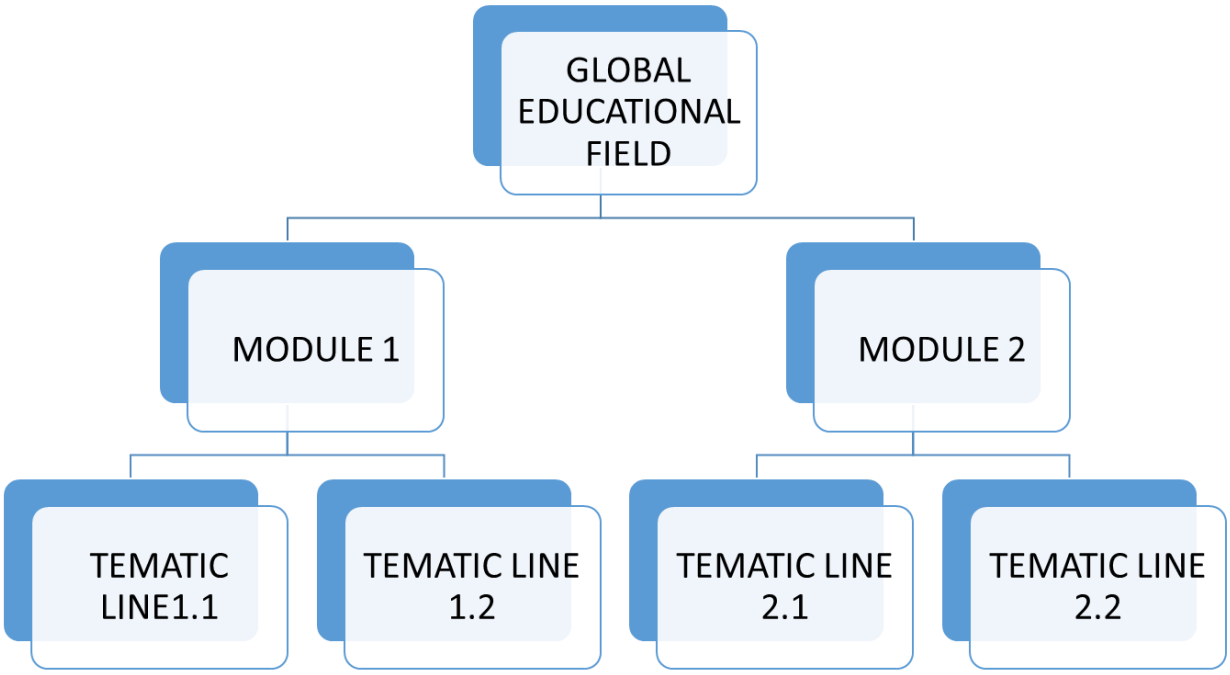

Fig. No. 10. ***Generalized view of the principle of thematic organization of PROJECT-BASED LEARNING***

The significance of the model is confirmed by the facts that its organizational format provides freedom for teachers to plan a different number of projects within the school year, in accordance with: the set goals, the strategy of the educational institution, as well as the characteristics of the children.

The educational model for the organization of the learning process for 6-7-year-old children is subordinated to the modern concept in education for the implementation of competence-oriented learning and the stimulation of project work. The innovative nature of the proposed model for pedagogical interaction is based on upgrading the idea of implementing PBL in preschool practices and organizing a comprehensive, integrated educational process. Its holistic expression is highlighted in the competencies focused on the overall development of the child.

To illustrate the above-mentioned opinions, a block diagram is presented in fig. 18.

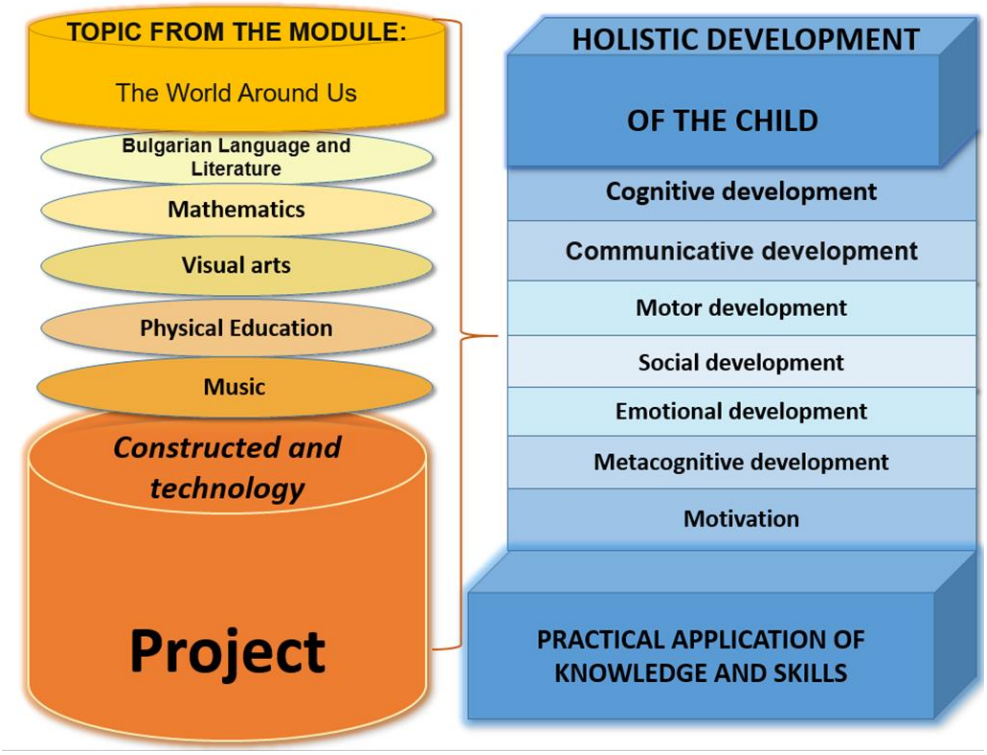

Fig. No. 18. ***Principle of integrating educational directions into projects***

The leading idea of the concept is to create an incentive for children's motivation to participate in the educational process and, respectively, to increase their cognitive activity by providing conditions for practical application of the acquired knowledge and skills.

To ensure the idea, all educational fields were considered and the possibilities of constructive activity to perform a two-way function were distinguished: as a motive and as a means of developing cognitive activity. Both its subject-manipulative aspect and the material result of it are preferred and are of interest to children. At the same time, they provide conditions for understanding theoretical knowledge and its application in practice, which leads to a higher level of understanding and opportunities for their creative interpretation.

The project orientation of pedagogical interaction implies greater opportunities for teamwork and exchange of ideas, which in turn is extremely important for the development of both

social and communicative skills, as well as for the development of emotional intelligence in children. Constructive activities have a manipulative nature and require the execution of thought processes, which develops motor skills and, respectively, the cognitive side of children. Collective work on a project allows children to understand their own achievements, and to set goals for improvement, which develops their metacognitive skills. The organization of such a type of pedagogical interaction contributes not only to increasing cognitive activity in children, but also to their overall development.

In section 3.5. a holistic model for tracking the achievements and progress in the development of 6-7-year-old children is presented.

The goal of developing an innovative toolkit is to serve as an objective assessment of child development. In this regard, the competences from all Educational Fields (EF) have been examined and restructured into a holistic model for monitoring and tracking achievements and progress in their development. The selection of eight key aspects for development, decomposed into the following components: cognitive, communicative, practical, motor, motivational, social, emotional and metacognitive, is argued in detail.

For the needs of the empirical study, a sample was taken from the complete model presented in Appendix No. 2. We believe that it could be used both for the assessment of school readiness and be successfully applied in preschool practices engaged in project-based learning, as it was prepared in accordance with the requirements of the SES and international education policies.

The concept of building the toolkit is based on the idea of emphasizing the practical application of the acquired knowledge and skills of children, while at the same time taking into account their predisposition and emotional state during the activities performed. The application of this approach ensures objectivity in the final assessment, since the individual characteristics of each child are taken into account (Fig. No. 23).

The overall structure of the COMBINATION OF THE TWO MODELS for pedagogical interaction in a project-oriented environment presents an educational framework with a pronounced holistic expression. It combines the active participation of the child, the creativity of the teacher and the possibilities of the PBL for developing key competences. The planned constructive activities make a significant contribution to the active participation of children in the projects, as well as to the development of their cognitive, social-emotional and creative skills.

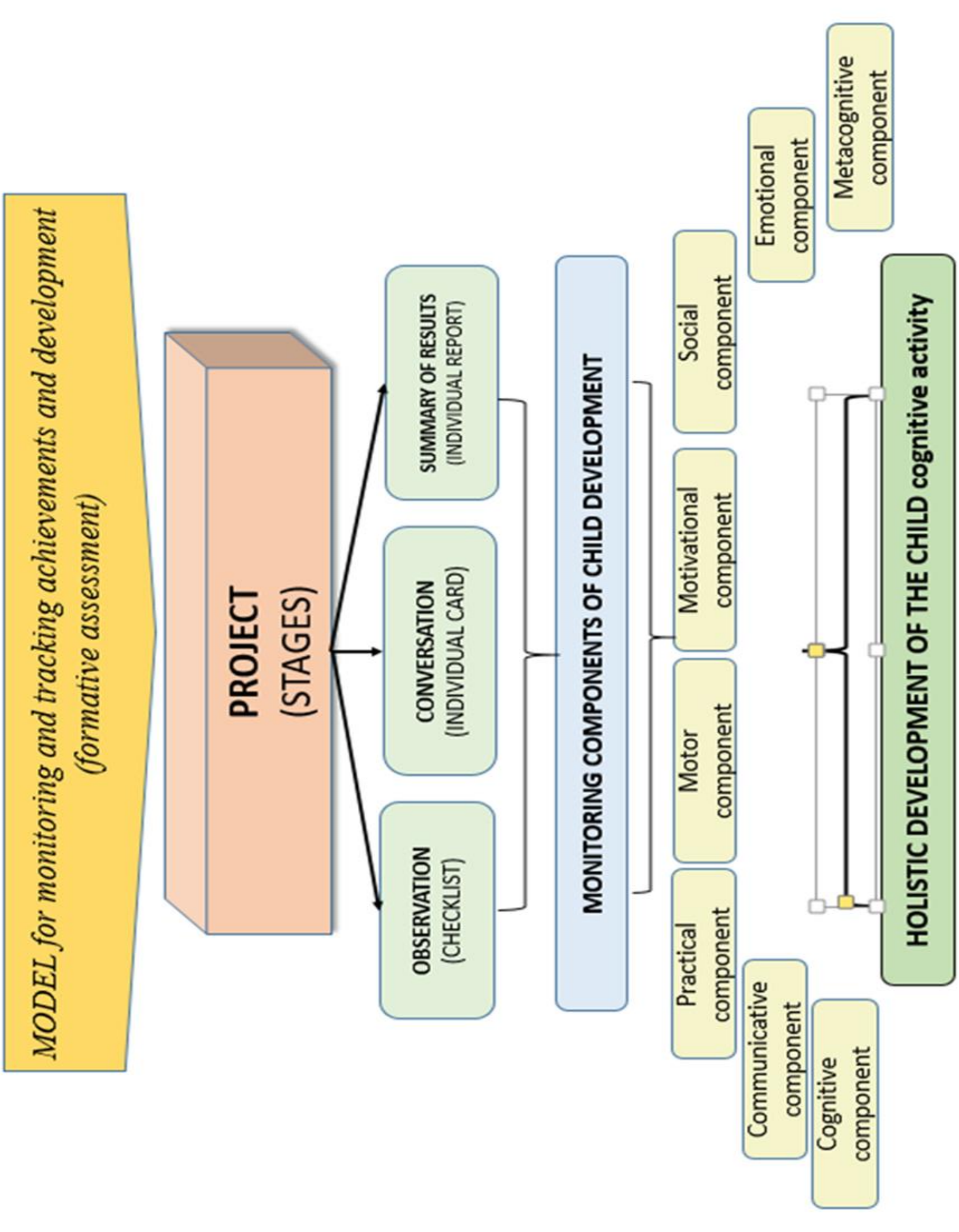

Fig No. 23. ***A holistic model for tracking the achievements and progress in the development of 6-7-year-old children in the conditions of Project-Based Learning***

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF THE OBTAINED RESULTS OF EMPIRICAL RESEARCH

To process the empirical data, the method of arithmetic averages was used, which allows to follow the dynamics of the results in the experimental group (EG) before and after the experiment.

• Calculating individual scores:

Each of the studied indicators is evaluated on a scale from 1 to 3, according to the following level:

1 point - low level;

2 points - medium level;

3 points - high level.

• Calculation of Arithmetic Average (Av):

In order to determine the overall success rate of the group according to a given indicator, an average arithmetic value is calculated, which reflects the level of achievement of all children included in the study. This indicator allows for a generalized characteristic of the group and to track the dynamics of its development during the pedagogical experiment.

• Calculation of standard deviation (SAv):

To account for the extent to which children's results are concentrated around the average value or are significantly scattered, a standard deviation is used. It provides information about the degree of homogeneity or heterogeneity of the group on the relevant indicator.

• Comparison between groups:

At the next stage, a comparison is made between the experimental and the control group. The aim is to establish whether the two groups start from equal positions at the entry level, as well as to assess the effect of the pedagogical intervention at the output level. If no significant differences are established at the entry, this guarantees the correctness of the experiment and provides grounds for attributing the conclusions of the final stage to the applied constructive activities.

• Intra-group comparison:

For each of the groups, the results of the entry and exit measurements are compared. Thus, it is established whether there has been a development over time and how statistically significant it is. Particular attention is paid to the experimental group, where the expectations are for a significant increase in results.

Practical relevance:

Along with the statistical significance of the differences, their practical value is also considered. It is determined by the size of the increase and the volume of children who have passed from a lower to a higher level according to the relevant criteria. This makes it possible to draw conclusions not only about the presence of differences, but also about the real pedagogical effect of the applied intervention.

4.1. Analysis of the results by criterion 1: Cognitive development

Table 10 presents the data from the comparison between the two groups at the beginning of the experiment by Criterion 1 Cognitive development.

Table No. 10

Entry level comparison table under Criterion 1

Criteria 1: *Cognitive Development* **Entry**				
Indicator	**EG**		**CG**	
	Av	**SAv**	**Av**	**SAv**
Reproduces knowledge	2.00	0.68	1.84	0.62
Understand notions	1.96	0.67	1.96	0.64
Analytical Thinking	1.92	0.70	1.88	0.75
Flexible thinking	1.84	0.74	1.84	0.65
Reflection	1.96	0.67	1.80	0.60
Attention	1.96	0.68	2.00	0.73

The data in the table show close average values between the experimental and control groups on all indicators. The results ***(Appendix No. 11.1. and 11.2.)*** outline an equal start for both groups and allow objective monitoring of the effect of the pedagogical intervention at the baseline level.

The graph in Fig. No. 24 visualizes the entry level between the two groups.

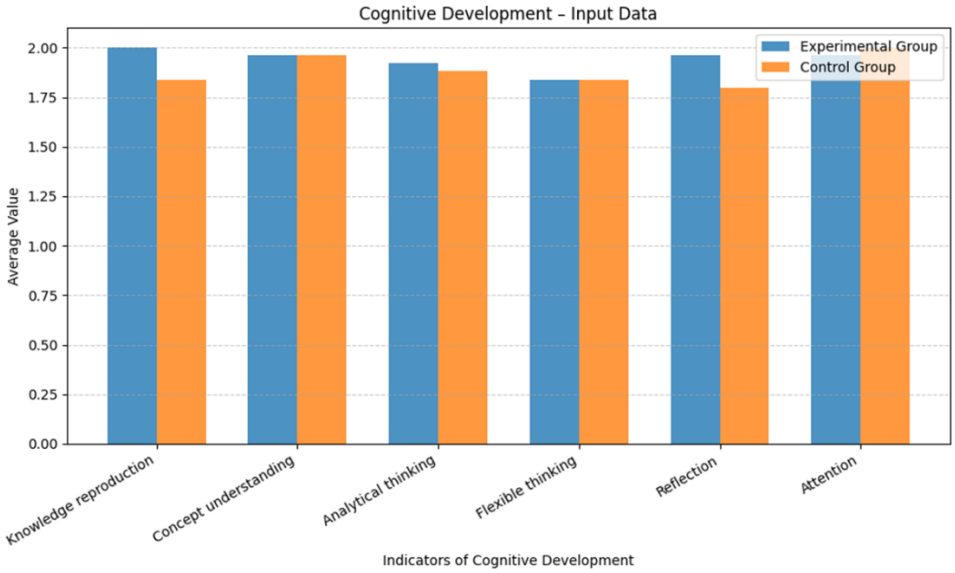

Fig. No. 24. ***Criterion 1: Cognitive development (entry level, by indicators)***

At the entry level on Criterion 1 for Cognitive Development, the results of the two groups are close. The average value for the experimental group is 2.01, while for the control group it is 1.89. The difference of 0.12 units (6.3%) is minimal and does not have a significant impact on the general picture. This confirms that at the start of the research the two groups were from relatively equal positions in terms of their cognitive development. Thus, the correctness of the experiment is guaranteed, since the observed changes in the output can be reasonably attributed to the applied constructive activities in project-based learning.

According to the indicator "Reproduces knowledge" (EG Av=2.00; KG Av=1.84), a slight advantage of the experimental group can be seen - the children recall facts and concepts, but at an elementary level.

According to indicators related to thinking - "Understands concepts", "Analytical thinking" and "Flexible thinking" - the results are within the average level in both groups (Av≈1.8–1.9). Here the need for more stimulating tasks that provoke children to compare, classify and look for different solutions is highlighted. That is why the baseline measurement includes group games such as "Discover the first letter of your teammate's name", tasks for selecting healthy foods and the application of puzzles – all aimed at developing analytical and flexible thinking.

The lowest values are reported in the indicator "Reflection" (EG Av =1.96; CG Av =1.80), which shows that children still have difficulty realizing and evaluating their own achievements. Therefore, at the exit level, special attention is paid to self-assessment activities - presentation of encyclopedias, as well as a final talk "Are you satisfied with your book?".

Table No. 11 presents data from the comparison between the two groups at the end of the experiment under Criterion 1.

Table No. 11

Comparative table at exit level under Criterion 1

Criteria 1: *Cognitive Development*				
Exit				
Indicator	**EG**		**CG**	
	Av	**SAv**	**Av**	**SAv**
Reproduces knowledge	2.80	0.41	1.92	0.70
Understand notions	2.92	0.41	2.00	0.71
Analytical Thinking	2.52	0.70	1.96	0.81
Flexible thinking	2.60	0.58	1.84	0.69
Reflection	2.64	0.61	1.84	0.60
Attention	2.80	0.41	2.00	0.79

The data show distinct differences between the experimental and control groups at baseline. While the results ***(Appendix 11.3. and 11.4.)*** of the control group remain close to the average level, the EG registered a significant increase in all indicators. The graph in Fig. No. 25 visualizes the exit level between the two groups.

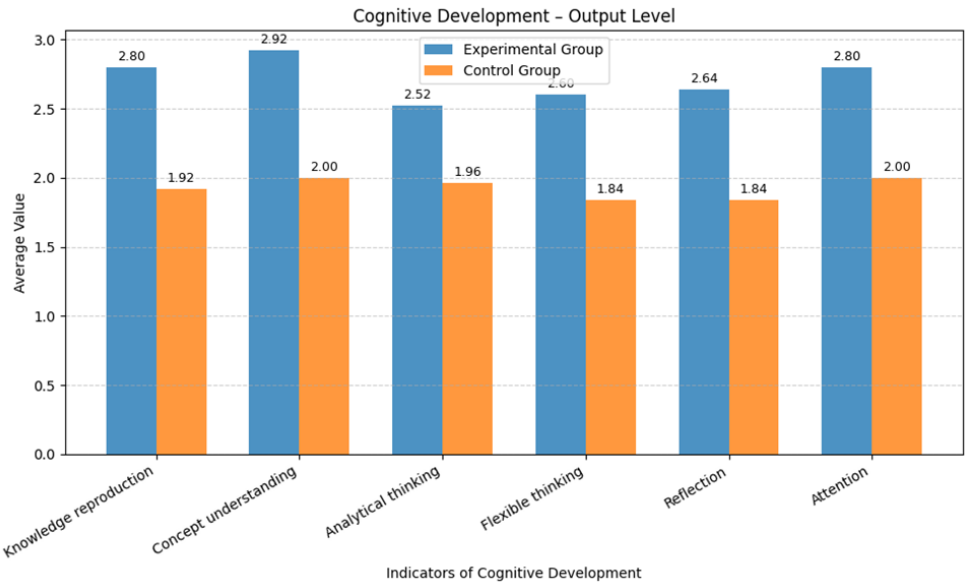

Fig. No. 25. ***Criterion 1: Cognitive development (exit level, by indicators)***

At the exit level according to Criterion 1 for cognitive development, a significant difference between the groups is observed. The average value for the EG is 2.78, while for the control group it is 1.93. The difference is 0.85 units, which represents an approximately 44% increase in favor of the EG. The graph clearly shows that the inclusion of constructive activities within the project-based learning has led to a distinct progress in the cognitive activity of the children.

According to the indicator "Reproduces knowledge", the children of the EG showed significantly higher results (average value 2.80) compared to the CG (1.92). Tasks for recognizing and naming objects and phenomena, as well as connecting them with specific terms, reveal a wider scope and more accurate use of knowledge in the EG.

For the indicator "Understands concepts, categories and dependencies", the EG reaches an average value of 2.92, while the CG - 2.00. Diagnostic tasks, in which children had to explain the meaning of concepts and look for connections between categories, showed a clearer and more systematic understanding in children from the EG.

According to the "Analytical thinking" indicator, the results are 2.52 for the EG against 1.96 for the CG. The included tasks for classifying, arranging and comparing elements, such as a puzzle and finding errors in a picture, show that the children in the EG are more successful in making generalizations and conclusions based on given signs.

When considering the indicator "Flexible thinking", the results of the EG (2.60) significantly exceed those of the CG (1.84). Diagnostic tasks that assessed the ability to offer more than one solution and to change strategy showed a higher degree of adaptability and creative thinking in the EG children.

According to the indicator "Reflection", the average value in the EG is 2.64 compared to 1.84 in the control group. Tasks related to self-evaluation and expressing opinions about personal achievements show that children in the EG can successfully recognize and articulate their strengths and progress.

In relation to the indicator "Attention" an average value of 2.80 is reported for the EG against 2.00 for the CG. In diagnostic tasks requiring sequential completion and concentration (e.g. seriations and application), children from the EG show more sustained concentration and better distribution of attention.

Table No. 12 presents the results of the comparison of the EG at the entrance and exit according to Criterion 1 - Cognitive development. A distinct increase is observed in all indicators. The average increase for the entire criterion is 0.77 units or 38.3%, which indicates a clear increase in cognitive activity as a result of the pedagogical intervention.

Table No. 12

Comparative table of the experimental group according to Criterion 1

Comparing the experimental groups' entry and exit level by Criteria 1: Cognitive development			
Indicator	**Entry Av**	**Exit Av**	**Increase**
Reproduces knowledge	2.00	2.80	+0.80
Understand notions	1.96	2.92	+0.96
Analytical thinking	1.92	2.52	+0.60
Flexible thinking	1.84	2.60	+0.76
Reflection	1.96	2.64	+0.68
Attention	1.96	2.80	+0.84
Average for the criterion	**2.01**	**2.78**	**+0.77 (38.3%)**

According to the "Reproduces knowledge" indicator, an increase from 2.00 at the entry to 2.80 at the exit (+0.80 units, +40%) is reported. This shows that children are more successful in recalling facts and concepts and relating them to new knowledge.

The indicator "Understands concepts" increased from 1.96 to 2.92 (+0.96 units, +49%). The increase here is the most significant and indicates a deeper understanding of facts, categories and dependencies.

The indicator "Analytical thinking" increased from 1.92 at the entrance to 2.52 at the exit (+0.60 units, +31%), which proves that children are now more confident in comparing, classifying and drawing conclusions.

The indicator "Flexible thinking" increased from 1.84 to 2.60 (+0.76 units, +41%), which indicates the development of the skills to seek different solutions and strategies.

The indicator "Reflection" increased from 1.96 to 2.64 (+0.68 units, +34%). This speaks of progress in awareness and appreciation of one's own efforts and accomplishments.

The "Attention" indicator shows an increase from 1.96 to 2.80 (+0.84 units, +42%). A more sustained focus and consistency in work is clearly noticeable.

The graph in Fig. No. 26 presents the comparison between the input and output levels of the experimental group on the individual indicators of Criterion 1 "Cognitive Development". It is

clear from the graph that after the pedagogical intervention, the average values for all indicators increased significantly. The most significant growth is reported in "Understands concepts" and "Reproduces knowledge", which shows that children are now more confidently using and linking cognitive categories and facts. There is also an increase in the other indicators - "Analytical thinking", "Flexible thinking", "Reflection" and "Attention", which indicates a complex development of cognitive processes.

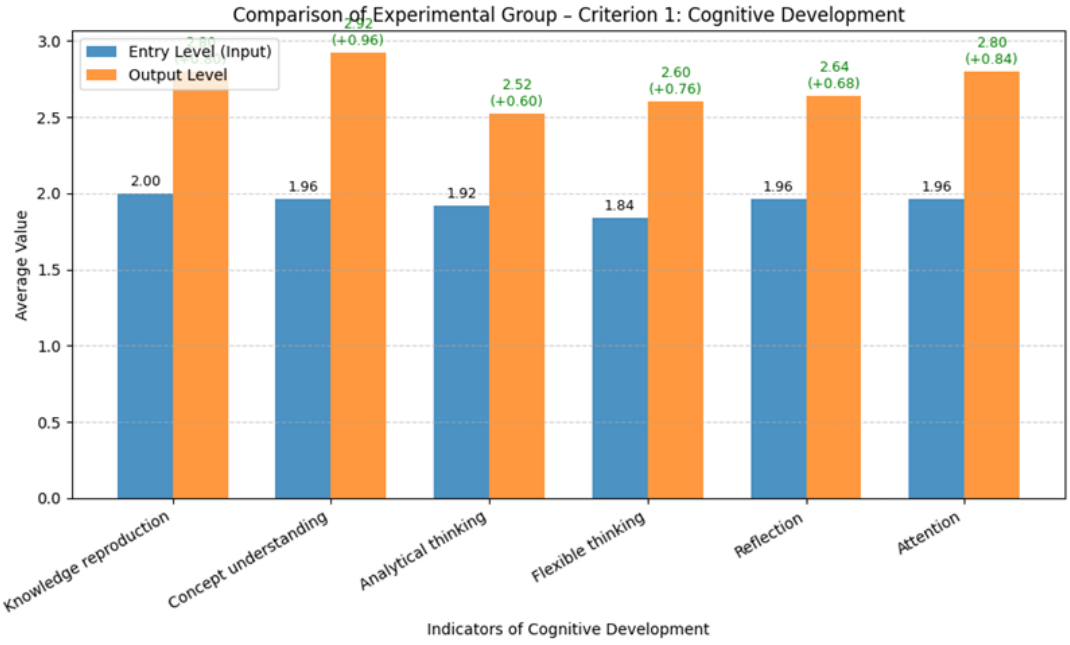

Fig. No. 26. ***Criterion 1: Cognitive development – experimental group (entry and exit level) according to indicators***

Fig. No. 27 presents the results in percentages, showing the relative increase from the entry level to the exit level measurement for each indicator. The data confirm a clear increase – from 25% to over 40% – in all the aspects studied. For example, in "Flexible thinking" and "Reflection" the increase is over 35%, which highlights that children have developed the ability to propose different solutions and to be aware of their own achievements. This percentage analysis makes the changes clearer and more comparable, showing not only the absolute but also the relative progress achieved thanks to the pedagogical impact.

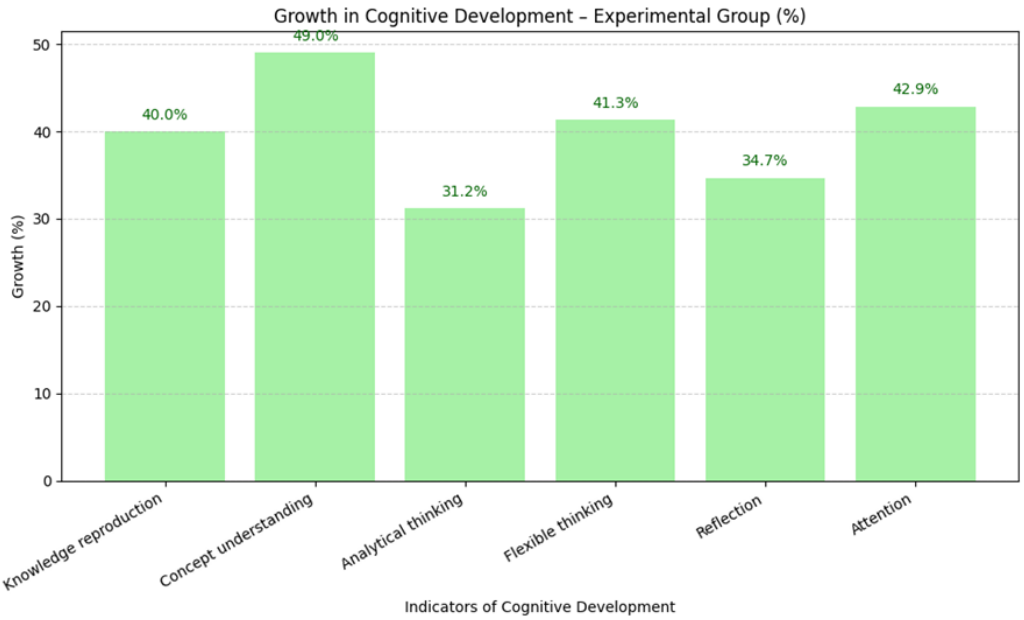

Fig. No. 27. ***Criterion 1: Cognitive development – growth in the experimental group (input and output)***

1.1. Analysis of the results according to criterion 2: Motivation

Table No. 13 presents data on the motivation of children from the experimental and control groups at the entry level.

Table No. 13

Comparative table of entry level under Criterion 2

Criteria 2: Motivation **Entry**				
Indicator	**EG**		**CG**	
	Av	**SAv**	**Av**	**SAv**
Curiosity and interest	2.00	0.65	1.88	0.72
Perseverance in the face of hardships	2.00	0.65	1.84	0.75
Initiative	2.00	0.65	1.88	0.73
Overall average	2.00	0.65	1.87	0.73

The results ***(Appendix No. 11.5. and 11.6.)*** show that the two groups exhibit relatively close starting positions, although the experimental group has a slight advantage (average value 2.00 vs. 1.87 for the control group, which represents a difference of 0.13 units or 6.5%). This confirms the equal start and creates conditions for objective monitoring of the impact of the pedagogical experiment.

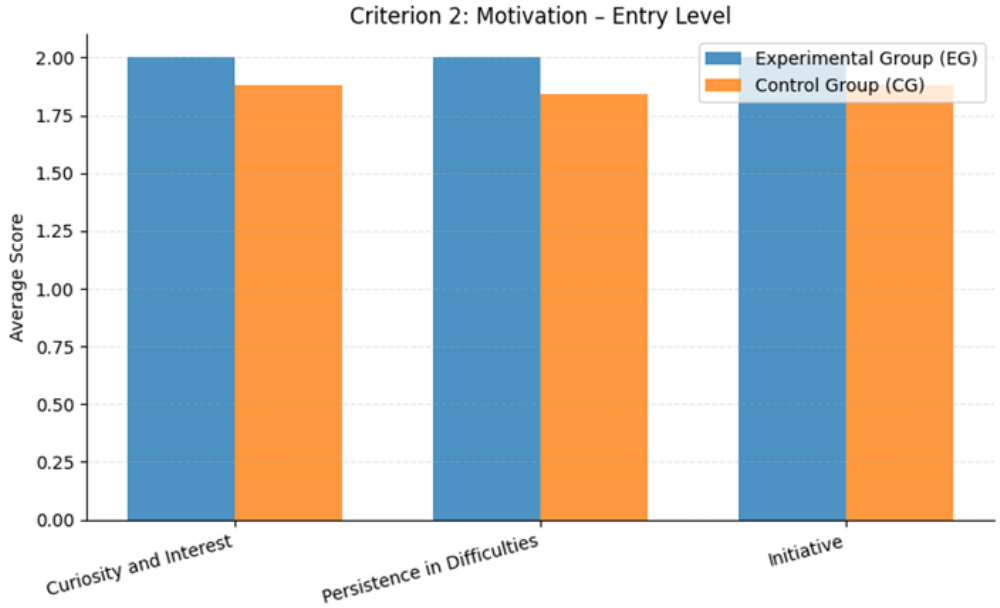

Fig. No. 28. ***Criterion 2: Motivation (entry level)***

The diagram visualizes the result of the entry level for both groups. Similar data are reported for the indicators "Curiosity and interest", "Perseverance in the face of difficulties", as well as "Initiative", measured by observation of the team game "Let's build a castle" and the independent construction task.

Table No. 14 presents the data from the analysis of the criterion "Motivation" to establish the baseline level of both groups.

It is evident from the table that the EG demonstrated distinctly higher values compared to the CG. The average value for the EG is 2.55, while for the control group it is 2.05, which indicates an increase of 0.50 units (24.4%).

The indicator "Curiosity and Interest" recorded data for the EG - 2.80 and for the CG - 2.08, which shows the desire of the children in the EG to share and brag about their achievements, while in the CG the interest remained more hesitant and limited.

When observing the performance of the assigned tasks, the following results are reported for the indicator "Persistence in the face of difficulties": for the EG - 2.32 and for the CG - 1.96), which proves the independence in progress in the experimental group, in contrast to the control group, where children more often sought assistance from the teacher.

Table No. 14

Comparative table at exit level by Criterion 2

Criteria 2: Motivation **Exit**				
Indicator	**EG – Av average**	**CG – Av average**	**Growth**	**Growth (%)**
Curiosity and interest	2.80	2.08	+0.72	+34.6 %
Perseverance in the face of hardships	2.32	1.96	+0.36	+18.4 %
Initiative	2.52	2.12	+0.40	+18.9 %
Overall Average	**2.55**	**2.05**	**+0.50**	**+24.4 %**

When monitoring the activity of children according to the indicator "Initiative", progress was found in favor of the experimental group, which is proven by the data: for the EG - 2.52 and for the CG = 2.12.

The graph in Fig. No. 29 clearly illustrates the increase in favor of the experimental group.

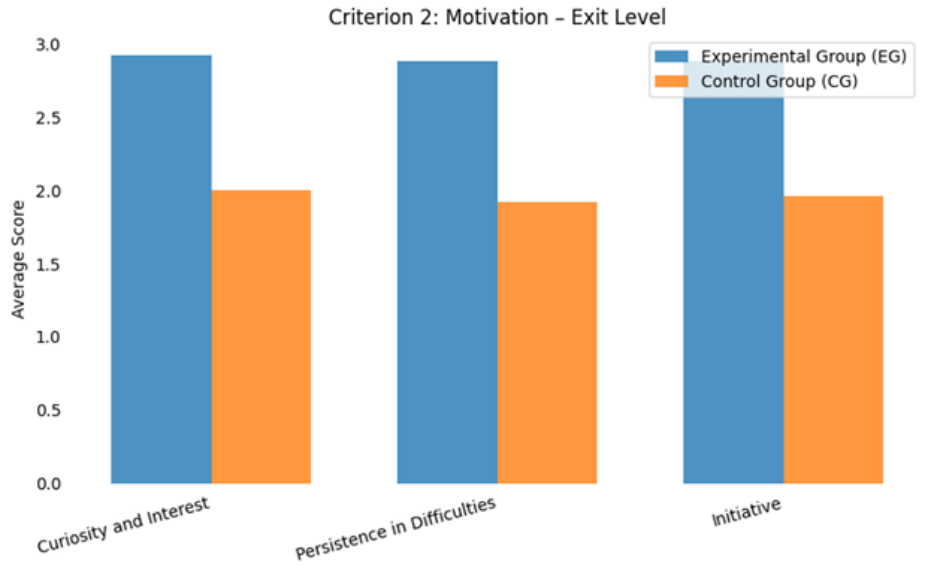

Fig. No. 29. ***Criterion 2: Motivation (exit level)***

According to the initial results of the criterion proving the motivation of the children, it can be concluded that the constructive activities included in the projects not only deepened the cognitive development, but also strengthened the motivation of the children from the experimental group - they demonstrate greater interest, greater independence, as well as a willingness to be actively involved in the activities.

Table No. 15

Comparison table of the experimental group according to Criterion 2

Comparing the experimental group's entry and exit level by Criteria 2: Motivation				
Indicator	**EG – Av average**	**CG – Av average**	**Growth**	**Growth (%)**
Curiosity and interest	2.00	2.80	+0.80	+40.0%
Perseverance in the face of hardships	2.00	2.32	+0.32	+16.0%
Initiative	2.00	2.52	+0.52	+26.0%
Overall Average	**2.00**	**2.55**	**+0.55**	**+27.5%**

Table No. 15 presents the average values and the increase in % of the **experimental group at the entry and exit level according to Criterion 2 "Motivation"**. The data show a *distinct growth in all indicators*, which *testifies to the positive influence of project work and constructive activities.*

An increase of +0.80 units (40.0%) was reported for the ***"Curiosity and interest" indicator***, which shows that children are significantly more often interested in the tasks and are actively involved.

In ***"Persistence in the face of difficulties"***, the increase is +0.32 units (16.0%) - a sign of greater resilience and perseverance in overcoming obstacles.

The indicator ***"Initiative"*** increased by +0.52 units (26.0%), which indicates that children more often offer ideas and take a role in group tasks.

On average, the criterion shows an increase of +0.55 units (27.5%), which is a clear indicator of a general increase in motivation as a result of participation in the project.

The graph in Fig. No. 30 visualizes the comparison of t***he entry and exit results for the experimental group according to the criterion "Motivation"***. A clear upward shift is seen in all indicators - especially in ***"Curiosity and Interest"***, where the value increases most significantly.

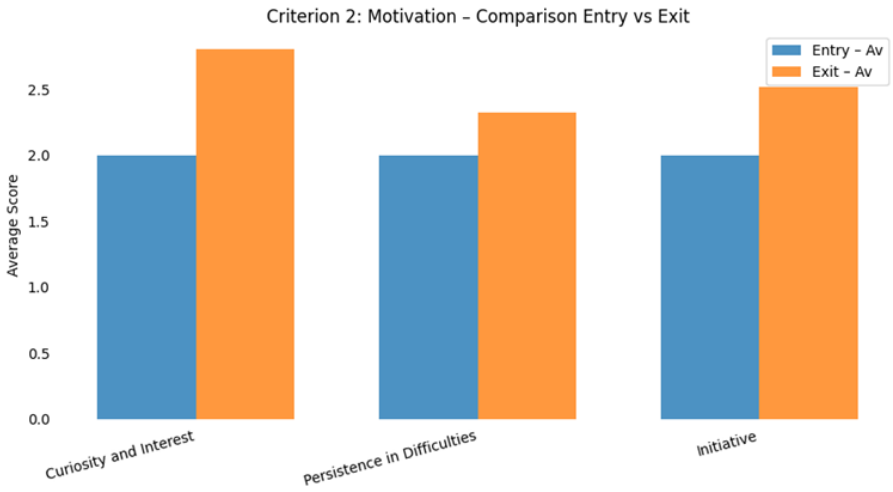

Fig. No. 30. ***Criterion 2: Motivation – experimental group (entry and exit level) by indicators***

Fig. No. 31 visually presents the increase in the experimental groups at the entry and exit levels.

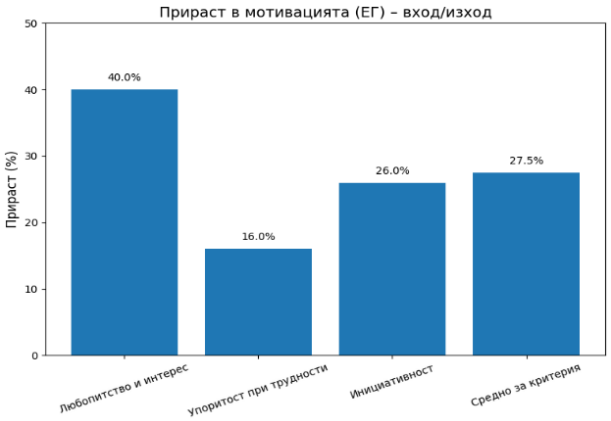

Fig. No. 31. *Criterion 2: Motivation – growth in experimental group (entry and exit)*

The data show that the most significant increase was observed in the indicator "Curiosity and interest" (40%), which is evidence of increased internal motivation and desire to participate in project activities. An increase of 26% was reported for the "Initiative" indicator, which shows that children are increasingly taking on independent roles and proposing their own ideas. In "Persistence in the face of difficulties", the increase is more moderate - 16%, but is also a positive sign of developing perseverance and readiness to overcome difficulties. The average increase for the criterion is 27.5%, which confirms that as a result of participation in the project, the experimental group demonstrated a higher level of motivation, resilience and personal activity compared to the beginning of the study.

4.3. Analysis of the results under Criterion 3: Application of knowledge and skills

Fig. No. 32 presents the data for comparison under Criterion 3: Application of knowledge and skills at the entry level in the experimental and control groups.

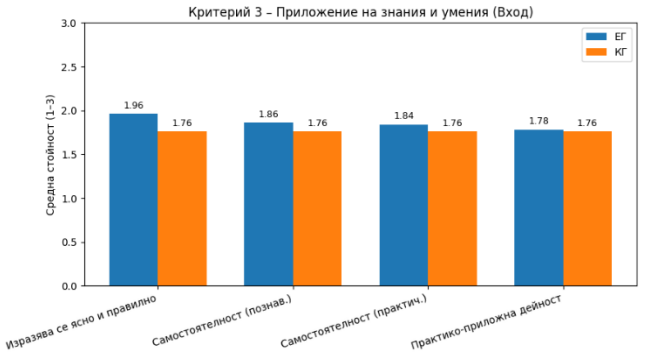

Fig. No. 32. *Criterion 3: Application of knowledge and skills (entry level)*

The diagram in Fig. No. 32 shows minimal differences from the data presented in the table. According to the indicator for Clear and Correct Expression, the results were recorded: for the experimental group – 1.96 and for the control group – 1.76, assessed in the conversations with the children on Tasks 1, 3, 5, 6, 7, where logical expression, correct use of words and sequence in the story are monitored. The difference is insignificant – both groups are at an average level.

With tasks 1, 2, 3 and 4, the children's independence was measured when performing cognitive tasks, where the results for the experimental group (1.86) and for the control group (1.76) were reported, which shows a minimal difference in the number of children who cope without help.

When observing the implementation of the constructive task and the application of a "healthy plate", the following results are reported for the indicator "Independence in practical tasks": for the experimental group - 1.84 and for the control group - 1.76, which shows an approximately equal start with a minimal difference in the number of children who manage without help.

According to the indicator for "Quality and precision in the implementation" in the practical-applied activity, the data reported the values 1.78 for the experimental group and 1.76 for the control group. Accuracy and completeness in performance (cutting, gluing, arranging) were monitored. The two groups are practically equal at entrance level.

According to the criterion “Application of knowledge and skills”, the two groups start from close positions. The small differences in favor of the experimental group are insignificant, which gives us a stable basis for correctness in the comparison of the initial results and for proving the effect of the pedagogical experiment.

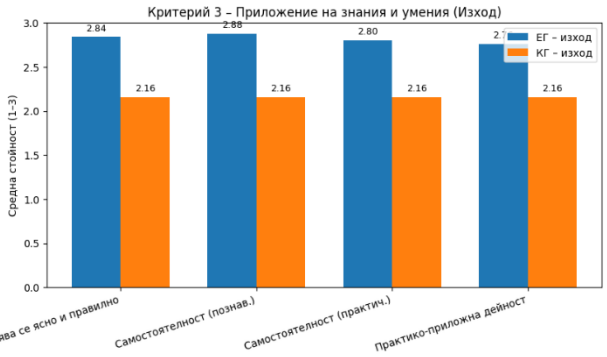

Fig. No. 33. *Criterion 3: Application of knowledge and skills (exit level)*

Fig. No. 33 clearly illustrates the exit level under Criterion 3 for both groups. Children from the experimental group demonstrate a significantly higher level in all indicators compared to the control group. The difference of 0.66 units on average (≈37%) reflects the positive impact of constructive activities within the framework of project-based learning.

4.4. Analysis of the results for Criterion 4: Socio-emotional interaction

Table 19 presents data from a comparison of the two groups at the entry level for Criterion 4: Socio-emotional interaction.

Table No. 19

Entry level comparison table under Criterion 4

Criteria 4: *Socio-emotional interaction* **Entry**			
Indicator	**EG - Av**	**CG - Av**	**Variation**
Listens and complies	2.00	1.76	+0.24
Tolerance and respect	2.00	1.68	+0.32
Positive attitude	2.00	1.76	+0.24
Overall Average	**2.00**	**1.73**	**+0.27**

The data from the table makes it clear that the experimental group (EG) started with slightly higher values (average 2.00) compared to the control group (CG) (average 1.73). The most distinct difference is in the indicator "Tolerance and respect" (+0.32), while in the other indicators - "Listens and complies" and "Positive attitude" - the advantage of the EG is more moderate (+0.24).

Fig. No. 36 visualizes the data from the measured values by indicators.

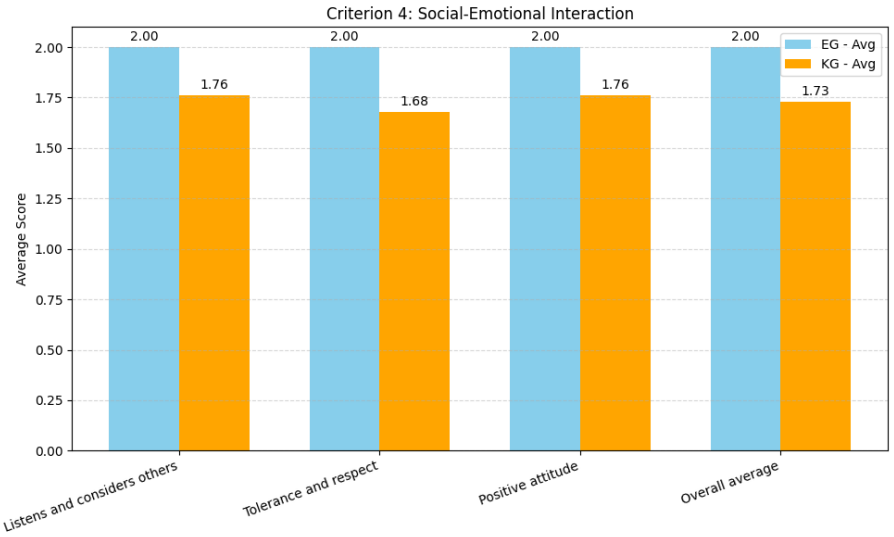

Fig. No. 36. *Criterion 4: Social-emotional interaction (entry level)*

At the entry measurement for Criterion 4 "Socio-emotional interaction", children from both groups were involved in a series of tasks that provided an opportunity to track how they were coping with basic social-emotional skills.

The indicator "Listens and considers the opinions of others" was assessed in the framework of the team game "Let's build a castle", which required coordination of actions and agreement of ideas. The average values for the two groups are close – 2.00 for the experimental group and 1.76 for the control group, which indicates that children at this stage show similar difficulties and opportunities in collective interaction.

The ability to tolerate and respect was again monitored in the context of group work and discussions focused on social roles and rules of behavior. The differences between the two groups are minimal (EG – 2.00; CG – 1.68) and do not outline a distinct advantage, but rather confirm a similar starting level.

The indicator "Positive attitude", measured through the conversation "Show how you feel today" and the self-assessment after the task "Wonderful house", also revealed similar results (EG - 2.00; CG - 1.76).

From the presented parameters, it can be concluded that the two groups entered the study with relatively close socio-emotional skills, which guarantees the objectivity of the subsequent comparison.

Table No. 20 presents data from the baseline level of the two groups according to criterion 4, which measures the socio-emotional interaction of children.

Table No. 20

Comparative table of exit level according to Criterion 4

Criteria 4: *Socio-emotional interaction* Exit		
Indicator	**EG – Av average**	**CG – Av average**
Listens and complies	2.80	2.08
Tolerance and respect	2.32	1.88
Positive attitude	2.52	1.92
Overall Average	**2.55**	**1.96**

The data in the table reflect a distinct increase in social-emotional skills in the experimental group compared to the control group. The average value for the EG is 2.55, while for the CG – 1.96, which represents an increase of 0.59 units or approximately 30%. The differences are significant and indicate that the children from the experimental group demonstrate a higher level of acquired social skills and a positive attitude in communication.

Fig. No. 37 presents a graphical representation of the data from the table by indicators.

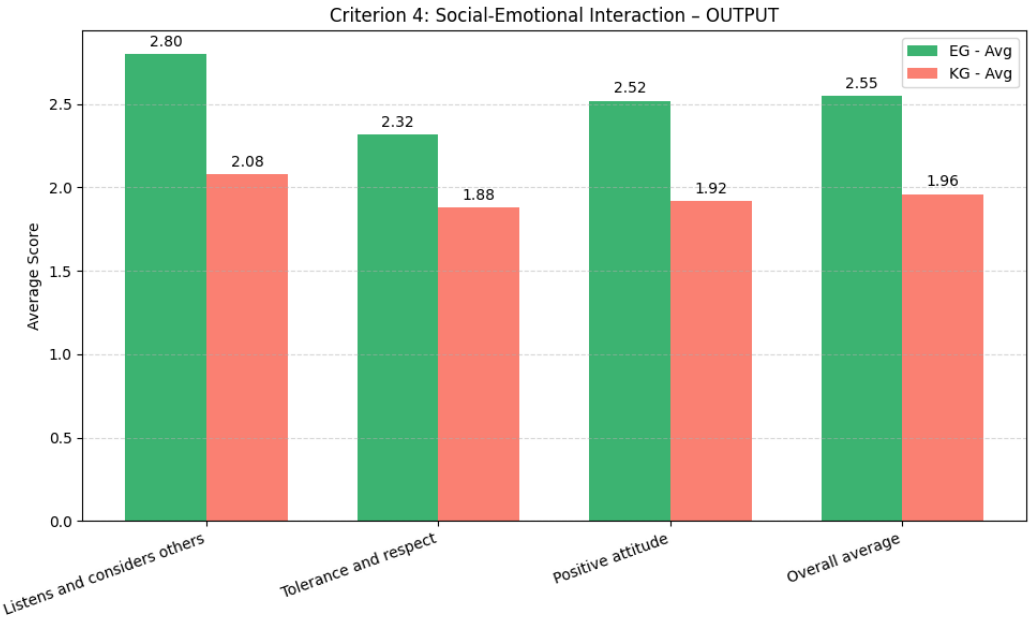

Fig. No. 37. *Criterion 4: Socio-emotional interaction (exit level)*

When observing the social-emotional manifestations of the children, the following results were found according to baseline indicators:

According to the indicator "Listens and takes into account the opinion of others", the data shows values of 2.80 for EG and 2.08 for CG, which indicates a greater willingness of children from the EG to wait their turn, comply with the rules and respect the opinion of their peers. In the CG, the ability to dialogue and observe order remains at a lower level.

For the indicator "Shows tolerance and respect", the average value for EG is 2.32, and for CG - 1.88. This reflects a more pronounced ability of the EG children to show understanding and mutual assistance in joint activities, while in the CG these qualities are less developed.

According to the "Positive Attitude" indicator, the results show the values for the EG - 2.52 and for the CG - 1.92. With the EG, a more stable positive attitude and satisfaction with what has been achieved is reported, while with the CG, fluctuations in emotional stability are preserved.

When observing the socio-emotional manifestations of the children at the exit level, a clear advantage of the experimental group over the control group was established. The greatest growth is reported in the indicator "Listens and complies" - children from EG show a significantly greater willingness to follow rules and respect other people's opinions. For the indicators "Tolerance and respect" and "Positive attitude", higher values are also registered for EG, which indicates the development of skills for cooperation, mutual assistance and emotional resilience. In summary, the results indicate that project and constructive activities have had a positive impact on the socio-emotional interaction of children in the experimental group.

Table 21 presents data for the experimental group on the indicators of Criterion 4: Social-Emotional Interaction.

Table 21

Comparative table for the experimental group on Criterion 4

Comparing the experimental group's entry and exit levels by Criteria 4: *Socio-emotional interaction*				
Indicator	**Entry - Av**	**Exit - Av**	**Variation**	**% Growth**
Listens and complies	2.00	2.80	+0.80	+40.0 %
Tolerance and respect	2.00	2.32	+0.32	+16.0 %
Positive attitude	2.00	2.52	+0.52	+26.0 %
Overall Average	2.00	2.55	+0.55	+27.5 %

At the entry level on Criterion 4 "Socio-Emotional Interaction", the children from the experimental group achieved an average value of 2.00, which outlined an initial level requiring additional stimulation. At the exit, after the implementation of design and construction activities, the value increased to 2.55, which represents an increase of 0.55 units or 27.5%.

The graph of fig. No. 38 clearly shows the increase in values for all indicators - most significantly for "Listens and obeys", where the growth reaches 40%.

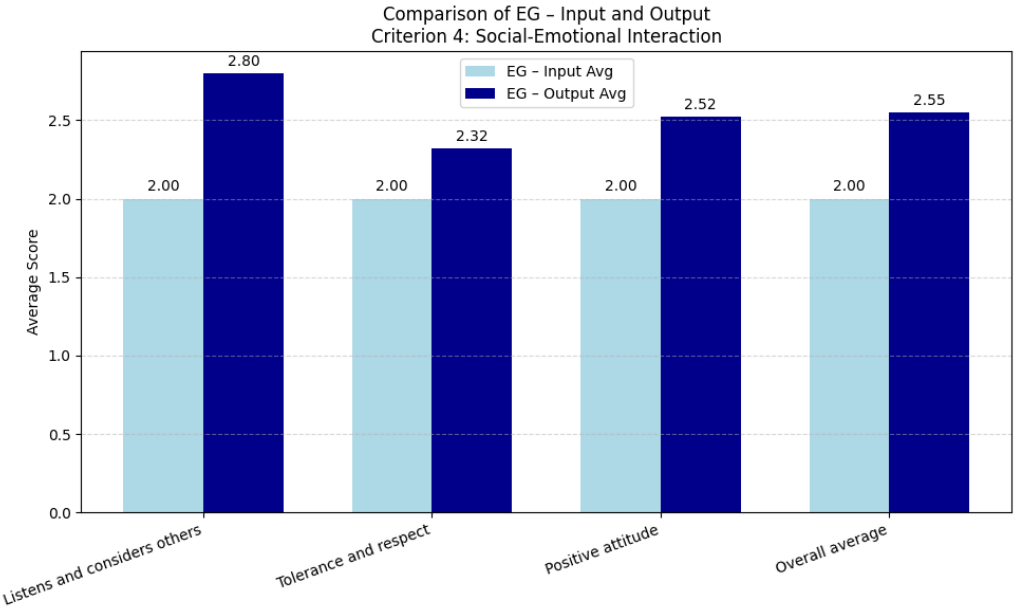

Fig. No. 38. *Criterion 4: Social-emotional interaction - experimental group (entry and exit level) according to indicators*

According to the indicator "Listens and complies", the most significant growth is reported - from 2.00 at the entrance to 2.80 at the exit (+40%). This shows that children are improving their communication skills, as well as showing attention and following the established rules in group activities.

The indicator “Tolerance and respect” shows a more moderate increase – from 2.00 to 2.32 (+16%). This indicates that although progress has been made, some children still need targeted support in building cooperation skills and respect for different points of view.

The indicator "Positive attitude" increased from 2.00 to 2.52 (+26%). Children show more confidence, joy from achievements and a sustainable positive mood when completing tasks.

Within the experimental group, a significant development is established under Criterion 4. The average value at the entry level was 2.00, while at the exit it reached 2.55, which represents a total increase of 27.3%. This result is indicative of a tangible strengthening of the children's social-emotional skills - better adaptation in the group, a more stable positive attitude and a more pronounced willingness to cooperate. The data confirm that project-based constructive activities create a favorable environment for the development of socio-emotional interaction at preschool age.

In summary of the empirical study, we can conclude that the results of the pedagogical experiment convincingly prove the role of constructive activities in the conditions of project-based learning for increasing children's cognitive activity. In all four criteria - cognitive development, motivation, application of knowledge and skills and socio-emotional interaction - significant increases in the average values are registered in the experimental group compared to the initial level. The most noticeable growth is in the application of knowledge and skills (49.5%), followed by cognitive development (38.3%), motivation (29.7%) and social-emotional interaction (27.3%).

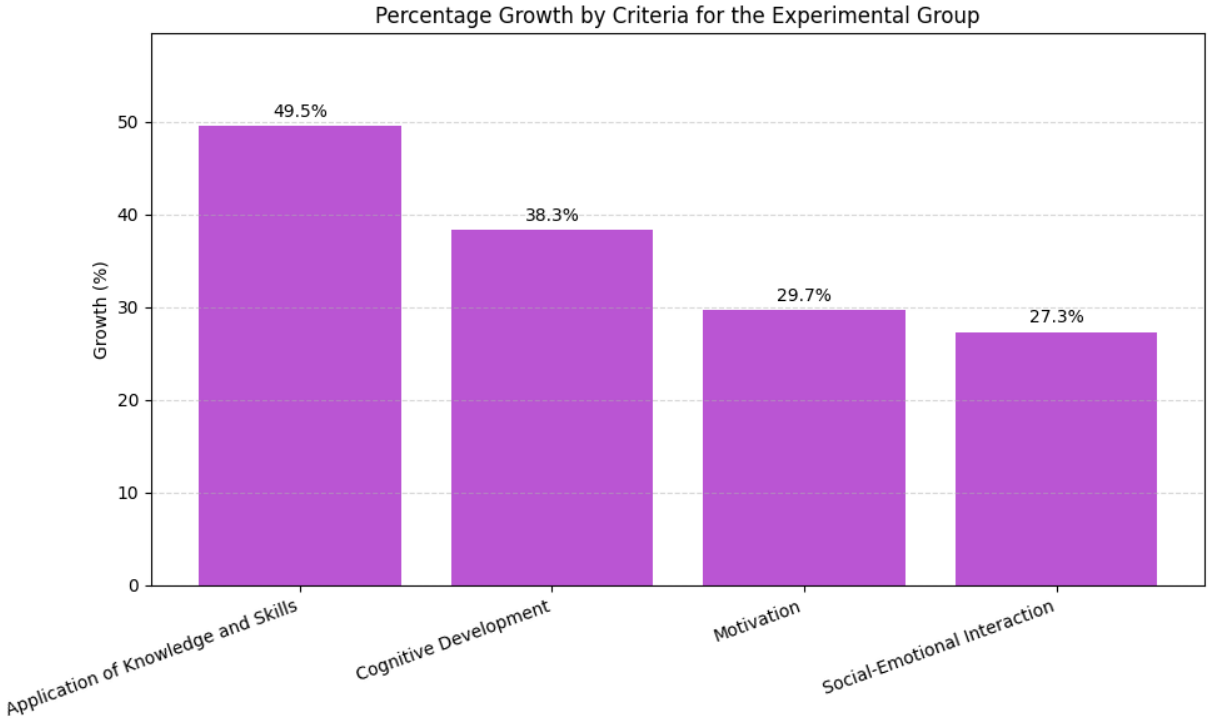

Fig. No. 40. *Growth according to criteria in the experimental group*

This positive dynamic shows that the systematic application of constructive activities, integrated into a project organization of pedagogical work, not only stimulates cognitive activity, but also creates conditions for complex development - intellectual, practical, social and emotional. Children become more confident, proactive, responsible and motivated to learn, and the acquired knowledge is transformed into skills for practical application and social realization.

CONCLUSION

From the above, we can conclude that the experimental model confirms the role of constructive activities, which can be considered as a reliable pedagogical tool for building an active, competent and socially adapted personality even at preschool age.

The results of the conducted empirical study confirm the hypothesis of the study, the creation of conditions for active mental activity, creative development and purposeful practical application of knowledge in the conditions of PBL, then the level of cognitive activity of children increases.

Conclusions based on the conducted experiment:

1. The specialized literature review and theoretical analysis revealed that the scientific question of our research on the organization of activities in kindergarten through project-based learning and its impact on the quality of the educational process has not yet been sufficiently clarified. This gave us grounds to create an experimental didactic model with an appropriate methodology and tools for studying its effectiveness.

2. PBL is an up-to-date form of organization of activities in kindergarten, which positively affects the quality of the educational process.

3. The results of testing the experimental model for PBL, implemented in conditions of interactive interaction with preschool children, based on the activity approach, prove its effectiveness and applicability. The registered growth of mental activity and creative development leads to an increase in the level of their cognitive activity, which proves the working hypothesis.

4. The overall structure of the model is based on the combination of innovation, normative compatibility and rationality in the education of children from the preparatory group, while at the same time creating prerequisites for building sustainable skills in them.

5. The role of constructive activities integrated into the general model is proven in creating motivation in children for active mastery, comprehension and application of knowledge mastered in various educational areas.

6. The created model for monitoring and tracking the achievements of 6–7-year-old children in the conditions of project-based learning is effective and can be used as a tool for assessing children's school readiness.

7. The final statistical ranking reveals that the highest percentage of growth was recorded in the application of knowledge and skills (49.5%), followed by cognitive development (38.3%), motivation (29.7%) and socio-emotional interaction (27.3%), which speaks of a targeted and effective impact of project-based constructive activities on the complex development of children.

SCIENTIFIC CONTRIBUTIONS

OF THE DISSERTATION PAPER

1. Based on a thorough and multi-directional analysis, the current state and contemporary characteristics of preschool education in Bulgaria have been revealed. The role of constructive activities has been analyzed and the prerequisites (approaches and strategies in education) for developing cognitive activity in children in conditions of PBL have been revealed.

2. An educational model for pedagogical interaction in a project-oriented environment has been theoretically justified. The model is of an integrative nature for developing key competencies through constructive activities in kindergarten.

3. In order to develop the cognitive activity of 6-7-year-old children, the educational content for the fourth age group has been systematized in global educational areas, which serve to plan thematic projects, within which competencies from all educational areas are integrated.

4. An educational and methodological model for pedagogical interaction in project-based learning conditions has been created and tested, which ensures practical applicability of the knowledge acquired in educational areas through various constructive activities and active participation in thematic projects.

5. For the implementation of the educational model for pedagogical interaction in a project-oriented environment, a toolkit has been developed and tested, which ensures objectivity in assessing the achievements of 6–7-year-old children and the progress in their development.

PUBLICATIONS

RELATED TO THE TOPIC OF THE THESIS

1. GEORGIEVA, V. 2021. Project work on construction and technologies to help the children's teacher for complex development of key competencies in 6–7-year-old children. Published in: Yearbook of "Konstantin Preslavsky" University of Shumen, 50 years together writing history, Vol. XXV D, Shumen, University Publishing House "Konstantin Preslavsky", pp. 65–72, ISSN: 1314 – 6769, 2021.

2. GEORGIEVA, V. 2022. STEM approach in project-based learning for 6–7-year-old children. Published in: Yearbook of "Konstantine Preslavsky" University of Shumen, Faculty of Pedagogy, Vol. XXVI D, Shumen, University Publishing House "Konstantin Preslavsky", pp. 114–120, ISSN: 1314 – 6769, 2022.

3. GEORGIEVA, V. 2025. The influence of constructive activities on the cognitive and physical development of children through an integrated approach in kindergarten. Published in: Collection of scientific papers from a traveling seminar Bucharest – Malta 02.06.2025 – 06.06.2025 "40 years of the Faculty of Pedagogy", Shumen, University Publishing House "Konstantin Preslavsky", pp. 18–23, ISBN 978-619-201-864-1, 2025.