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DEVELOPING PRESCHOOLERS’ CREATIVITY THROUGH THE INTEGRATED APPROACH TO ACTIVITIES WITH MATHEMATICAL CONTENT

Specialization: 532.01. Preschool Didactics

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CONCEPTUAL FRAMEWORK OF THE RESEARCH

Relevance and importance of the chosen topic: The activity of preschool children, globally, is addressed by focusing on creating a vertical continuity with other education levels. The systemic approach constitutes a true innovation in the current Early Childhood Education Curriculum, as it successfully articulates, in a coherent and flexible manner, the guidelines of European educational policy documents. This approach is directly aligned with the *European Parliament and Council Recommendation on Key Competences for Lifelong Learning (2006/962/EC), the European Commission Communication, and the EU Council Conclusions on Early Education and Care – Giving Our Children the Best Start for Tomorrow's World (2011/C/175/03), as well as the European Quality Framework developed through A Quality Framework for Early Childhood Education and Care (Early Childhood Education and Care Working Group, 2014*). It also correlates with *the Council Recommendation on the Development of High-Quality Early Childhood Education and Care Systems (May 2018)*, offering a solid conceptual foundation for modernizing early education. Similarly, the systemic approach facilitates achieving the objectives set out in European and national strategies for education, such as: *the Europe 2020 Strategy, the National Strategy on Reducing Early School Leaving (Government Decision no. 417/2015), the National Strategy on Social Inclusion and Poverty Reduction (Government Decision no. 383/2015), the Strategy for the Protection and Promotion of Children's Rights (Government Decision no. 1113/2014), and the Strategy for the Inclusion of Romanian Citizens Belonging to the Roma Minority for the Period 2014-2020 (Government Decision no. 18/14.01.2015).* It is also related to the *National Strategy for Lifelong Learning 2015-2020 (Government Decision no. 418/2015) and the National Strategy for Sustainable Development – Horizons 2013-2020-2030*, emphasizing the concern for aligning educational policies with the strategic directions of sustainable development. Through this alignment with European and national regulatory frameworks, the systemic approach not only optimizes the structure and functionality of the educational process but also creates favorable conditions for initiating relevant and constructive changes based on the progress and achievements made so far.

In addition to the systemic approach to learning, the Early Childhood Education Curriculum (2019) continues to promote the integrated approach to curricular content, thus supporting the holistic development of preschoolers in accordance with the demands of society and with the general characteristics of the environment in which they live. Models of integrated design of curricular content help build dynamic, flexible psychological structures that support the child in making appropriate and creative decisions, facilitating the development of self-confidence and the establishment of connections between contents.

In this context, the need to develop creativity in preschoolers becomes a key factor regarding their ability to adapt to new situations – an important element of personal evolution and self-actualization. Education should not prepare the child only for what is happening around them at a given moment, but for facing future challenges and the

changes that occur at various stages of society, whether economic, technological, or related to work methods. Therefore, what matters is not the amount of knowledge a person can store, but the skills they develop to cope with any situation, to find adaptive and innovative solutions that allow for continuous progress.

One of the essential areas for developing creativity in preschoolers is the Science Domain, with activities structured around mathematical content, because the surrounding world is mathematical – distances, calculations, dimensions, numbers, time, etc. Considering these aspects, as well as the age group we are addressing, activities with mathematical content require an integrated approach to curricular content, aiming to demonstrate to the child the necessity of studying these concepts and to identify the applicability of mathematical notions in daily life. In these conditions, an effective integration of mathematical content can optimally support the development of the children's creative potential. The phrase "activities integrated with mathematical content" combines the notion of "integrated activity," found in curricular documents, with "mathematical content," corresponding to the Science Domain and specifically mathematical activity. The combination of these two terms defines the scope of research in this paper, as creativity can be found in all areas of activity, being a broad concept, extremely important for adapting to new situations and for individual evolution.

In support of these ideas, mathematician Francis Su states, "*Mathematics makes the mind its playground. Doing mathematics properly means initiating a type of game: having fun with the ideas that arise when exploring patterns and cultivating awe at how things work. Mathematics does not mean memorizing procedures or formulas, or at least that is not where you should start (...). We can be drawn to mathematics, enticing others as well, through the deep human desire for play"* [39, p. 63]. These statements highlight the accessible and practical nature of mathematics, an apparently rigid field that can be adapted to the understanding level of those who engage with it, especially through elements of play, as well as its importance in human development.

Therefore, harnessing the potential of the early years of life, considered the most prolific in creative products but also the most opportune for the development of the child's personality traits, should be one of the priorities of preschool education. In these conditions, actions aimed at developing creativity in preschoolers are timely and welcome, especially in activities with mathematical content, which involve abstract and complex concepts.

Description of the situation in the research field and identification of the research problem:

Romanian authors who have addressed ***creativity*** in their research topics – primarily in the psychology of technical and scientific creativity—include: Al. Roșca [35], A. Neculau [25], M. Golu [13], and M. Zlate [45]. They were joined, in the field of school psychology, by A. Cosmovici [7], T. Crețu [9], M. Caluschi [5], M. Dincă [11], L. Anucuța and P. Anucuța [3], and in the field of the psychology of art, by U. Șchiopu

[40]. With regard to studies on the ***development of creativity in preschoolers***, we mention the authors I. Sima [37], E. Rafailă [32], and M. Lespezeanu [20].

In the Republic of Moldova, ***the issue of creativity*** has been addressed by several researchers, including Ig. Racu [31], P. Jelescu and R. Jelescu [17], V. Prițcan [30], E. Losîi [21], M. Pavlenco [27], T. Rusuleac [36], and E. Haheu-Munteanu [15].

Creativity, due to its complexity and the variety of approaches, has been defined and studied in multiple ways by various authors. J. Bruner [4, p. 8] stated: "Creativity consists in the combinatory activity of placing things in new perspectives," considering it a process of reorganizing and rearranging the potential each individual possesses. M. I. Stein [38, p. 25] referred to creativity as "that product which is expressed in a new work, accepted as valid, useful, or satisfactory by a group at a given moment," emphasizing the element of novelty in an activity as the source of its creative value, while also adding the aspects of value and usefulness of the creative product.

Research on creativity has materialized over time into a vast body of theories, concepts, models, visions, principles, and theses developed in the fields of education sciences and psychology. These theoretical frameworks have significantly contributed to understanding creative processes, the determining factors, and how creativity manifests and develops in preschool children. In this direction, there are a series of major theoretical orientations that have laid the foundation for the ***development of human creativity***, ***with applicability also to preschoolers***. Among these, the following theories can be mentioned: *the psychoanalytic theory* (S. Freud, D.M. Zamfirescu); *the associationist theory* (I. Maltzman, S.A. Mednik); *the gestalt theory* (M. Wertheimer, W. Kohler, R. Arnheim); *the behaviorist theory* (J. Rossman, J. Parnes, R. Hyman); *the humanist theory* (A. Maslow, R. May, C. Rogers, C. Moustakas); *the cultural theory* (M.I. Stein, M. Mead, H.H. Anderson); *the factorial theory* (J.P. Guilford, H.G. Gough, V. Lowenfeld, P. Popescu-Neveanu); and *the cognitive theory* (D. Cropley, G. Popescu). *Other theories related to the development of creativity* were developed by T. Amabile, H. Gardner, N. Eliot, A. Graham, I. Gandhi, J.T. DeGraff, E. Torrance, G. Wallas, I. Taylor, J. Piaget, Th. Ribot, M.I. Stein, A. Maslow, G.W. Allport, L.S. Vygotsky, A.V. Zaporojhets, A.N. Leontiev, and others. ***The integrated approach to curricular content*** *was researched by* M. Chiriac, C. Crețu, C. Cucoș, L. Culea, A. Grama, M. Ionescu, and others. ***The formation of elementary mathematical representations in preschoolers*** is found in the studies of researchers such as M. Neagu, G. Beraru, C. Petrovici, V. Păduraru, M. Pavlenco, and others.

The analysis of the mentioned studies highlighted the following **contradiction:** between the increasing demands of society at the present stage regarding the development of preschoolers' creativity and the lack of a methodology for activities integrated with mathematical content.

This leads to the **research problem**: What are the theoretical and practical foundations for developing preschoolers' creativity through activities integrated with mathematical content?

The purpose of the research is to determine the theoretical and praxiological foundations of creativity, as well as to develop and validate the Pedagogical Model for Developing Preschoolers' Creativity Through Integrated Activities with Mathematical Content.

The research objectives are:

1. To establish the theoretical foundations of human creativity in general, and preschoolers' creativity, in particular.
2. To determine the principles, factors, criteria, levels, and psycho-pedagogical conditions for developing preschoolers' creativity through the integrated approach to activities with mathematical content.
3. To characterize the ways of developing creativity in preschool-age children.
4. To experimentally diagnose the level of creativity development in preschoolers through activities integrated with mathematical content.
5. To design and experimentally implement a Formative Program for Developing Preschoolers' Creativity.

Hypothesis of the research. Creativity can be developed in preschoolers if they are included in a complex process of activities integrated with mathematical content through the active utilization of selected strategies.

Research methodology synthesis and justification of the chosen research methods: The analysis of the scientific problem was based on the following: ***the concept of creativity*** (T. Amabile [2], C.G. Jung [18], A. Manolescu [22], P.P. Neveanu [26], A. Adler [1], J. Bruner [4]), ***the factors influencing creativity*** (M. Zlate [45], Al. Roșca [34]), ***creativity as an object of study from both didactic and scientific perspectives*** (M. Roco [33]), ***the characteristics of the creative personality*** (J.P. Guilford [14], C. Taylor [41], M. Zlate [45]), ***the particularities of how creativity manifests in preschoolers*** (L.S. Vygotsky [43], A.V. Zaporojhets [44], A.N. Leontiev [19]), ***the concept of integration*** (B. Moffet [23], C. Crețu [8]), ***the use of teaching tools for the purpose of developing creativity*** (C. Cucoș [10], E. Tiron and T. Stanciu [42], G. Popescu [29]), ***mathematical content used with preschoolers*** (M. Neagu and G. Beraru [24], Rafailă E. [32], V. Păduraru [28]), ***didactic strategies for developing preschoolers' creativity*** (E. Haheu-Munteanu [16]), and ***the project method in early childhood*** (S. Chard [6]).

The research methodology involved the following methods:

- *Theoretical methods*: scientific documentation, theoretical modeling, and design;
- *Empirical methods*: testing, observing subjects' behaviors, and analyzing the products of the subjects' activity;
- *Statistical methods*: mathematical processing of experimental data (percentage mean), the Wilcoxon Signed Ranks Test, and the Mann–Whitney U Test.

The scientific novelty and originality of the research lie in the scientific grounding of the *Pedagogical Model for Developing Preschoolers' Creativity Through Integrated Activities with Mathematical Content*, as well as in highlighting a new approach to designing integrated activities aimed at fostering preschoolers' creativity. The study also includes the development and validation of a *Formative Program for Developing Preschoolers' Creativity*. Interdisciplinary activities can serve as a foundation for cultivating creative behaviors through the transfer of knowledge into various application contexts, across stimulation areas where preschoolers act consciously and directly upon the materials provided, thus enabling the internalization of content.

The results obtained, which contributed to solving the scientific problem, consist in the theoretical and methodological substantiation of the *Pedagogical Model for Developing Preschoolers' Creativity Through Integrated Activities with Mathematical Content* - an approach that enabled the effective use of such integrated mathematical activities to foster the creativity of 5–6-year-old preschoolers.

The theoretical significance of the research is supported by the clarification of the psychopedagogical conditions and principles that facilitate the development of creativity in preschool children, by identifying the conceptual benchmarks of integrated activities with mathematical content, by scientifically arguing the relevance and necessity of developing preschoolers' creativity through integrated mathematical activities, and by clarifying the notion of content-level integration within activities across experimental domains.

The applicative value of the research lies in elucidating the praxiological experiences of creativity development in general, and in preschoolers in particular, through integrated activities with mathematical content. The experimental results and research conclusions can be used to reconsider existing ideas and conceptions regarding the use of mathematical content solely for developing certain thinking operations, as well as the view that kindergarten activities should be integrated only at a thematic level.

Implementation of the scientific results: the materials presented in the study were used in the programs of kindergartens in Galați County, Romania, and in the Republic of Moldova included in the target group, in the teaching of university courses such as Psychopedagogy of Creativity, Psychopedagogy of Play, and Issues in Contemporary Education, as well as in professional training activities within the Methodological Circles of kindergartens in Galați County.

Approval of the research results. The core ideas and findings of the investigation were presented and discussed through communications at national and international scientific conferences, including: *The Integrated Approach to Activities in Kindergarten*, in the Scientific-Practical Conference with International Participation "Axiological Orientations of Constructivism in Modern Education," Tiraspol State University, Chișinău, 2020; *The Creative Approach to Activities with Mathematical Content in Kindergarten*, in the Republican Conference of Teaching Staff "Didactics of the Exact Sciences," Chișinău, Republic of Moldova, 2020; *The Role of the Kindergarten Teacher in Developing the*

Preschooler Creative Abilities, in the International Conference "Issues of Social and Human Sciences and the Modernization of Education," Chișinău, 2020; *The Impact of Mathematical Activities on Preschooler Development*, in the International Scientific Symposium "Education in the Spirit of National and Universal Values from the Perspective of Pedagogical Dialogue," Chișinău, 2020; *Ways to Optimize the Development of the Preschooler's Personality through Integrated Kindergarten Activities*, in the National Scientific Conference with International Participation "Quality in Education – an Imperative of Contemporary Society," Chișinău, 2020; and *Strategies for Facilitating Deep Learning in the Science Domain – Mathematical Activities in Preschool Education*. At the International Conference *"Challenges and Solutions in Online Education"*, Chișinău, 2021; *Developing Preschoolers' Creativity through the Integrated Approach to Activities with Mathematical Content*, in the Scientific-Practical Seminar with International Participation *"Involvement of Students, Master's, and Doctoral Candidates in Research Activities Developed by Associative Environments: Challenges and Solutions"*, Chișinău, 2021; *Strategies for Facilitating Deep Learning in the Science Domain through the Application of the Theory of Multiple Intelligences*, in the National Scientific Conference with International Participation *"Issues in Social and Human Sciences"*, Chișinău, 2021; *Utilizing Preschoolers' Non-formal and Informal Experiences in Mathematical Activities in Kindergarten*, in the National Scientific Conference with International Participation *"Issues in Social and Human Sciences and Modernization of Education"*, Chișinău, 2021; *Teaching Resources/Open Educational Resources in Preschool Education, Science Domain – Mathematical Activities*, at the International Conference *"Education and Spirituality"*, Bucharest, 2021; *Education for Children's Rights in Preschool Education*, in the International Scientific Conference *"Education on Children's Rights"*, Chișinău, 2022; *Innovative Approaches to the Early Education Curriculum in Romania – Integrated Activities*, at the International Conference *"Education from the Perspective of Values"*, Sofia, Bulgaria, 2022; *Correlated Methods for Developing Creativity in Early Education*, in the International Conference *"Globalization, Intercultural Dialogue and National Identity"*, Târgu Mureș, 2023; *Integrated Design of Activities Across Experiential Domains in Kindergarten: From Thematic Integration to Content Integration*, at the International Conference *"Literature, Discourse and Multicultural Dialogue"*, Târgu Mureș, 2023.

Publications on the thesis topic: The results obtained have been published in 18 scientific works (4 articles in specialized journals and 14 communications at national and international conferences).

Keywords: creativity, preschool education, integrated activities, mathematical activities with integrated content, creative potential, factors of creativity, characteristics of creativity, theories of creativity, creative learning, creative teaching strategies.

CONTENT OF THE THESIS

Chapter 1, ***Theoretical Foundations Regarding Creativity and the Importance of the Creative Act in Preschool Education****,* reflects an analysis of theoretical resources on creativity in general and on the preschool child in particular, as well as the significance of the creative act. The chapter refers to interpretations of the concept of creativity from the perspective of numerous authors to highlight the interest it has received as a result of recognizing its value in individual behavior.

I. A. Taylor [41, p. 61], when defining creativity, referred to it as "the capacity to shape experience in new and different forms, the ability to perceive the environment plastically and to communicate to others the unique resulting experience*,"* linking the innovation process to internal, personal psychic structures specific to each individual's potential.

P. Popescu–Neveanu [26, p. 23] situates creativity in "the optimal interaction, generating novelty, between aptitudes and attitudes. Aptitudes are not creative in themselves but become so to the extent that they are activated and valorized through creative motives and attitudes," emphasizing the role of motivation in the development of creativity.

M. Zlate [45, p. 281] identifies four main categories of factors that favor the manifestation of creative behavior as a multidimensional phenomenon: internal-structural factors (psychological); external-conjunctural factors (socio-cultural); psychosocial factors; and socio-educational factors.

Researchers Al. Roșca, P. P. Neveanu, J. Rossman, J. Haefele, and A. Crosby [apud 29, p. 5] identify creativity in four aspects: creativity as a process, creativity as a product, creativity as potential, and creativity as a personality trait.

J. P. Guilford [14] describes the main characteristics of a creative personality as: *fluency, flexibility, originality, elaboration, sensitivity to problems, and the ability to redefine.*

The chapter also presents ways to approach creativity multidimensionally in human activities, as well as models of the creative process, including references in educational policy documents from Romania and the Republic of Moldova that influence the organization of kindergarten activities. Analysis of these documents shows that developing preschoolers' creativity is recognized as a key objective, integrated into the curricular structure and methodological guides.

Although there are differences in terminology ("behaviors" vs. "competencies") and in the organization of activities, both approaches promote child-centered principles, individualization, and active stimulation of children, emphasizing free and holistic development, respect for each child's individuality, and meeting personal needs through adaptation and integration into new contexts. These aspects demonstrate the importance of creativity in human activity, constituting a factor that ensures well-being and adaptive integration in any social, professional, or personal context.

The need to improve the integrated design of activities with preschoolers is based on the main directions proposed by the Early Childhood Education Curriculum, namely: emphasizing the role of free play and integrated activities in the learning process, using the thematic project method, and shifting from an objective-centered curriculum toward one oriented to developing the child's future competencies.

From the above, it can be observed that the orientation of education, both in Romania and in the Republic of Moldova, aims to develop creative abilities that enable the child to integrate into social life, enter the labor market, and satisfy personal needs in relation to the surrounding environment.

Chapter 2, ***Psychopedagogical Conditions for Developing Preschoolers' Creativity through the Integrated Approach to Activities with Mathematical Content,*** describes the curricular framework for designing and conducting integrated activities in kindergarten, taking into account the analysis of curricular outputs. This highlights the principles and curricular recommendations that support a holistic approach, adapted to the needs and pace of each child, with the aim of fostering creativity.

The chapter presents integrated activities in kindergarten, starting with explanations of the terms "integration," "monodisciplinarity," "multidisciplinarity," "pluridisciplinarity," and "transdisciplinarity," with particular emphasis on "interdisciplinarity."

The design of the teacher's approach to developing preschoolers' creativity is based on adapting the methods and techniques used, selecting those that eliminate blockages and encourage the free combination of ideas, thereby making maximum use of unconscious resources [169, p. 32]. Using an analytical-synthetic approach, the methodological configurations for developing preschoolers' creativity through integrated activities with mathematical content are valorized.

All these considerations formed the basis for developing the ***Pedagogical Model for Developing Preschoolers' Creativity through Integrated Activities with Mathematical Content***, founded on an interdependent relationship between theoretical and methodological elements. It constitutes the premises of an open and innovative educational approach, emphasizing both the interests and the potential of the preschooler, from the perspective of early education objectives.

The theoretical foundations are represented by educational policies in the field of early childhood education, analyzed comparatively in the context of Romania and the Republic of Moldova, taking into account the possibilities for fostering creativity within kindergarten activities.

The perspective presented in the model justifies the analysis of factors influencing the development of creativity in preschoolers - psychological, social, and biological - leading to a deeper awareness of their role in the teaching process and the necessity of valorizing them within education.

Based on the study of the theoretical foundations, the *methodological foundations* were systematized, comprising the presentation of the components of creativity

development in preschoolers and the identification of the psychopedagogical conditions necessary for its stimulation through integrated activities with mathematical content. As an element of novelty, the methodological foundations include, in addition to the psychopedagogical conditions, didactic principles adapted to enhance the development of preschoolers' creativity through integrated activities with mathematical content.

The theoretical and methodological foundations served as the basis for designing a *Formative Program for Developing Preschoolers' Creativity*, defined through activities aimed at fostering creativity via integrated activities with mathematical content, grouped according to the targeted indicators: *flexibility, fluency, originality, and elaboration* – all of which were also assessed in evaluation tasks. The components of the pedagogical model for developing preschoolers' creativity through integrated activities with mathematical content are interconnected and form a unified whole, thereby creating the optimal context for achieving the intended educational outcomes.

The Pedagogical Model includes the integrated design model of activities across experiential domains, optimized from the perspective of adhering to the fundamental principles of the Early Childhood Education Curriculum. Alongside the theoretical and methodological foundations mentioned earlier, it provides optimal epistemological benchmarks for developing preschoolers' creativity through integrated activities with mathematical content.

The integrated design model proposes a cohesive approach to cognitive content, applied in varied contexts through interest centers that also incorporate practical skills from a second experiential domain. The activity begins with a frontal stage, focused on the methodology of the main activity, and continues with work in centers, adapted to the typology of planned activities, in which content and skills from the selected experiential domains are integrated.

The teacher has the freedom to create various centers that combine different contents, thus stimulating creativity and knowledge transfer. For each center, clear operational objectives are formulated, reflecting both content and interdisciplinary integration, ensuring precise planning of activities and educational expectations.

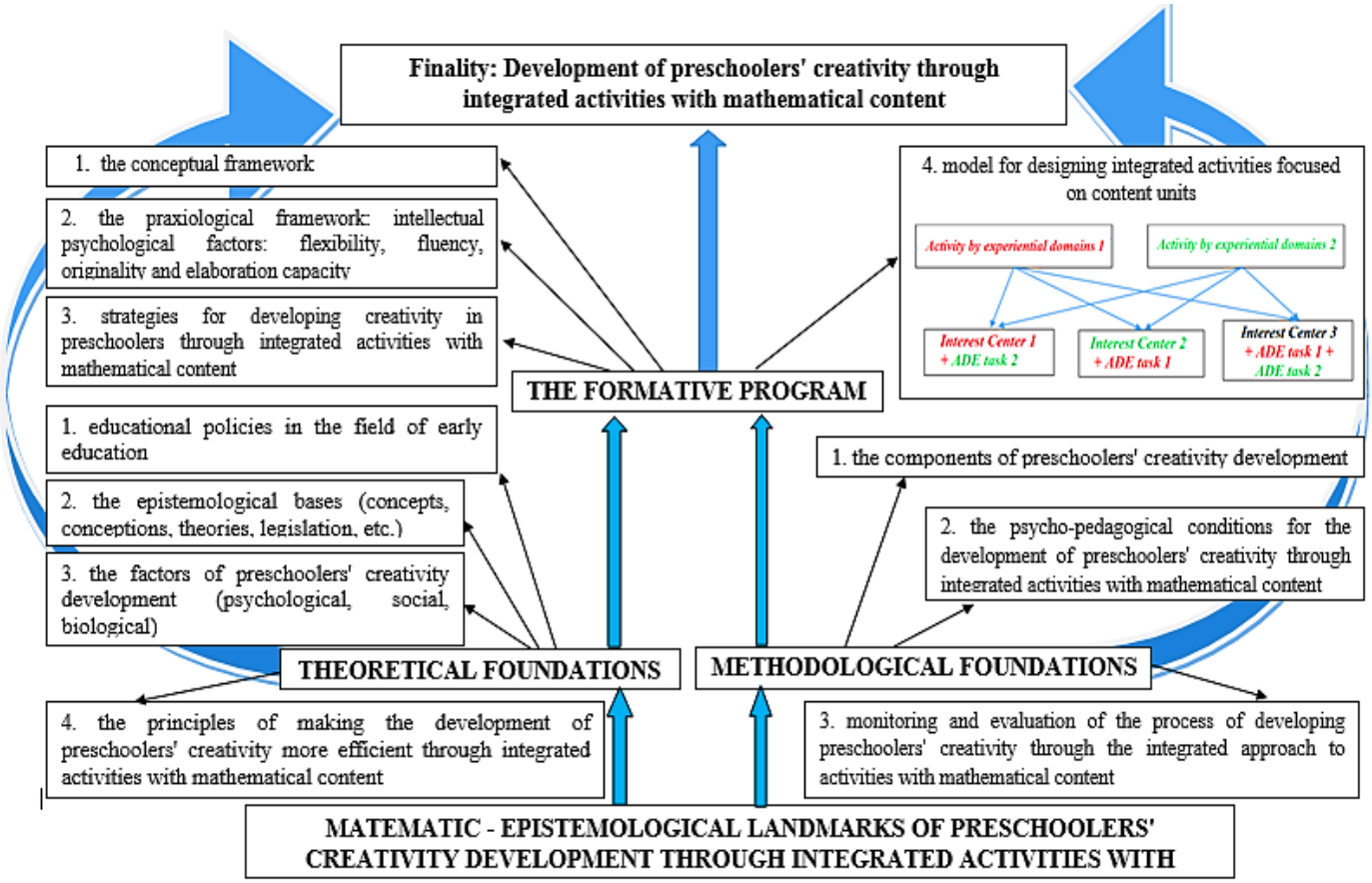

Figure 1. Pedagogical Model for Developing Preschoolers' Creativity through Integrated Activities with Mathematical Content

Chapter 3, ***Experimental Dimension of Developing Preschoolers' Creativity through the Integrated Approach to Activities with Mathematical Content,*** describes the design of the pedagogical experiment, conducted in three interrelated stages: the preliminary experiment, the formative experiment, and the control experiment.

Purpose of the pedagogical experiment: to develop creativity in preschoolers within the framework of integrated activities with mathematical content.

Objectives of the pedagogical experiment:

✓ Implementing the developed assessment tools: four tasks and recording the results in the progress sheet of the preschoolers in the senior group during the activities;

✓ Selecting age-appropriate interactive teaching strategies for organizing integrated activities with mathematical content;

✓ Experimentally developing creativity in senior-group preschoolers through the implementation of the Formative Program for Developing Preschoolers' Creativity;

✓ Providing feedback based on the activities carried out;

✓ Systematizing and analyzing the data from the pedagogical experiment regarding the development of creativity in preschoolers in the context of integrated activities with mathematical content.

For the experiment, 90 preschoolers aged 5–6 were selected from the following institutions: the Extended Program Kindergarten "Elena Doamna" in Galați and Kindergarten no. 1 Slobozia Conachi, Galați County, Romania; and Early Childhood Education Institution No. 4 "R.T. Erdogan" in Copceac village, Ceadîr-Lunga district,

Republic of Moldova, and Early Childhood Education Institution No. 4 “Soare” in UTA Găgăuzia, Comrat municipality, Republic of Moldova. Units were selected from both urban and rural environments.

The ***diagnostic experiment*** was conducted in September 2021. *Purpose of the preliminary stage***:** to assess the initial level of creativity development in senior-group preschoolers within activities with mathematical content.

Objectives of the preliminary stage aimed at:

✓ Providing varied and original responses within a defined time frame, related to mathematical content, serving as a benchmark for creativity fluency;

✓ Developing responses by restructuring data and mathematical content, aiming to foster flexibility in creativity;

✓ Creating new images by transforming mathematical representations or products of imagination into drawings through the figurative creativity task, using mathematical concepts as an expression of originality in creative activity;

✓ Representing proposed themes through drawing, aiming to enrich ideas based on mathematical content, providing details and recombinations as an outcome of elaboration capacity in creative activity.

At this stage, four tasks were applied:

- task 1 for the initial assessment of preschoolers’ fluency, entitled “The Similarities Game”, aimed at producing as many responses as possible within a given time;
- task 2, entitled *“*The Sticks Game*”*, for the initial assessment of preschoolers’ flexibility, aimed at developing solutions through data restructuring, based on figurative and sensory-motor creativity;
- task 3 for the initial assessment of preschoolers’ originality, entitled *“*The Figures Game”, aimed at creating novel images resulting from the transformation of mental representations or imaginative products into drawings, serving as a figurative creativity test;
- task 4 for the initial assessment of preschoolers’ elaboration capacity, entitled *“*Let’s Draw About *…”*, aimed at developing, expanding, and enriching ideas, as well as representing proposed themes through drawing. The results are systematized in Figure 2.

The assessment tasks were designed using content familiar to preschoolers, with operational objectives whose degree of achievement could be quantified through the scores assigned to each item. The obtained scores allowed the classification of preschoolers within the time-based behavior categories specified in the Early Childhood Education Curriculum progress sheet: achieved/performed behavior, developing/in progress behavior, and behavior requiring support/not achieved.

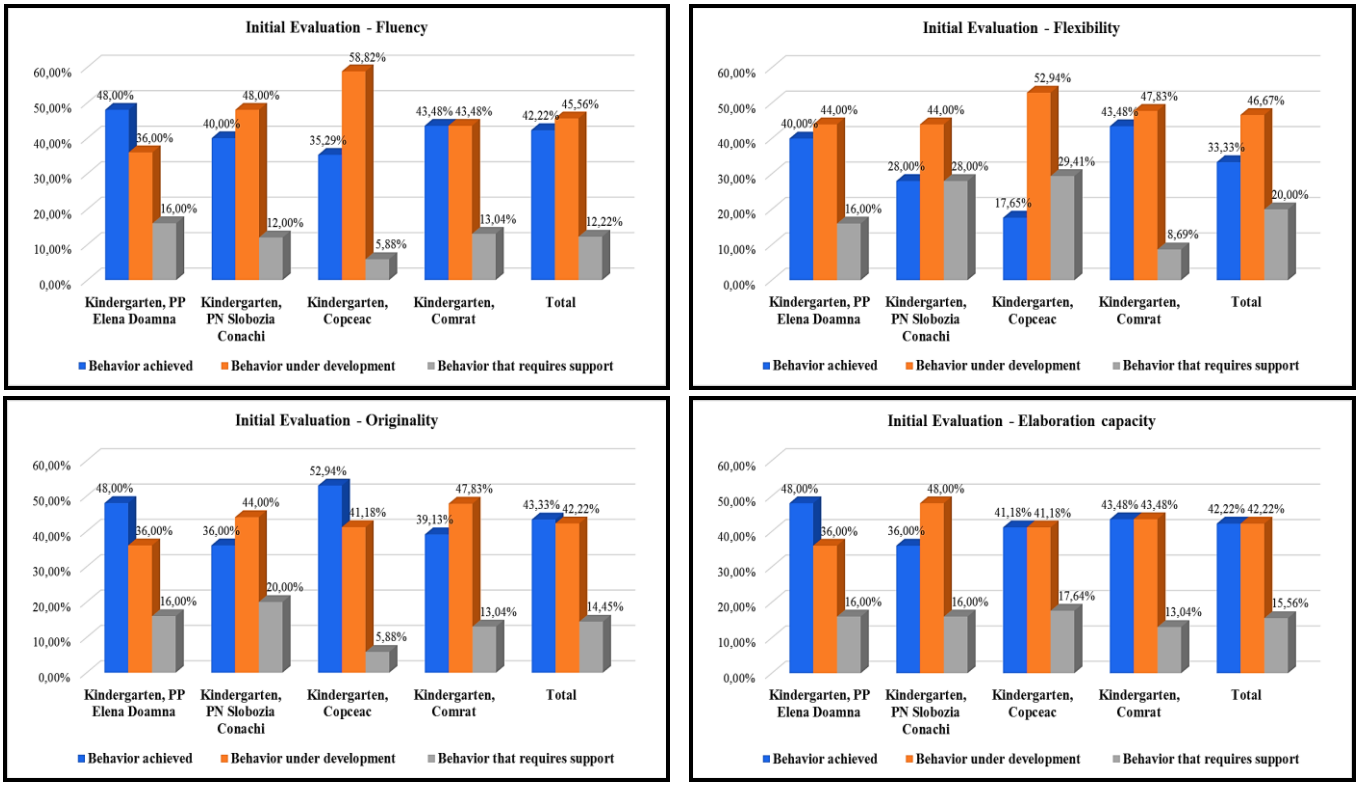

Figure 2. Results of the Diagnostic Experiment

The diagnostic pedagogical experiment assessed preschoolers' ability to work creatively at a satisfactory level, as a result of systematically engaging with the content, with *Achieved Behavior* percentages around 40%. Greater difficulties were observed in tasks targeting the elaboration capacity, which required children to add details and restructure content. This was reflected in the equal percentage of preschoolers classified at the *Achieved Behavior* level and those at the *Developing Behavior* level.

Regarding gender distribution, notable percentage differences were observed in *Achieved Behavior* between girls and boys, with girls performing better. Additionally, preschoolers from urban environments obtained higher *Achieved Behavior* percentages than their rural counterparts.

The ***formative experiment*** aimed to implement the training program based on the integrated design model for developing preschoolers' creativity, taking into account cognitive achievements in the Dimension *of Forming Elementary Mathematical Representations,* integrated with content from other activity domains.

The *objectives of the formative stage* aimed at:

✓ Enriching mathematical representations of object characteristics (shape, size) and grouping criteria;

✓ Developing mathematical language using terms specific to the content addressed in the senior group;

✓ Forming skills for working with mathematical content and the ability to solve tasks independently within mathematical activities;

✓ Stimulating creative interventions in finding solutions to given tasks, with emphasis on fluency, flexibility, originality, and elaboration capacity, using mathematical concepts.

The integrated activities were designed according to the pedagogical integration model proposed in this study and implemented according to a unified work plan, discussed with the group's lead teachers during periodic joint training sessions.

The Formative Program for Developing Preschoolers' Creativity was based on four methodological itineraries:

- *The methodological itinerary for developing fluency* aimed to cultivate preschoolers' ability to generate as many ideas as possible within tasks involving mathematical content.
- *The methodological itinerary for developing flexibility* aimed to foster preschoolers' capacity to provide varied responses, also drawing on concepts from other domains.
- *The methodological itinerary for developing originality* aimed to stimulate preschoolers' ability to produce novel ideas, different from common, obvious, or usual ones.
- *The methodological itinerary for developing elaboration capacity* aimed to develop preschoolers' skill in enriching ideas and using additional details in the process of completing tasks.

Each itinerary included integrated activities with mathematical content, aligned with the weekly theme. The integration of mathematical activities with other categories of activities was intended to provide preschoolers with the opportunity to transfer knowledge and skills from the mathematical domain to other domains, and vice versa.

In summary, the training program proposes the following activities:

Table 1. Sequences from the Methodological Itineraries Followed by Preschoolers

Common Activity	Objectives	Mathematical Content
Fluency		
1. Mathematical Activity: "Please Give Me!" – educational game. Practical Activity: "Grandmother's Pantry" – practical-household activity.	- To group objects according to different criteria other than those suggested by the teacher; - to identify the criteria by which given objects can be grouped;	Sets of objects and operations with elements
2. Mathematical Activity: "Happy Faces" – educational game. Social Education: "What Color is a Kiss?" – teacher's reading.	- to create human figures and objects using numbers; - to propose symbols made from numbers for each emotion.	Geometric shapes
3. Mathematical Activity: "Count 6–10" – educational game. Music Education: "The Counting Song" – song.	- to form groups with a given number of objects; - to associate numbers with objects from nature;	Number and numeration in the range 1–10
4. Mathematical Activity: "The Forest Dispute" – exercise game. Art Education: "Favorite Animal" – painting,	- to identify the components of a mathematical operation based on images; - to propose additions and subtractions	Addition and subtraction of natural

color blot.	based on painted images;	numbers
5. Mathematical Activity: "The Question Game" – educational game. Social Education: "Friends in the Park" – picture-based reading.	- to give examples of ways to compose and decompose numbers; - to create exercises for composing and decomposing numbers based on the read image;	Composition and decomposition of numbers
6. Mathematical Activity: "Find the Objects…" – educational game. Language Development: "The Magic Bag" – educational game.	- to measure objects using non-standard tools; - to propose ways to measure the objects found in the bag;	Size and units of measurement
7. Mathematical Activity: "Where Can We Place?" – educational game. Art Education: "Flower Picture" – painting; Art theme: color blot.	- to use various spatial positions when arranging toys; - to indicate the spatial position of the painted elements; - to propose other ways of arranging the elements;	Spatial orientation
Flexibility		
1. Mathematical activity: "Choose and Group!" – didactic game. Language development: "What Do I Know?" – memorization.	- to propose various criteria for grouping elements of a set; - to identify ways of grouping objects found in a poem according to different criteria;	Sets and operations with elements
2. Mathematical activity: "The Explorers" – logic game. Practical activity: "The Nature Picture" – wire bending.	- to list as many characteristics of objects as possible; - to associate objects from nature with geometric shapes by bending wire;	Geometric shapes
3. Mathematical activity: "Complete What Is Missing!" – didactic game. Physical education: "The Animals' Relay" – obstacle course.	- to create groups of objects according to a given number; - to perform a motor skill as many times as; indicated by the number of the station reached;	Number and numeration
4. Mathematical activity: "A Story with Numbers" – exercise using individual materials. Practical activity: "Cheerful Numbers" – wire bending.	- to propose problem variations based on individual materials; - to perform addition and subtraction operations using numbers made of wire;	Addition and subtraction of numbers
5. Mathematical activity: "My Lunch" – didactic game. Art education: "The Dwarfs' Table" – modeling (clay work).	- to identify various characteristics of objects; - to compare the weight or capacity of modeled objects;	Units of measurement for mass and capacity
6. Mathematical activity: "Find Its Place!" – didactic game. Environmental studies: "Vitamins from Whom?" – discussion.	- to identify various spatial positions for placing objects - to use the names of spatial positions in everyday speech;	Spatial orientation
Originality		
1. Mathematical activity: "The Cheerful Neighborhood" – exercise using individual materials. Art education: "My Neighborhood" – Color Spot – painting with sticks/other tools.	- to give examples of objects' characteristics; - to mention the characteristics of the painted objects;	Sets and operations with elements
2. Mathematical activity: "Choose, Build, Group!" – didactic game. Language development: "In Grandparents'	- to count objects in the same category; - to propose criteria for grouping objects;	Number and numeration within 1–10

Yard" – reading from pictures.		
3. Mathematical activity: "Making Toys Ourselves" – logic transformation game. Practical activity: "Toys for Children" – hands-on project.	- to create images from geometric shapes by transforming as many attributes as possible; - to identify other ways of combining pieces to represent toys;	Geometric shapes
4. Mathematical activity: "The Math Fairy" – exercise using individual materials. Art education: "Spring Landscape" – painting, color spot technique.	- to compare various sets of elements; - to identify attributes of the painted objects;	Comparing sets
5. Mathematical activity: "Measure!" – exercises using individual materials. Language development: "How Many Words Can I Say?" – didactic game.	- to use non-standard tools to measure objects; - to propose different ways of measuring the length of words and sentences;	Length and units of measurement
6. Mathematical activity: "The Maze" – didactic game. Music education: "Winter Has Come at Dawn" – song, eighth-note duration.	- to use specific spatial orientation terms to describe routes; - to follow routes according to given spatial orientation instructions;	Spatial orientation
Elaboration capacity		
1. Mathematical activity: "The Little Gingerbread Men's Town" – didactic game. Art education: "Cheerful Pictures" – painting, visual composition.	- to use geometric shapes to add details to given objects; - to paint elements creatively, including as many details as possible;	Geometric shapes
2. Mathematical activity: "10-Piece Domino" – didactic game. Practical activity: "My Favorite Animal" – wire bending.	- to creatively match Domino pieces in as many ways as possible; - to make as many paper folds as possible to create details of objects;	Number and numeration within 0–10
3. Mathematical activity: "Culinary Recipes" – didactic game. Practical activity: "The Housewives' Fair" – hands-on project.	- to use the ordinal number creatively in speech; - to propose different ways of ordering objects;	Ordinal aspect of numbers
4. Mathematical activity: "How Are They Alike?" – logic game. Art education: "A Vanished World" – painting, color spot technique.	- to identify common attributes of elements or sets of elements; - to group the painted elements according to original criteria;	Sets and operations with elements
5. Mathematical activity: "Putting Together, Placing Separately" – exercise using individual materials. Social studies: "Flowers as a Gift" – reading from pictures.	- to perform addition and subtraction with one unit; - to propose addition and subtraction exercises with one unit based on the provided material.	Addition and subtraction of natural numbers

During the formative stage, a notable interest in the proposed creative activities was observed among the children, as they were motivated by the variety of teaching methods and materials, both in form and color, as well as by the combination of mathematical content with other dimensions.

At the same time, an improvement in the quality of preschoolers' activities and creative products was observed across all activity categories. The children were not only asked to reproduce knowledge but also to apply personal experience in new situations, experiment, observe, express their own observations and opinions, formulate questions, and find different solutions to the tasks presented. The problem situations included both

convergent and divergent types, with problematization used alongside systematic and independent observation and discovery-based activities.

Frontal activities were combined with team and individual activities, stimulating cooperation, competition, spontaneity, initiative, and, above all, the development of independent working skills. It was observed that the use of affective motivation, verbal and nonverbal praise, along with the use of rich and attractive teaching materials and an approving and participatory attitude, helped stimulate preschoolers' creative behavior and enhanced the creative process.

During the course of this formative program, preschoolers with strong creative potential were identified, standing out in the activities carried out, as well as children who were unable to overcome their barriers and limits, constrained by the fear of making mistakes or being different from their peer group.

The control experiment aimed to validate the pedagogical tools incorporated in the *Pedagogical Model for Developing Preschoolers' Creativity through Integrated Activities with Mathematical Content*. The stage of evaluating the effectiveness of the *Model for Developing Creativity* was conducted from May 23 to June 10, 2022, using the same experimental sample of 90 preschoolers.

The purpose of the control stage: to assess the level of creativity development in senior-group preschoolers after the implementation of the training program.

The objectives of the control stage included:

✓ Evaluating preschoolers' creativity levels with respect to fluency, flexibility, originality, and elaboration capacity;

✓ Validating the integrated design model used in integrated activities with mathematical content following the implementation of the formative approach;

✓ Analyzing and comparing children's results between the preliminary (diagnostic) stage and the control stage.

The tools used in the final evaluation stage consisted of non-standardized tasks applied to the initial sample:

- Task 1, "The Hourglass", was applied to assess preschoolers' fluency. Its objective was to generate as many responses as possible within a given time, using mathematical terms related to geometric shapes and their attributes.
- Task 2, "Find the Intruder!", was applied to assess preschoolers' flexibility. The aim was to determine the level of flexibility development by encouraging children to go beyond conventional problem-solving methods and to identify different or original criteria for classifying and regrouping objects.
- Task 3, "Let's Build!", was applied to assess preschoolers' originality, aiming at creating novel objects or constructions through the combination of geometric shapes.
- Task 4, "Upside-Down Stories", was applied to assess preschoolers' elaboration capacity, encouraging them to compose as many problem situations as possible based on illustrations and observed details.

A comparative analysis of the initial and final evaluation results of the children involved in the study is presented in Figure 3.

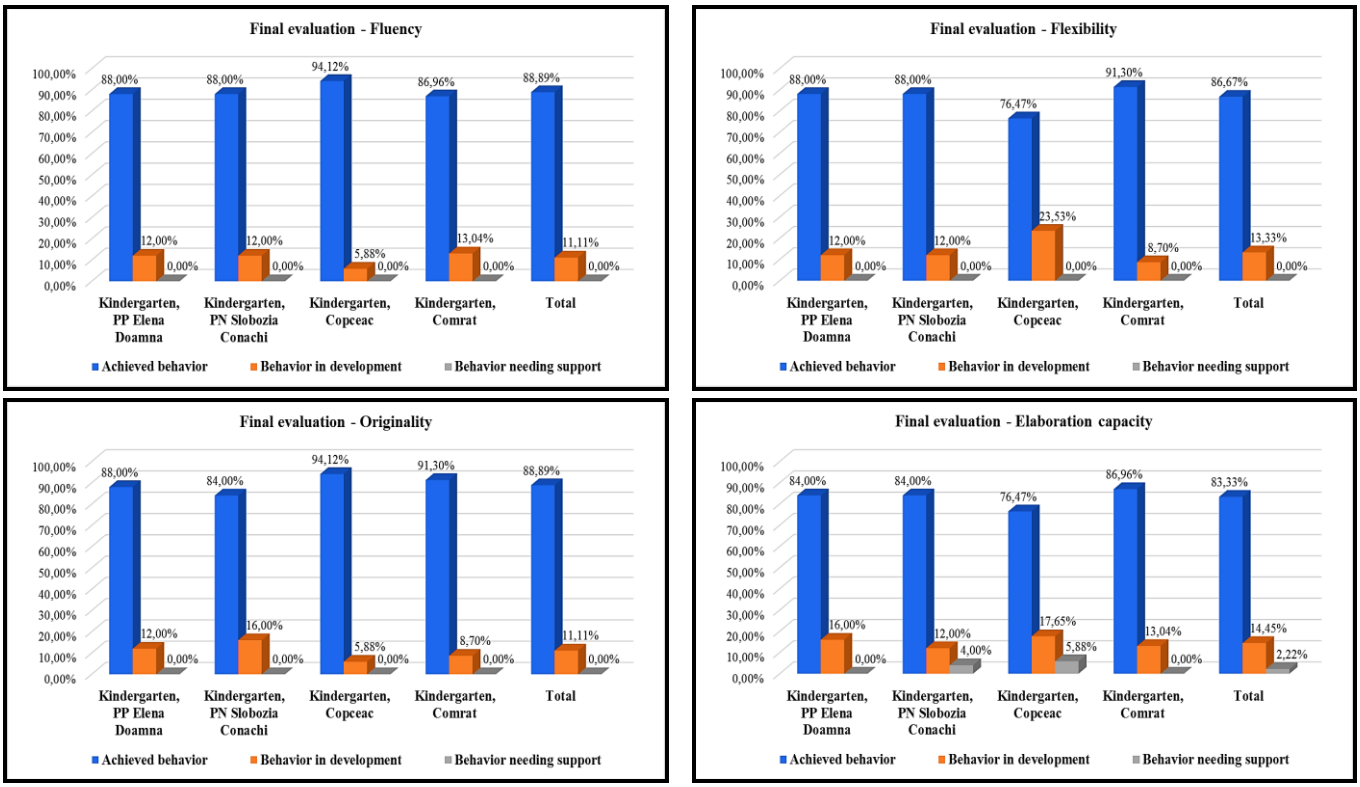

Figure 3. Synthesis of the Final Evaluation Results of Preschoolers' Performance

Table 2. Comparison of Initial and Final Evaluation Results of Preschoolers' Performance

The "Fluency" Indicator

Target Group: 90 preschoolers	Achieved behavior		Behavior in development		Behavior needing support	
	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation
Extended Program Kindergarten "Elena Doamna" Galați, Romania	*48,00%* *12 preschoolers* 5 girls and 7 boys	*88,00%* *22 preschoolers* 12 girls and 10 boys	*36,00%* *9 preschoolers* 6 girls and 3 boys	*12,00%* *3 preschoolers* 1 girl and 2 boys	*16,00%* *4 preschoolers* 2 girls and 2 boys	*0,00%*
Normal Program Kindergarten no. 1 Slobozia Conachi, Galați County, Romania	*40,00%* *10 preschoolers* 6 girls and 4 boys	*88,00%* *22 preschoolers* 10 girls and 12 boys	*48,00%* *12 preschoolers* 4 girls and 8 boys	*12,00%* *3 preschoolers* 2 girls and 1 boy	*12,00%* *3 preschoolers* 2 girls and 1 boy	*0,00%*
EEI no. 4 "R.T. Erdogan", Copceac village, Ceadîr-Lunga district, Republic of Moldova	*35,30%* *6 preschoolers* 5 girls and 1 boy	*94,10%* *16 preschoolers* 7 girls and 9 boys	*58,82%* *10 preschoolers* 2 girls and 8 boys	*5,90%* *1 preschoolers* 1 girl and 0 boys	*5,90%* *1 preschoolers* 1 girl and 0 boys	*0,00%*
EEI no. 4 "Soare", Comrat municipality, Republic of Moldova	*43,48%* *10 preschoolers* 6 girls and 4 boys	*87,00%* *20 preschoolers* 12 girls and 8 boys	*43,48%* *10 preschoolers* 6 girls and 4 boys	*13,00%* *3 preschoolers* 1 girl and 2 boys	*13,04%* *3 preschoolers* 1 girl and 2 boys	*0,00%*
Total	***42,22%*** ***38 preschoolers*** **22 girls and 16 boys**	***88,89%*** ***80 preschoolers*** **41 girls and 39 boys**	***45,56%*** ***41 preschoolers*** **18 girls and 23 boys**	***11,11%*** ***10 preschoolers*** **5 girls and 5 boys**	***12,22%*** ***11 preschoolers*** **6 girls and 5 boys**	***0,00%***

The "Flexibility" Indicator

Target Group: 90 preschoolers	Achieved behavior		Behavior in development		Behavior needing support	
	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation
Extended Program Kindergarten "Elena Doamna" Galați, Romania	*40,00%* *10 preschoolers* 5 girls and 5 boys	*88,00%* *22 preschoolers* 11 girls and 11 boys	*44,00%* *11 preschoolers* 5 girls and 6 boys	*12,00%* *3 preschoolers* 2 girls and 1 boy	*16,00%* *4 preschoolers* 3 girls and 1 boy	*0,00%*
Normal Program Kindergarten no. 1 Slobozia Conachi, Galați County, Romania	*28,00%* *7 preschoolers* 6 girls and 1 boy	*88,00%* *22 preschoolers* 10 girls and 12 boys	*44,00%* *11 preschoolers* 2 girls and 9 boys	*12,00%* *3 preschoolers* 2 girls and 1 boy	*28,00%* *7 preschoolers* 4 girls and 3 boys	*0,00%*
EEI no. 4 "R.T. Erdogan", Copceac village, Ceadîr-Lunga district, Republic of Moldova	*17,65%* *3 preschoolers* 1 fată și 2 boys	*76,50%* *13 preschoolers* 7 girls and 6 boys	*52,94%* *9 preschoolers* 4 girls and 5 boys	*23,50%* *4 preschoolers* 2 girls and 2 boys	*29,41%* *5 preschoolers* 3 girls and 2 boys	*0,00%*
EEI no. 4 "Soare", Comrat municipality, Republic of Moldova	*43,48%* *10 preschoolers* 7 girls and 3 boys	*91,30%* *21 preschoolers* 12 girls and 9 boys	*47,83%* *11 preschoolers* 5 girls and 6 boys	*8,70%* *2 preschoolers* 1 girl and 1 boy	*8,69%* *2 preschoolers* 1 girl and 1 boy	*0,00%*
Total	***33,33%*** ***30 preschoolers*** **19 girls and 11 boys**	***86,67%*** ***78 preschoolers*** **40 girls and 38 boys**	***46,67%*** ***42 preschoolers*** **16 girls and 26 boys**	***13,33%*** ***12 preschoolers*** **7 girls and 5 boys**	***20,00%*** ***18 preschoolers*** **11 girls and 7 boys**	***0,00%***

The "Originality" Indicator

Target Group: 90 preschoolers	Achieved behavior		Behavior in development		Behavior needing support	
	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation
Extended Program Kindergarten "Elena Doamna" Galați, Romania	*48,00%* *12 preschoolers* 6 girls and 6 boys	*88,00%* *22 preschoolers* 11 girls and 11 boys	*36,00%* *9 preschoolers* 5 girls and 4 boys	*12,00%* *3 preschoolers* 2 girls and 1 boy	*16,00%* *4 preschoolers* 2 girls and 2 boys	*0,00%*
Normal Program Kindergarten no. 1 Slobozia Conachi, Galați County, Romania	*36,00%* *9 preschoolers* 7 girls and 2 boys	*84,00%* *21 preschoolers* 11 girls and 10 boys	*44,00%* *11 preschoolers* 3 girls and 8 boys	*16,00%* *4 preschoolers* 1 girl and 3 boys	*20,00%* *5 preschoolers* 2 girls and 3 boys	*0,00%*
EEI no. 4 "R.T. Erdogan", Copceac village, Ceadîr-Lunga district, Republic of Moldova	*52,94%* *9 preschoolers* 5 girls and 4 boys	*94,12%* *16 preschoolers* 7 girls and 9 boys	*41,18%* *7 preschoolers* 2 girls and 5 boys	*5,88%* *1 preschooler* 1 girl and 0 boys	*5,88%* *1 preschooler* 1 girl and 0 boys	*0,00%*
EEI no. 4 "Soare", Comrat municipality, Republic of Moldova	*39,13%* *9 preschoolers* 5 girls and 4 boys	*91,30%* *21 preschoolers* 12 girls and 9 boys	*47,83%* *11 preschoolers* 6 girls and 5 boys	*8,70%* *2 preschoolers* 1 girl and 1 boyst	*13,04%* *3 preschoolers* 2 girls and 1 boy	*0,00%*
Total	***43,33%*** ***39 preschoolers*** **23 girls and 16 boys**	***88,89%*** ***80 preschoolers*** **41 girls and 39 boys**	***42,22%*** ***38 preschoolers*** **16 girls and 22 boys**	***11,11%*** ***10 preschoolers*** **5 girls and 5 boys**	***14,45%*** ***13 preschoolers*** **7 girls and 6 boys**	***0,00%***

The "Elaboration Capacity" Indicator

Target Group: 90 preschoolers	Achieved behavior		Behavior in development		Behavior needing support	
	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation	Initial evaluation	Final evaluation
Extended Program Kindergarten "Elena Doamna" Galați, Romania	*48,00%* *12 preschoolers* 6 girls and 6 boys	*84,00%* *21 preschoolers* 11 girls and 10 boys	*36,00%* *9 preschoolers* 5 girls and 4 boys	*16,00%* *4 preschoolers* 2 girls and 2 boys	*16,00%* *4 preschoolers* 2 girls and 2 boys	*0,00%*
Normal Program Kindergarten no. 1 Slobozia Conachi, Galați County, Romania	*36,00%* *9 preschoolers* 8 girls and 1 boy	*84,00%* *21 preschoolers* 10 girls and 11 boys	*48,00%* *12 preschoolers* 2 girls and 10 boys	*12,00%* *3 preschoolers* 1 girl and 2 boys	*16,00%* *4 preschoolers* 2 girls and 2 boys	*4,00%* *1 preschooler* 1 girl and 0 boys
EEI no. 4 "R.T. Erdogan", Copceac village, Ceadîr-Lunga district, Republic of Moldova	*41,18%* *7 preschoolers* 5 girls and 2 boys	*76,47%* *13 preschoolers* 8 girls and 5 boys	*41,18%* *7 preschoolers* 2 girls and 5 boys	*17,65%* *3 preschoolers* 0 girls and 3 boys	*17,64%* *3 preschoolers* 1 girl and 2 boys	*5,88%* *1 preschooler* 0 girls and 1 boys
EEI no. 4 "Soare", Comrat municipality, Republic of Moldova	*43,48%* *10 preschoolers* 6 girls and 4 boys	*87,00%* *20 preschoolers* 12 girls and 8 boys	*43,48%* *10 preschoolers* 6 girls and 4 boys	*13,00%* *3 preschoolers* 1 girl and 2 boys	*13,04%* *3 preschoolers* 1 girl and 2 boys	*0,00%*
Total	***42,22%*** ***38 preschoolers*** **25 girls and 13 boys**	***83,33%*** ***75 preschoolers*** **41 girls and 34 boys**	***42,22%*** ***38 preschoolers*** **15 girls and 23 boys**	***14,45%*** ***13 preschoolers*** **4 girls and 9 boys**	***15,56%*** ***14 preschoolers*** **6 girls and 8 boys**	***2,22%*** ***2 preschoolers*** **1 girl and 1 boy**

The data obtained following the implementation of the formative program show a significant increase in the percentage of preschoolers demonstrating accomplished and high-level performance in tasks involving creativity. This positive development is evident compared to the levels observed before the start of the program, highlighting the effectiveness of the integrated approach to mathematical content in stimulating children's creative abilities. The results support the idea that structured educational experiences, adapted to the pace and individual needs of preschoolers, can lead to the improvement of cognitive and creative skills, fostering the development of flexible and innovative thinking from the early years of education.

The comparative analysis of children's results between the initial and final evaluations demonstrated the effectiveness of the formative program for developing preschoolers' creativity that was designed and implemented. This confirms the hypothesis that developing creativity in preschoolers through integrated activities with mathematical content is achievable when the appropriate psychopedagogical conditions are met—conditions necessary for fostering skills that help the child adapt to new and unfamiliar situations, thereby preparing them for subsequent educational levels and social integration. The progress observed from the experimental activities shows a significant difference and an increase in both the quantitative and qualitative values obtained by the subjects. Specifically: At the diagnostic stage: task 1: 42.23% achieved/accomplished behavior, 45.56% developing/in progress, 12.21% requiring support/not achieved; task 2: 33.33% achieved/accomplished, 46.67% developing/in progress, 20.0% requiring support/not achieved; task 3: 43.33% achieved/accomplished, 42.22% developing/in progress, 14.45% requiring support/not achieved; task 4: 42.22% achieved/accomplished, 42.22% developing/in progress, 15.56% requiring support/not achieved. At the control (final) stage: task 1: 88.89% achieved/accomplished, 11.11% developing/in progress, 0.00% requiring support/not achieved; task 2: 86.67% achieved/accomplished, 13.33% developing/in progress, 0.00% requiring support/not achieved; task 3: 88.89% achieved/accomplished, 11.11% developing/in progress, 0.00% requiring support/not achieved; task 4: 83.33% achieved/accomplished, 14.45% developing/in progress, 2.22% requiring support/not achieved. These results were confirmed through the evaluation tasks, highlighting the substantial improvement in preschoolers' creative performance following the implementation of the Formative Program.

For the analysis of the data obtained in the study, two main statistical tools were used: the Wilcoxon Signed Ranks Test, which evaluated significant differences between pre- and post-intervention scores within the same group, and the Mann-Whitney U Test, used to compare performance between independent groups (e.g., by gender or area of residence).

The Wilcoxon test highlighted significant improvements in participants' performance across all applied tasks, demonstrating the effectiveness of the educational program in stimulating preschoolers' creativity. In most cases, no lower post-intervention scores were recorded, indicating a clear trend of progress.

The Mann-Whitney U test showed that, in general, there were no significant differences between the performance of boys and girls or between children from urban and rural areas. However, in one specific task ("Povești pe dos"), girls achieved significantly better results, suggesting a possible influence of factors such as verbal creativity ($p = 0.036$). Additionally, although preschoolers from urban areas performed slightly better in some tasks, these differences were not statistically significant, indicating equitable access to and impact of the program in both environments.

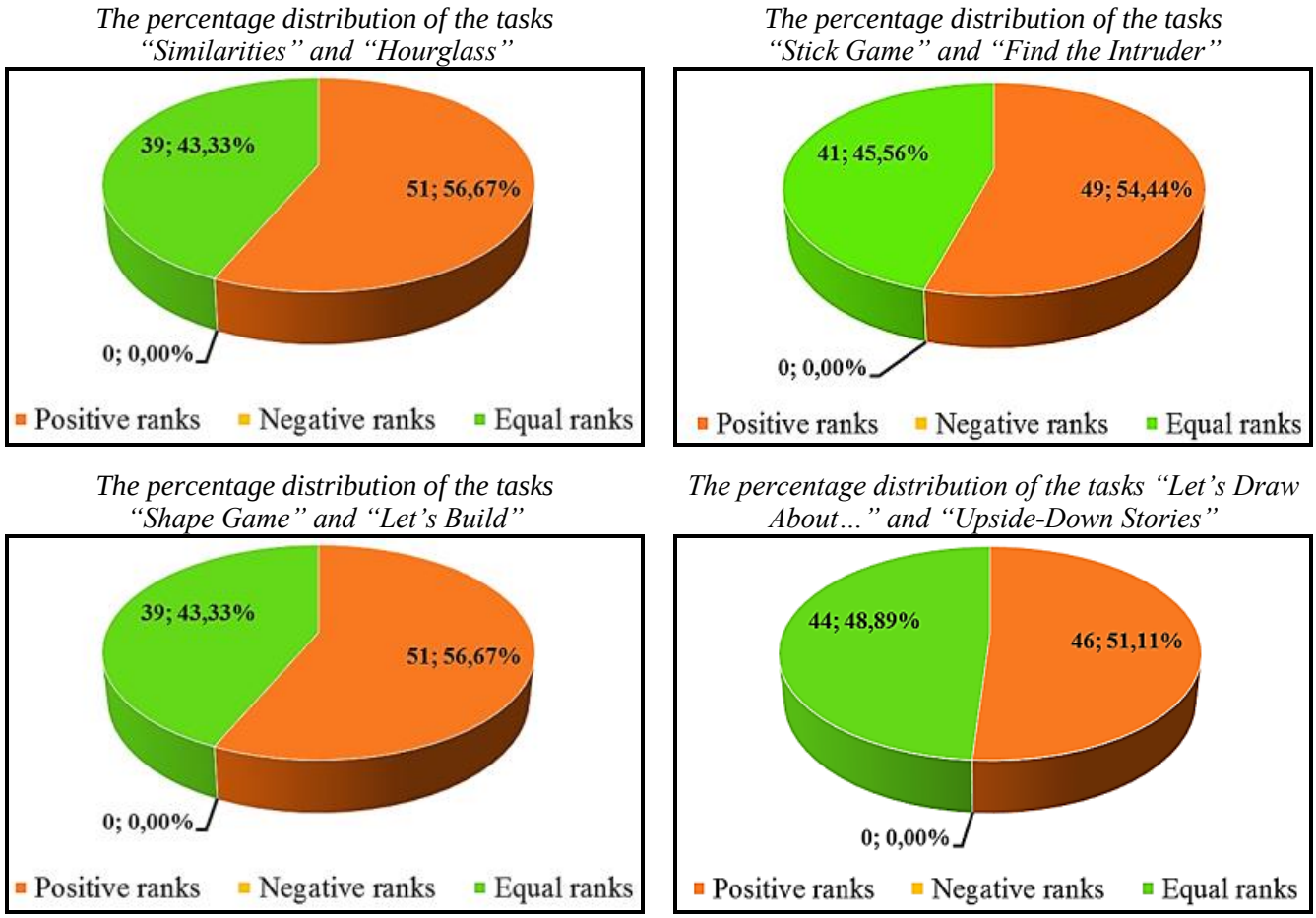

Figure 4. Percentage distribution of the tasks following the application of the Mann-Whitney U test

The implementation of the pedagogical experiment thus demonstrated the functionality of the Pedagogical Model for Developing Preschoolers' Creativity Through Integrated Activities with Mathematical Content, theoretically supported and applied in practice through the achievements of the educational subjects in the domain of creativity in relation to mathematical activities. The use of mathematical content highlighted its role in stimulating creative thinking, problem-solving skills, and the application of knowledge in new contexts. Furthermore, it reinforced the role of mathematical content as a tool for developing elaboration skills, originality, and flexibility in preschool activities, while also facilitating knowledge transfer and promoting children's creative and autonomous engagement.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

1. Through an analytical and synthetic approach to the specifics of creativity development during the preschool period, the dynamic and transformative nature of the creative process was highlighted, as well as the fundamental role of expressive activities in stimulating original thinking and innovative capacity. Creativity can be defined as the mental and behavioural process through which the individual generates new and useful ideas, combines familiar elements in novel ways, and finds original solutions to various problems. The study of the defining elements of creativity – such as fluency, flexibility, originality, and elaboration – made it possible to outline a conceptual framework adapted to the characteristics of preschool children.

2. The analysis of curricular policy documents from Romania and the Republic of Moldova, from the perspective of preschoolers' creativity development, reveals the existence of content equivalences between the Early Childhood Education Curricula of the two countries. These focus on similar aspects regarding the organisation of early education systems, emphasising the child's free and holistic development, respect for individuality, and the fulfilment of personal needs through adaptation and integration into new contexts. These elements highlight the importance of developing creativity during the preschool years, considered an essential factor for ensuring well-being and adaptive integration into various social, professional, and personal contexts.

3. The applied research revealed that integrated activities with mathematical content provide a favourable environment for the development of creativity, contributing to the development of logical and abstract thinking, the formation and consolidation of numerical and spatial concepts, as well as the enhancement of problem-solving abilities. Through these activities, children acquire fundamental notions of numeration, classification, seriation, and measurement, while simultaneously developing attention, memory, and concentration. At the same time, mathematical activities stimulate creativity by offering varied contexts in which children can explore, experiment, and apply acquired knowledge in new and diverse situations.

4. The proposed integrated design model addresses current challenges by adopting a unified approach that combines predominantly cognitive content with practical activities organised in interest centres adapted to preschoolers' needs and preferences. By ensuring smooth transitions, well-defined routines, and the opportunity to freely choose activity centres, the model respects each child's individual pace and promotes autonomous action. Furthermore, intra-disciplinary and interdisciplinary integration – expressed through balanced and complementary tasks in each centre – facilitates the consolidation of knowledge and skills while preventing intellectual overload.

5. The *Pedagogical Model for Developing Preschoolers' Creativity Through Integrated Activities with Mathematical Content* is based on a close and interdependent relationship between theoretical and methodological foundations, creating the premises for an open, innovative, and child-centered educational approach that focuses on the child's potential and interests. The theoretical foundations synthesise the essential concepts

related to the topic, while the methodological foundations outline an optimal framework for fostering creativity, taking into account preschoolers' age-specific characteristics, the educational environment, children's rights, and the adaptation of material resources. Thus, instructional design and teaching strategy are conceived to maximise children's creative potential by diversifying pedagogical strategies and offering multiple opportunities for exploration and innovation.

6. *The Formative Program for Developing Preschoolers' Creativity*, which includes an innovative model for designing integrated activities with mathematical content, goes beyond traditional thematic integration by promoting authentic interdisciplinary correlations that facilitate creative approaches to educational tasks, while respecting each preschooler's pace, interests, and personal perspective. This model supports the development of a creative educational approach, the enhancement of innovative teaching competences among educators, and the creation of effective methodological tools—all contributing to the establishment of a coherent and optimal framework for stimulating and strengthening creativity in preschool education.

7. The consistent implementation of the *Formative Program for Developing Preschoolers' Creativity*, through integrated activities with mathematical content, generated creative outcomes, significantly stimulating the creative factors - fluency, flexibility, originality, and elaboration - in children aged 5–6. At the same time, it contributed to the development of teachers' competences in designing and conducting integrated activities in a stimulating manner, achieving both thematic and content-level integration in preschool institutions in Galați County.

8. The pedagogical experiment conducted highlighted the significant impact of implementing the *Formative Program for Developing Preschoolers' Creativity* on children's creative behaviour. The data obtained indicate a considerable increase in the percentage of preschoolers who demonstrate accomplished and high-performing behaviour in solving tasks requiring creativity, compared with the period prior to the programme's implementation. This increase reflects not only a simple accumulation of knowledge but, more importantly, a profound transformation in the way children respond to educational challenges, demonstrating increased adaptability to new environmental factors. Moreover, the programme facilitated the development of essential competences for creative learning, such as initiative in social interactions, flexibility in thinking, and the ability to generate original solutions for unusual or problematic situations. Thus, preschoolers not only learned to respond effectively in familiar contexts, but also acquired valuable exploratory and innovative abilities, essential for continuous adaptation to their environment.

9. These results confirm the effectiveness of the Formative Program in supporting and stimulating creativity at the preschool age, highlighting the importance of integrating activities with mathematical content that promote a pedagogical approach centred on the child's holistic and flexible development. Moreover, the behavioural changes observed indicate that well-designed creative education can decisively contribute to the formation of proactive and competent attitudes for successfully managing new and unpredictable

situations, thus laying the foundation for an educational trajectory adapted to future challenges.

10. Thus, the research results confirmed the resolution of the important scientific problem concerning the development of the psycho-pedagogical and methodological foundations for fostering creativity in preschool children through integrated activities with mathematical content, included in the *Pedagogical Model for Developing Preschoolers' Creativity through Integrated Activities with Mathematical Content*. Implemented within the formative creativity development programme, this model led to the formation of children's innovative abilities, facilitated their smoother integration into kindergarten activities, and supported the development of open and conciliatory behaviours towards peers and adults.

In summary, the conclusions presented allow us to formulate the following ***recommendations:***

At the macrostructural level:

✓ The Ministry of Education should develop functional policies that promote concrete and effective models for integrating curricular content, aimed not only at fostering preschoolers' creativity but also at developing the competencies needed for higher education levels and everyday life.

✓ School Inspectorates should initiate debate sessions focused on improving the design and implementation of integrated activities.

✓ The Houses of the Teaching Staff and Teacher Training Centres should organise and conduct mentoring activities to promote unified pedagogical models for developing creativity in preschoolers and to enhance the use of mathematical competences.

At the microstructural level:

✓ Introduce optional activities for developing creativity in preschoolers, focused on different domains, such as "Fun with Mathematics" or "Mathematics Shows Us How Colorful the World Is", leveraging the perspective of stimulating the creative capacities of preschoolers, future schoolchildren, adolescents, and adults.

✓ Implement activities aimed at developing preschoolers' creativity through the integrated approach to mathematical content within the initial or ongoing training of teachers.

The research also identified certain limitations, such as difficulties and even reluctance among some teachers in integrating content from multiple experiential domains, as well as a tendency to work in a single-disciplinary manner.

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ADNOTARE

ENACHE Oana Iuliana „Dezvoltarea creativității preșcolarilor prin abordarea integrată a activităților cu conținut matematic”
Teză de doctor în științe ale educației, Chișinău, 2025

Structura tezei: Teza conține: introducere, trei capitole, concluzii generale și recomandări, bibliografie (234 surse), 9 anexe. În total, conține: 169 pagini text de bază, 14 figuri și 18 tabele. Rezultatele cercetării au fost publicate în 18 lucrări științifice.

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Cuvinte-cheie: creativitate, învățământ preșcolar, activități integrate, activități matematice cu conținut integrat, potențial creativ, factorii creativității, trăsăturile creativității, teoriile creativității, învățare creativă, strategii didactice creative.

Scopul cercetării constă în determinarea fundamentelor teoretice și praxiologice ale creativității, elaborarea și validarea Modelului pedagogic de dezvoltare a creativității preșcolarilor prin activitățile integrate cu conținut matematic.

Obiectivele cercetării vizează stabilirea reperelor teoretice ale creativității umane în general, și a preșcolarilor, în special; determinarea principiilor, factorilor, criteriilor, nivelurilor și condițiilor psihopedagogice ale dezvoltării creativității preșcolarilor prin abordarea integrată a activităților cu conținut matematic; caracterizarea modalităților de dezvoltare a creativității la vârsta preșcolară; diagnosticarea experimentală a nivelului dezvoltării creativității preșcolarilor în cadrul activităților integrate cu conținut matematic; elaborarea şi valorificarea experimentală a Programului formativ de dezvoltare a creativității preșcolarilor.

Noutatea și originalitatea științifică a cercetării se exprimă prin fundamentarea științifică a *Modelului pedagogic de dezvoltare a creativității preșcolarilor prin activitățile integrate cu conținut matematic* și evidențierea unei noi abordări de proiectare a activităților integrate, în scopul dezvoltării creativității preșcolarilor; elaborarea și validarea *Programului formativ de dezvoltare a creativității preșcolarilor.* Activitățile interdisciplinare pot sta la baza cultivării comportamentelor creative prin transferul cunoștințelor în situații variate de aplicare, pe arii de stimulare, unde preșcolarii acționează conștient și direct asupra materialelor puse la dispoziție pentru interiorizarea conținuturilor.

Rezultatele obținute care au contribuit la soluționarea problemei științifice rezidă în fundamentarea teoretică și metodologică a *Modelului pedagogic de dezvoltare a creativității preșcolarilor prin activitățile integrate cu conținut matematic,* fapt care a condus la valorificarea activităților integrate cu conținut matematice în vederea dezvoltării creativității preșcolarilor de 5-6 ani.

Semnificația teoretică a cercetării este susținută de precizarea condițiilor psihopedagogice și a principiilor care facilitează dezvoltarea creativității la preșcolari, în identificarea reperelor conceptuale ale activităților integrate cu conținut matematic; argumentarea științifică a relevanței și a necesității dezvoltării creativității preșcolarilor prin activitățile integrate cu conținut matematic; semnificarea noțiunii de integrare la nivel de conținut a activităților pe domenii experimentale.

Valoarea aplicativă a cercetării este reprezentată de elucidarea experiențelor praxiologice ale dezvoltării creativității, în general, și a preșcolarilor, în special, prin activitățile integrate cu conținut matematic. Rezultatele experimentale și concluziile cercetării pot fi utilizate în reconsiderarea ideilor și concepțiilor existente cu privire la utilizarea conținuturilor matematice doar în scopul dezvoltării unor operații ale gândirii și la integrarea doar sub aspect tematic a activităților din grădiniță.

Implementarea rezultatelor științifice: materialele prezentate în lucrare au fost utilizate în programul grădinițelor din județul Galați, România și din Republica Moldova vizate în grupul țintă, în predarea cursurilor universitare de Psihopedagogia creativității, Psihopedagogia jocului și Problematica educației contemporane și a activităților de formare profesională din cadrul Cercurilor metodice ale grădinițelor din județul Galați.

ANNOTATION

ENACHE Oana Iuliana „Development of Preschoolers' Creativity Through an Integrated Approach to Activities with Mathematical Content”

PhD Thesis in Education Sciences, Chisinau, 2025

Thesis structure: The thesis contains: introduction, three chapters, general conclusions and recommendations, references (234 sources), 9 annexes. In total it contains: 169 pages of basic text, 14 figures and 18 tables. The research results have been published in 18 scientific papers.

Keywords: creativity, preschool education, mathematical activities, fluency, flexibility, originality, elaboration capacity, creative potential, creativity stimulation, creativity factors, creativity theories, creative learning, divergent thinking, creative behaviours, teaching strategy, teaching style, stimulating educational environment.

The aim of the paper is to determine the theoretical and praxeological foundations of creativity, the development and validation of the Pedagogical Model for Developing Preschoolers’ Creativity Through Integrated Activities with Mathematical Content.

The objectives of the research aim to establish the theoretical benchmarks of human creativity in general, and of preschoolers, in particular; determination of principles, factors, criteria. levels and psychopedagogical conditions of the development of creativity of preschoolers through the integrated approach to activities with mathematical content; characterization of ways to develop creativity at preschool age; experimental diagnosis of the level of development of preschoolers' creativity within integrated activities with mathematical content; the elaboration and experimental valorization of the Formative Program for Developing Preschoolers' Creativity.

Scientific novelty and originality: identification of the psycho-pedagogical conditions for the development of preschoolers' creativity through integrated activities with mathematical content, of the principles necessary for the effective development of preschoolers' creativity through an integrated approach to activities with mathematical content and of the pedagogical model on the optimal development of preschoolers' creativity through an integrated approach to activities with mathematical content.

The scientific results obtained in the research lie in the determination and elaboration of the pedagogical foundations of preschoolers' creativity development through integrated activities with mathematical content, structured in the targeted pedagogical model, tested and validated in kindergartens.

The theoretical significance concerns the analysis, observation and highlighting of the particularities of preschoolers' creativity development through integrated activities with mathematical content and the elaboration of a pedagogical model of integration that optimizes creative performance.

Application value: the way of designing integrated activities presented in the thesis can constitute a model to be promoted through national legislative documents, best practice guidelines, in order to develop preschoolers' creativity and skills to adapt to new situations. It can also be the subject of debate and of initial and life-long training for pre-school teachers.

Implementation of the scientific results: The research results were approved during the meetings of the thesis steering committee of "I. Creangă" SPU, presented and published in the volumes of national and international scientific conferences and in specialized BDI indexed books. The materials presented in the work were used in the kindergarten program in Galati County and in the Republic of Moldova, in the teaching of the university courses of Psychopedagogy of Creativity, Psychopedagogy of Play and Problems of Contemporary Education and in the professional training activities of the methodological meetings of kindergartens in Galati County.

ENACHE Oana Iuliana

DEVELOPING PRESCHOOL CHILDREN'S CREATIVITY THROUGH THE INTEGRATED APPROACH TO ACTIVITIES WITH MATHEMATICAL CONTENT

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