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MACOVEI Raluca-Andreea

**DEVELOPMENT OF COGNITIVE-MOTOR CAPACITIES IN
PRIMARY SCHOOL PUPILS WITHIN THE INTEGRATED
CURRICULUM**

**Specialty: 533.04. Physical Education, Sports, Physical Therapy and
Recreation**

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Composition of the Commission for the public defense of the doctoral thesis:

- 1. JURAT Valeriu**, PhD in Pedagogical Sciences, Professor at the Institute of Physical Education and Sport, Moldova State University, Chisinau, Republic of Moldova - ***President***
- 2. POPESCU Veronica**, PhD in Educational Sciences, Associate Professor at the Faculty of Physical Education and Sport, "Alexandru Ioan Cuza" University, Iasi, Romania – ***Scientific coordinator***
- 3. CARP Ivan**, PhD in Pedagogical Sciences, Professor at the Institute of Physical Education and Sport, Moldova State University, Chisinau, Republic of Moldova – ***official referent***
- 4. TEODORESCU-MATE Silvia-Violeta**, PhD in Sports Sciences (Habilitated), Professor at the National University of Physical Education and Sport, Bucharest, Romania – ***official referent***
- 5. MAN Maria-Cristina**, Ph.D in Human Motor Sciences (Habilitated), Associate Professor at the Department of Physical Education and Sport, "1 Decembrie 1918" University, Alba Iulia, Romania – ***official referent***

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Chairman of the Public Defense Committee,

Jurat Valeriu,
PhD., Professor

Scientific coordinator,

Popescu Veronica,
PhD, Associate Professor

Author:

Macovei Raluca-Andreea

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CONCEPTUAL HIGHLIGHTS OF RESEARCH

The actuality and importance of the addressed topic. The formative valences of physical education go beyond the sphere of motor development, through the active participation of cognitive and socio-emotional functions. Unlike the other disciplines that address mainly at the cognitive level, school physical education addresses the human ensemble through the unitary formation of the motor, intellectual and affective components. It is essential that physical education creates developmental benefits so that students integrate physical activity as a long-term priority in their own lifestyle. Recent studies in the field of educational sciences confirm that motor activities positively influence students' affective moods, school motivation and social interactions, facilitating inclusion and active participation in diverse learning environments [11, 14]. Participation in physical activities for pleasure is one of the extremely important psychological factors that can influence the development of the child from the earliest ages and with positive effects throughout life.

The literature highlights the primary cycle period as essential for approaching the methods that lead to the formation and development of competences, thus making an interconnection between traditional and modern education [4]. At this stage, integrated teaching activities respond optimally to the child's developmental particularities, facilitating cognitive and motor acquisitions [7].

New educational perspectives characterized by dynamism and diversification of teaching strategies require creative and integrated approaches, capable of combining theoretical and applicative learning. Adapting the contents to the individual particularities of the students contributes to multilateral development by training the competences necessary to manage real-life situations. The integrated curriculum supports the organization of the educational process by capitalizing on the relationships between fields of knowledge, facilitating the development of applicable competences in contextualized learning experiences.

The theme of this research is topical because the research aims to highlight the formation of key competences through the discipline of physical education. Physical education discipline has an important role in facilitating the approach of specific content to other disciplines [5, 16], and the interest in observing and evaluating an integrated approach to the means of physical education underlines the relevance of the proposed topic to be solved.

In primary school motor play proves to be one of the most effective methods of psychomotor stimulation [10, p.188] and can represent an effective way of integrated training. It allows methodological approaches focused on problematization, applied tasks, decision stimulation, team communication and self-regulation of behavior, essential skills in forming the profile of the primary cycle graduate.

Teacher training and personalized curriculum design, focused on interdisciplinarity and transdisciplinarity, is one of the current concerns of educational policies. Given that currently the school curricula emphasize the connection between subjects, it is recommended that the lessons be taught in a way that is as unitary and attractive as possible for the students. We consider the use of dynamic games to support the transversality of the curriculum, facilitating the integration of content from other disciplines and implicitly improving school results.

Description of the situation in the field of research and identification of research problems.

Current educational trends require the adaptation of school physical education towards a complex field of integrated learning, centered on the real needs of the young school-age child. The present research aims to complete and extend the existing teaching practices by substantiating a pedagogical model with integrated movement games, meant to support the development of the cognitive-motor capacity of primary school students. Through this pedagogical model, games are no longer just simple moments of engagement or relaxation during the lesson, but become organized activities, where the student must collaborate with the team, solve logical puzzles with cognitive requirements while performing physical exercises, learning in an adaptable way and with the possibility of transferring the skills formed. The theme also meets the current methodologies by proposing an integrated assessment system, designed as a complementary tool to respond to the competence requirements specific to primary education.

The purpose of the research is to substantiate and validate a training model through the discipline of physical education, which integrates movement games to stimulate the cognitive-motor and competence development of primary school students.

In the research hypothesis, it was assumed that the systematic implementation of integrated movement games, designed according to the school curricula and oriented towards the development of key competences, determines a significant improvement of the cognitive-motor capacity, favoring school progress, social integration and shaping the profile of the primary school graduate.

Research objectives:

1. Theoretical-methodological substantiation regarding the integrated approach of educational contents through means specific to physical education, with emphasis on the formation of key competences and cognitive-motor development of primary school pupils;
2. Analysis of teachers' opinions regarding the level of their training and involvement in the educational process using integrated teaching strategies;
3. Assessing the level of physical and cognitive-motor development of primary school pupils;
4. Arguing and capitalizing on the efficiency of the pedagogical model with integrated movement games that support the development of cognitive-motor capacities and key competences by analyzing the results obtained and developing an integrated evaluation system.

The methodology of scientific research is based on the use of a set of research methods, such as: the method of studying the literature, the method of observation, the method of investigation, the method of tests, the method of experiment, the statistical-mathematical method, and the method of graphic representation. Each of these methods has been selected to ensure a complementary approach, allowing the phased transition from theoretical analysis to the implementation of the proposed practices. The theoretical methods strengthen the theoretical framework of the integrated curriculum, providing arguments for the integration of physical education with other subjects, in order to form the key competences and cognitive-motor development of the primary school student. By studying the specialized literature, the conceptual landmarks of the research topic were established, while the questionnaire-based survey allowed the centralization of the opinions of 86 teachers on the integrated teaching approach. They demonstrate that correlating physical effort with specific tasks of other

disciplines is not a secondary activity, but a modern didactic necessity that directly supports the graduate's profile. The practical methods verify the relationship between the integrated movement game, cognitive-motor capacity and school progress, demonstrating how its application can facilitate the transfer of acquisitions in various learning contexts. The pedagogical experiment was the core of the research, the statistical-mathematical and graphical representation methods facilitating the processing, validation and clear illustration of all the progress made. The results obtained during the five learning modules confirm that an assessment based also on descriptors of cognitive development transforms the physical education lesson into a central pillar of inter- and transdisciplinary learning, where the student improves his general educational performance in an attractive climate and adapted to his particularities.

The scientific novelty and originality consists in the conceptual design of a pedagogical model with integrated movement games for primary school pupils, which aims to develop cognitive-motor skills, the formation of key competences and the validation of an integrated assessment tool that contributes to the formation of the profile of the primary school graduate.

The results obtained that contribute to solving the important scientific problem refer to the development and application of a pedagogical model with integrated movement games, materialized by specific tests, having the effect of optimizing the students' evaluation process by monitoring the progress and developing cognitive-motor skills, in order to ensure a coherent educational approach, adapted to the requirements of the integrated curriculum for primary education.

The theoretical significance lies in the theoretical-applicative argumentation of the need to apply a pedagogical model with integrated movement games within primary school physical education lessons, in the context of the current contemporary society, based on the multilateral and competential development of young school-age pupils.

The applicative value of the work. The results of the research can be applied by physical education teachers as a method, both in the formal and in the non-formal environment, being easy to adapt to the material resources and individual particularities of primary school pupils.

Implementation of scientific results. The scientific results were implemented in the primary school physical education lessons at the Secondary School no. 1 Hiliseu-Horia, "Mihail Sadoveanu" Secondary School Dumbravita, "Academician Alexandru Zub" Varfu Campului Secondary School, in Botosani County and "Iulia Halaucescu" Tarcau Secondary School, in Neamt County, in order to determine a coherent framework for the practical application of the research, ensuring pedagogical relevance and contributing to the improvement of the physical education system in the primary cycle.

Volume and structure of the thesis. The paper includes annotations in Romanian and English, list of abbreviations, introduction, three chapters, general conclusions and recommendations, bibliography of 235 titles, 13 annexes, 151 pages of basic text, 45 figures and 23 tables. The obtained results are published in 8 scientific papers.

Keywords: school physical education, primary education, movement games, development of cognitive-motor capacities, integrated curriculum, key competences.

CONTENT OF THE THESIS

1. CONCEPTUAL FOUNDATIONS REGARDING THE RELATIONSHIP BETWEEN COGNITIVE-MOTOR DEVELOPMENT AND THE SCHOOL CURRICULUM IN PRIMARY SCHOOL PUPILS

The current curricular structure provides a focus on competences, meaning an organization of disciplines so as to facilitate interdisciplinary approaches and transfer of procurement in varied learning contexts. The component documents of the current national curriculum are represented by the framework curriculum and school curricula. The framework curriculum establishes the structuring by curricular areas, grouped into conceptually common study subjects, with methodologies and time resources allocated to them. Through this document, each school cycle is assigned a number of hours that is respected by all schools. It also determines the number of hours in the common core, the curriculum at the school's decision and the minimum/maximum number of hours per week. In the content of the framework plan, physical education is part of the Physical Education, Sport and Health curricular area, together with the discipline Play and Movement [25]. The school curriculum is a national curricular document, which presents the educational offer for each year of study and subject of study according to the framework curriculum. Their characteristics are mandatory in all schools and for all subjects established in the framework plan, determining the minimum level of achievement of the contents and ensuring a unitary preparation for all students [3, 9]. The physical education curriculum specific to grades CP-II [26] refers to the formation of the psycho-motor baggage necessary for a harmonious physical development and the preservation of an optimal state of health, the use of motor capacities acquired according to the individual potential in specific activities and the development of interpersonal relationships through participation in group motor activities. For the third and fourth grades [27], the physical education curriculum ensures the continuity of the process of training the competences established in the previous stage, constituting a fundamental support for the secondary school cycle.

At European level the orientation towards the training of key competences is a fundamental reference of European education policies. The current Romanian curriculum appears as a completion of the teaching approaches in accordance with the European ones, respectively the focus on the 8 key competences [24, pp. 7-8]:

- ✓ literacy competences;
- ✓ multilingual competences;
- ✓ competences in science, technology, engineering and mathematics;
- ✓ digital competences;
- ✓ personal, social and learning competences;
- ✓ citizenship competences;
- ✓ entrepreneurial competences;
- ✓ competences of sensitisation and cultural expression.

By training key competences, the student will also be able to improve both the motor skills and the intelligence necessary to solve situations quickly, efficiently and creatively by combining learned

strategies. The integrated curriculum is an innovative approach to school content, appreciated by researchers for facilitating connections between subjects, optimizing the teaching-learning relationship, combining traditional and modern methods and supporting multi-, trans- and interdisciplinary learning [13]. Against the background of contemporary educational trends, the new curricular documents confirm the need to adapt the physical education lesson by strengthening the competence dimensions and capitalizing on the relationship between motor and cognitive development.

Integrated knowledge teaching is a modern strategy for organizing and delivering educational content. The concept of integrated activity refers to an action in which the methods and means of teaching-learning knowledge intertwine, combining various fields and constituting a wide area of skills of the students [1]. The involvement of primary school students in integrated physical activities requires cognitive processes such as attention, memory, thinking and imagination, contributing to their development in applied contexts. The transition from a traditional teaching model, where the teacher is the main source of knowledge, to a model in which the student takes an active role in the learning process becomes central to the formation of key competences. Student-centered approaches allow the development of critical thinking, responsibility and collaboration, essential elements for success in various learning contexts, in which the teacher acts more as a facilitator of the acquisition of skills than as a simple information instructor [6]. Increasing the efficiency of the physical education lesson depends on the initial training of the teacher through the university programs and his permanent interest in improving. Teachers need to combine content from multiple subjects, manage available time and resources, and promote key competences among students, which involve considerable pedagogical and intellectual effort.

Considered to be one of the most important stages of the child's development, the period 6-10 years declared by the authors to be the small school pupil [4, 23], represents the passage through primary education and is a stage characterized by the child's progressive adaptation to the organized learning activity. At the somatic level, between 6 and 10 years, the bone system is in a continuous process of ossification, characterized by the still significant presence of cartilaginous tissue, which gives increased plasticity, but also an increased vulnerability to external influences. Although the fundamental particularities specific to the stage of development are similar, there are some differences in development both between genders and between rural and urban educational environments, which are also due to environmental factors. From a motor point of view, the stage of development of middle childhood is significantly influenced by the level of physical activity and daily living conditions. The rhythm of movement strengthens with age, and gross motor skills, such as controlling objects and moving, develop significantly [8]. This is where some gender differences come into play: boys are more skilled in object control skills, and girls prefer activities with locomotor skills. The cognitive development of the primary school student is in a continuous process of adaptation, manifesting peculiarities specific to each age: at 6 years old he can be unstable in actions, at 7 years old more withdrawn, at 8 years old enthusiastic and open to new activities, at 9 years old he begins to show independence, and at 10 years old he becomes more balanced in respecting the rules, assuming responsibilities and expressing thoughts [2, pp. 4-11]. The entry into primary school requires the child

from a social point of view in integration at the class level as well as accommodation with the observance of new rules. If at the beginning of school the family occupies an important place in the formation and shaping of the personality, acting through the examples and rules that it offers and imposes, at the age of 8-9 years the child directs his reference model towards the educational environment. At the age of 6-8, children are dynamic and emotionally unstable, quickly change activities and friendships, seek appreciation and react intensely to criticism or failure. Between the ages of 8-10, a gradual maturation occurs: relationships become more stable, responsibility and acceptance of others' opinions develop, and the school environment contributes to behavioral balancing and social adaptation. Thus, going through the primary educational environment brings transformations: the agitated ones become quieter, and the calmer ones become more active. Primary education contributes to the socio-emotional development of the child by training communication and cooperation skills, supporting responsible decision-making, strengthening self-knowledge and stress management, as well as facilitating integration in diverse social and cultural contexts.

In primary classes, integration is facilitated by the teaching of several subjects by the same teacher and by collaboration with other teachers, family and community, ensuring the transfer of knowledge from the formal to the informal environment and strengthening student learning. Physical education is considered by the authors Kaittani D., Kouli O., Derri V. and Kioumourtzoglou E. [12], as a core discipline in the interdisciplinary approach to content, in that it can easily establish links between disciplines, providing teachers with effective and attractive teaching paths. The researcher Rauschenbach J. [21] completes the idea by stating that the use of means of action in an integrated way is not only an accumulation or mixture of knowledge, these need to be approached as a process of action and resolution of situations that require the adaptation of knowledge from various areas. By training key competences, the student will also be able to improve the motor skills necessary for the primary cycle, developing the intelligence necessary to solve situations quickly, efficiently and creatively by combining learned strategies. The game has always been a basic activity both in leisure time and as a teaching method. From a pedagogical perspective, the beginning of the game has a simple motor form, evolving at the end of the primary cycle towards a more complex form, with a well-defined purpose and rules. Dynamic games are an essential means in the harmonious development of the primary school student, contributing to the formation of motor skills, but also to the stimulation of cognitive and socio-emotional dimensions. At the cognitive level, movement games, especially those characterized by variability, strategic demand and cooperation, contribute to the development of fundamental processes for self-regulation and academic performance. Play plays an essential role in memory productivity, giving a voluntary character to the processes of fixation, recognition and reproduction [22, p. 135]. Through their instructional-formative value, dynamic games ensure the quality of teaching physical education content and contribute to strengthening the motor, emotional and social dimensions, while facilitating the formation of key competences. They allow creative initiative in the choice of teaching aids and support the transfer of knowledge in various contexts.

2. METHODOLOGICAL FRAMEWORK FOR DETERMINING THE INTEGRATED COMPONENTS OF PHYSICAL EDUCATION ON THE DEVELOPMENT OF THE COGNITIVE-MOTOR CAPACITY OF PRIMARY SCHOOL STUDENTS

The development of the methodological framework of this paper starts from the need to adapt school physical education to modern curricular requirements, which promote the focus on competences formation and student-centered learning. By adapting movement games into interdisciplinary learning stimuli, our approach aims to ensure a cognitive-motor evolution of the student, creating the necessary framework for the adaptive transfer of knowledge, skills and attitudes in various school and everyday contexts. The research methods that outline the present research have been applied in four stages that concretize the methodological framework and operationalize the proposed objectives:

Phase I took place between 2020 and 2021 and included:

1. Approval of the research topic and preparation of a specific work plan.
2. Analysis, synthesis and generalization of the data of the specialized literature specific to the field of physical education as well as to the researched topic.
3. Establishing the purpose, hypothesis and objectives of the proposed theme.

Stage II organized and carried out in the period 2021-2022, in which the preliminary investigation was established and organized:

1. Elaboration and application of the questionnaire for determining the opinions of teachers regarding integrated teaching, belonging to rural schools in Botoșani County.
2. Determination of subjects participating in the preliminary study for the control and experiment groups, respectively students of the III-rd and IV-th classes - a from the Gymnasium School no. 1 Hilișeu-Horia and movement games used as an independent variable;
3. Selection of methods and tests necessary to determine the level of physical and cognitive-motor development specific to the field of interest;
4. Analysis of the physical and cognitive-motor training indicators of the students involved in the preliminary research;
5. Development of the experimental curriculum focused on cognitive-motor strategies with integrated specificity, which aim at the development of key competences and cognitive-motor capacities of primary school students.

Phase III took place between 2022 and 2023 and included:

1. Establishing the subjects included in the basic experiment: Secondary School no. 1 Hilișeu-Horia from Botoșani County (experimental group), "Mihail Sadoveanu" Dumbravița Secondary School from Botoșani County (control group), "Academician Alexandru Zub" Vârfu Câmpului Secondary School from Botoșani County (control group) and "Iulia Hălăucescu" Tarcău Secondary School from Neamț County (control group).
2. Application of the initial and final tests of both groups included in the research: height, weight, IMA, samples from the EUROFIT test battery.

3. Implementation of the experimental program. Both groups followed the current school programs, content planning by number of lessons, the difference in the experimental program being given by the use of the pedagogical model with integrated movement games.

The fourth phase carried out between 2023 and 2024 included:

1. Presentation of the groups involved in the research;
2. Centralization of the data obtained from the application of the initial and final tests.
3. Statistical-mathematical analysis, interpretation of the obtained data and graphical representation of the groups participating in the experiment.
4. Evaluation of the effectiveness of the implemented experimental program and development of an evaluation system with integrated specificity.
5. Formulating conclusions and recommendations.

In order to identify the teachers' opinions regarding the importance of professional training in the integrated teaching approach, we resorted to sociological questioning. The 86 respondents are teachers who work in schools in rural areas (communes: Hilișeu-Horia, Cristinești, Vârfu Câmpului, Ibănești, Brăești), in Botoșani County. 83% are women and 17% men. Their distribution according to seniority in education is as follows: 14% between 0-5 years, 11% between 5-10 years, 17% between 10-15 years, 20% between 15-20 years and 38% over 20 years. The teaching grades of the respondents are divided as follows: 13% beginners, 17% with final, 16% with the second grade and 54% with the first grade. 76% of the respondents have a tenured status and 24% a substitute status. 38% of them teach in primary classes and 62% teach in secondary classes. The data analysis reveals a high degree of diversity in the profile of the respondent teachers, which is reflected in the structure of the researched sample. The records obtained identified the following results:

- 88% of the respondent teachers stated that they have participated in the last 5 years in training programs such as courses, teaching degrees, conversion programs, master's degrees, etc.

- The majority of respondents who have participated in training programs in the last 5 years said that they have been helpful in improving their teaching activity, respectively 53% to a very large extent and 43% to a large extent.

- Regarding the acquisition of training skills and the design of teaching activity with integrated specificity within the training programs, teachers obtained percentages of 44% to a very large extent, 51% to a large extent, 4% to a small extent and 1% to a very small extent.

- Most of the respondent teachers used integrative activities in the training process, namely 28% to a very large extent and 62% to a large extent.

- The positive results of involving pupils in an integrated activity are perceived by respondents accordingly, with 20% to a very large extent, 71% to a large extent and only 9% to a small extent. It is worth emphasising that no teacher estimated or reported the use of integrative activity and the achievement of positive results to a very small extent.

- Teachers consider integrated teaching to be a plus for streamlining the instructional-educational process as follows: 40% to a very large extent, 53% to a large extent, 7% to a small extent and to a very small extent not registering any response.

- Regarding the desire to participate in training programs based on the integrated teaching approach, teachers answered as follows: 34% to a very large extent, 56% to a large extent, 4% to a small extent and 6% to a very small extent.

The answers of the teachers involved in the survey show that they have a positive opinion regarding the acquisition of training skills and the design of the integrated teaching activity, their application in the training process, obtaining positive results from the students, perceiving the efficiency of integrated teaching and willingness to participate in training programs [15].

The preliminary research was carried out at Secondary School no. 1 Hilișeu-Horia in Botoșani County, in the 2021-2022 school year. In order to ensure an increased statistical consistency in the preliminary experiment and to overcome the methodological limitations generated by the small groups of students at the level of each class, taking into account the organization of primary classes simultaneously, it was decided to merge the subjects from the third and fourth grades, by gender categories. This approach is justified for the constitution of analysis samples equal in number: the control group girls (n=10), the experiment group girls (n=10), respectively the control group boys (n=15) and the experimental group boys (n=15).

To highlight the level of physical development, we evaluated the main growth and development indicators: **height, weight and active mass index (AMI)**. The analysis of the results obtained from the measurements applied to the girls control group (GCG) and the girls experiment (GEG) and to the boys control groups (BCG) and experiment (BEG), within the preliminary finding research (Table 2.1.), was carried out in January 2021, and the data were collected and interpreted to observe if there are large differences between the two groups and if the AMI reports values outside the limit, which would influence the previously implemented physical activity.

Table 2.1. Analysis of the anthropometric level of groups, within the preliminary research

Nr. Crt.	INDICATORS		Primary school students in the preliminary research (n=50)			
			GIRLS (n=20)		BOYS (n=30)	
			GEG (n=10)	GCG (n=10)	BEG (n=15)	BCG (n=15)
1.	Height/cm	$\bar{X}$	140,7	140,10	143,53	144,20
		SD	2,54	1,91	3,76	3,19
		CV	1,81	1,36	2,62	2,21
2.	Weight/kg	$\bar{X}$	32,20	33	34,40	36,27
		SD	1,62	1,94	3,23	3,58
		CV	5,03	5,89	6,48	9,86
3.	AMI- kg/m ²	$\bar{X}$	1,63	1,68	1,67	1,74
		SD	0,05	0,08	0,05	0,11
		CV	3,02	5,01	3,23	6,22

The results obtained in the preliminary experiment show close values of anthropometric indicators and a high degree of homogeneity between all groups. These aspects confirm the comparability of the groups and create an experimental framework that is as objective as possible for the conduct of subsequent basic research.

The motor tests applied to the control and experiment groups were initially applied in September 2021 and finally in June 2022. The initial testing (IT) was applied to observe the level of motor development of the students, and the final testing (FT) to observe if there is a progress in the level of motor development, especially for the experimental group that participated in the program implemented within the preliminary research. The interpretation of the data will focus on the ratio between the arithmetic mean and the dispersion indicators (SD and CV), which follow the degree of homogeneity. The means of the motor tests obtained by the groups involved in the preliminary research are presented in Table 2.2.

Table 2.2. Analysis of motor development indicators for the groups in the preliminary research

Nr. Crt.	MOTRIC TESTS		Primary school students in the preliminary research (n=50)							
			GIRLS (n=20)				BOYS (n=30)			
			GEG (n=10)		GCG (n=10)		BEG (n=15)		BCG (n=15)	
			IT	FT	IT	FT	IT	FT	IT	FT
1.	Flamingo Balance (FB) /no. attempts	$\bar{X}$	3,30	1,90	3,20	2,30	3,27	1,87	3,20	2,27
		SD	0,48	0,32	0,79	0,67	0,59	0,35	0,68	0,70
		CV	14,64	16,64	24,65	29,35	18,17	18,85	21,13	31,05
2.	Tap the Tiles (TT)/sec	$\bar{X}$	13,68	13,03	13,77	13,49	13,74	13,13	13,81	13,53
		SD	0,63	0,57	0,69	0,62	0,63	0,52	0,75	0,77
		CV	4,57	4,39	5,01	4,61	4,55	3,98	5,40	5,65
3.	Mobility (M)/cm	$\bar{X}$	11,40	13,30	11,20	11,90	8,20	9,93	8,13	9,20
		SD	1,35	1,57	1,62	1,66	1,21	0,70	1,68	1,15
		CV	11,84	11,78	14,46	13,98	14,72	7,08	20,71	12,46
4.	Long Jump from the spot (LJ)	$\bar{X}$	127,00	133,20	126,30	129,60	136,13	141,07	135,53	138,00
		SD	5,03	4,52	5,10	5,58	4,26	4,35	4,55	4,88
		CV	3,96	3,39	4,04	4,31	3,13	3,08	3,36	3,54
5.	Torso Elevations (TE)/no. ele.	$\bar{X}$	16,10	17,90	16,20	17,50	17,60	19,53	17,67	18,73
		SD	1,52	1,52	1,48	1,65	0,99	1,06	1,11	1,16
		CV	9,47	8,51	9,11	9,43	5,60	5,43	6,30	6,21
6.	Shuttle 5x10m (S)/sec	$\bar{X}$	19,30	18,47	19,24	18,97	19,02	18,33	19,03	18,78
		SD	0,61	0,49	0,63	0,60	0,51	0,40	0,55	0,55
		CV	3,18	2,64	3,25	3,18	2,68	2,20	2,89	2,93

The analysis of the motor indicators in the preliminary experiment shows a positive evolution of performance in all tests (FB, TT, M, LJ, TE, S) in favor of GEG and BEG at FT, also confirming comparability at IT. In terms of data dispersion, SD values register a normal fluctuation within the groups, oscillating between a minimum of 0.32 (in the FB and S tests, for GEG) and a maximum of 5.58 (at the LJ test for GCG). The homogeneity of the groups is demonstrated by the CV values, which remain below the critical threshold of 10% in most of the tests (TT, LJ, TE, S). Higher CV values, above 10%, with a peak of 31.05% (in the FB sample for BCG) are found in isolation in the M and FB samples, a natural aspect for this stage of development. The methodological consistency

of these results were validated by their dissemination in several specialized publications [17, 19, 20], thus confirming the positive impact of the preliminary experimental program on the development of students.

The use of movement games is not only a tool for improving strength or speed indices, but is a complex stimulus for executive functions and learning processes specific to young school age. In this regard, in order to quantify the impact of playful methods on the knowledge baggage, a theoretical assessment tool was administered in May 2022. The knowledge test is presented as a summative test that the students involved in the preliminary research received in a physical education class, with a maximum score of 10 points, each item being scored differently. The evaluation items refer to the way in which the students have assimilated the information related to the rules, how to adapt, the space of development, the adaptation of material resources as well as various cognitive processes that are activated during the game. The arithmetic average of the score of the third and fourth grades, for the experiment group is 9.11 points, and for the control group it is 6.27. The difference between the result obtained by the experiment group and the control group is 2.84 points, a fairly large difference, considering the diverse program of movement games applied to the experiment group. Also, the experiment group recorded a score very close to the maximum, only 0.89 less than the maximum 10 points awarded. These results support the effectiveness of movement games for triggering students' executive functions in primary education [18].

The implementation of a topical experimental design with a focus on the development and training of key competences is the basic element proposed by us to obtain the validity of the proposed hypothesis. The planning of the didactic approach within the research respected the same number of lessons for each thematic unit, aimed at the development of cognitive-motor capacities and the formation of key competences established by the National Curriculum, for all schools participating in the research. The difference was made by the personalized realization of the learning activities: the experiment group participated in the physical education lessons carried out with the help of *the pedagogical model with integrated movement games*. The proposed model is built taking into account the opinion of teachers for primary education and after analyzing the contents offered by the primary school physical education curriculum and other subjects (CLR, MEM, CLE – grades I-II and Romanian language, mathematics, English – grades I-IV) in the framework plan for primary education. It was applied in a total number of 63 main themes and in 57 lessons divided during the five modules of the 2022-2023 school year. The 30 integrated movement games specify the recommended age level, the key, general competences of physical education as well as those related to other disciplines, the skills developed in motor, cognitive and socio-emotional terms, the non-scrapping materials, the description, dosage, rules and methodical indications necessary to carry out the proposed activities. The proposed activities can be adapted according to the particularities of the class of students, by changing/supplementing the requirements, dosage or methodical indications. The realization of the lessons by applying the proposed model provides the framework for positive influence on the development of cognitive-motor abilities and key competences in primary school students.

3. EXPERIMENTAL INTERVENTION OF THE INTEGRATED COMPONENTS OF PHYSICAL EDUCATION ON COGNITIVE MOTOR DEVELOPMENT IN PRIMARY SCHOOL STUDENTS

The students of the experimental group come from the Gymnasium School no. 1 Hilișeu-Horia, this being also the school participating in the preliminary research that provided positive results on the impact of movement games on the level of cognitive-motor development for pupils in grades III-IV. The other participating schools whose pupils are part of the control group are: "Mihail Sadoveanu" Secondary School Dumbrăvița, "Academician Alexandru Zub" Secondary School Vârfu Câmpului and "Iulia Hălăucescu" Secondary School Tarcău. The students participating in the research belong to grades I-IV, and the total number of students is 268, of which 134 represent the experiment group and 134 the control group.

In order to determine the efficiency of the experimental planning implemented in primary classes, a complex approach was applied, with interpretations of the antropometric and motor indicators. The comparative analysis of height, body weight and AMI allowed a better understanding of the students' way of development and a more precise interrelation with the performance in the applied motor tests. All students, regardless of gender or group membership, recorded similar increases in height, between 3.5 – 4.5 cm, between IT and FT. The results obtained after measuring the initial and final weight show an approximate difference between 1.5-2.5 kg, in all groups involved in the research. The analysis of the AMI values shows that all pupils included in the research have a normal physical development for their age and gender, without deviations that indicate the risk of malnutrition or obesity. These increases are recorded in the natural trajectory of physical development for primary school age, with no statistically significant differences between the groups analyzed in both tests ($p > 0.05$), with a probability of over 5% that the observed variations are purely random. Except for this case, only in first grade girls are observed, where the values become statistically significant at: IT weight with $p < 0.05$, FT weight with $p < 0.01$, IT AMI with $p < 0.001$ and FT AMI with $p < 0.001$, in favor of GCG. These p values correspond to probabilities of over 95%, 99% and 99.9% that the results obtained are not just a coincidence. The Pearson coefficients above 0.90 demonstrate a very strong relationship between tests in the paired groups, which suggests that there were no sudden increases and supporting the impact of physiological development for this age stage.

At the age of 7–11, pupils go through a stage of progress on the ability to coordinate, strength, speed, endurance and balance, fundamental aspects of general motor skills. The testss also found in the EUROFIT test battery adapted for young schoolchildren provide a standardised, scientifically validated tool for measuring physical performance in various dimensions of motor skills. The analysis of the indicators obtained from the application of these motor tests at the beginning and end of the experiment allowed the observation of the effectiveness of the pedagogical intervention.

Table 3.1 presents the analysis of the results of the initial and final motor tests specific to motor training, obtained by the groups of first grade students.

Table 3.1. Analysis of motor training indicators of first grade pupils (n=60)

Table 3.2 presents the analysis of the results obtained after IT and FT by the groups of second-grade pupils, in the same tests within the Eurofit battery.

Table 3.2. Analysis of the motor training indicators of second-grade pupils (n=76)

Nr. crt.	Tests	Gender	Groups	Initial Testing	Final Testing	t	P	r
				$\bar{X} \pm m$	$\bar{X} \pm m$			
1.	Flamingo Balance (FB) - no. attempts	Girls	E	6,53±0,23	4,05±0,29	17,63	<0,001	0,88
			C	6,68±0,24	5,21±0,21	10,5	<0,001	0,82
			t	0,37	3,22	-	-	-
			P	>0,05	<0,05	-	-	-
		Boys	E	6,95±0,21	4,26±0,25	20,09	<0,001	0,85
			C	6,89±0,27	5,26±0,30	11,91	<0,001	0,89
			t	0,15	2,53	-	-	-
			P	>0,05	<0,05	-	-	-
2.	Tap the Tiles (TT) – sec.	Girls	E	14,44±0,07	13,50±0,08	17,24	<0,001	0,77
			C	14,23±0,09	13,95±0,08	15,54	<0,001	0,98
			t	1,85	3,73	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	14,38±0,08	13,49±0,08	19,83	<0,001	0,85
			C	14,36±0,05	13,98±0,06	7,41	<0,001	0,64
			t	0,16	4,68	-	-	-
			P	>0,05	<0,001	-	-	-
3.	Mobility (M) - cm	Girls	E	17,68±0,59	20,26±0,62	22,16	<0,001	0,98
			C	17,58±0,36	18,58±0,43	4,94	<0,001	0,88
			t	0,15	2,23	-	-	-
			P	>0,05	<0,05	-	-	-
		Boys	E	18,11±0,41	20,68±0,49	12,47	<0,001	0,91
			C	17,47±0,39	18,74±0,39	8,43	<0,001	0,93
			t	1,11	3,11	-	-	-
			P	>0,05	<0,01	-	-	-
4.	Long Jump (LJ) - cm	Girls	E	118,68±0,73	128,16±1,09	15,56	<0,001	0,85
			C	118,95±1,03	122,47±1,05	9,75	<0,001	0,94
			t	0,21	3,75	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	125,68±1,71	134,84±1,65	16,56	<0,001	0,95
			C	123,68±0,99	127,11±0,97	13,30	<0,001	0,96
			t	1,01	4,05	-	-	-
			P	>0,05	<0,001	-	-	-
5.	Torso Elevations (TE)/no. elevations	Girls	E	15,16±0,22	18±0,28	20,57	<0,001	0,87
			C	15,26±0,24	16,47±0,23	9,86	<0,001	0,87
			t	0,32	4,22	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	16,89±0,30	19,63±0,33	16,26	<0,001	0,86
			C	16,37±0,24	17,37±0,26	13,08	<0,001	0,95
			t	1,37	5,46	-	-	-
			P	>0,05	<0,001	-	-	-
6.	Shuttle 5x5m (S) – sec.	Girls	E	13,14±0,08	12,12±0,08	27,21	<0,001	0,89
			C	13,64±0,04	13,32±0,06	9,96	<0,001	0,90
			t	1,72	11,76	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	12,89±0,08	11,81±0,10	21,88	<0,001	0,88
			C	13,19±0,11	12,74±0,12	12,79	<0,001	0,96
			t	2,17	5,98	-	-	-
			P	>0,05	<0,001	-	-	-

Note: df=18 t = 2,101 2,878 3,922 df=36 t = 2,021 2,704 3,551
p < 0,05 0,01 0,001 p < 0,05 0,01 0,001

The analysis of the results obtained by the third class groups involved in the research is being presented in Table 3.3.

Table 3.3. Analysis of motor training indicators of third grade pupils (n=66)3

Nr. crt.	Tests	Gender	Groups	Initial Testing	Final Testing	t	P	r
				$\bar{X} \pm m$	$\bar{X} \pm m$			
1.	Flamingo Balance (FB) - no. attempts	Girls	E	3,69 $\pm$ 0,26	1,77 $\pm$ 0,26	25	<0,001	0,96
			C	3,77 $\pm$ 0,26	3,23 $\pm$ 0,28	2,94	<0,05	0,77
			t	0,21	3,84	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	4,35 $\pm$ 0,36	2,45 $\pm$ 0,32	10,78	<0,001	0,87
			C	4,55 $\pm$ 0,40	3,5 $\pm$ 0,39	5,69	<0,001	0,89
			t	0,37	2,07	-	-	-
			P	>0,05	<0,05	-	-	-
2.	Tap the Tiles (TT) – sec.	Girls	E	14,03 $\pm$ 0,06	13,02 $\pm$ 0,11	14,53	<0,001	0,80
			C	13,95 $\pm$ 0,12	13,59 $\pm$ 0,12	16,18	<0,001	0,98
			t	0,59	3,63	-	-	-
			P	>0,05	<0,01	-	-	-
		Boys	E	14 $\pm$ 0,07	13,11 $\pm$ 0,12	12,38	<0,001	0,87
			C	14,08 $\pm$ 0,12	13,49 $\pm$ 0,13	10,64	<0,001	0,90
			t	0,55	2,12	-	-	-
			P	>0,05	<0,05	-	-	-
3.	Mobility (M) - cm	Girls	E	17,54 $\pm$ 0,31	21,23 $\pm$ 0,46	11,26	<0,001	0,69
			C	17,08 $\pm$ 0,37	18,23 $\pm$ 0,43	2,96	<0,05	0,52
			t	0,96	4,81	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	16,6 $\pm$ 0,28	19,5 $\pm$ 0,48	9,72	<0,001	0,81
			C	16,05 $\pm$ 0,34	16,9 $\pm$ 0,52	2,90	<0,01	0,83
			t	0,99	3,67	-	-	-
			P	>0,05	<0,001	-	-	-
4.	Long Jump (LJ) - cm	Girls	E	125 $\pm$ 1,50	136,15 $\pm$ 1,89	13,42	<0,001	0,91
			C	124 $\pm$ 1,12	129,62 $\pm$ 1,27	11,52	<0,001	0,92
			t	0,53	2,87	-	-	-
			P	>0,05	<0,01	-	-	-
		Boys	E	132,95 $\pm$ 1,37	145,05 $\pm$ 1,41	22,72	<0,001	0,93
			C	131,05 $\pm$ 1,42	135,8 $\pm$ 1,49	14,33	<0,001	0,97
			t	0,97	4,57	-	-	-
			P	>0,05	<0,001	-	-	-
5.	Torso Elevations (TE)/no. elevations	Girls	E	16,08 $\pm$ 0,18	18,92 $\pm$ 0,29	12,82	<0,001	0,64
			C	15,92 $\pm$ 0,24	17,31 $\pm$ 0,21	5,74	<0,001	0,43
			t	0,52	4,55	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	17,25 $\pm$ 0,23	20,15 $\pm$ 0,31	16,46	<0,001	0,83
			C	16,7 $\pm$ 0,24	18,35 $\pm$ 0,30	9,90	<0,001	0,83
			t	1,67	4,16	-	-	-
			P	>0,05	<0,001	-	-	-
6.	Shuttle 5x5m (S) – sec.	Girls	E	20,29 $\pm$ 0,07	19,12 $\pm$ 0,09	28,92	<0,001	0,90
			C	20,30 $\pm$ 0,21	19,90 $\pm$ 0,22	14,80	<0,001	0,99
			t	0,10	3,33	-	-	-
			P	>0,05	<0,01	-	-	-
		Boys	E	20,00 $\pm$ 0,10	19,00 $\pm$ 0,13	14,07	<0,001	0,84
			C	20,13 $\pm$ 0,17	19,57 $\pm$ 0,16	9,79	<0,001	0,94
			t	0,66	2,77	-	-	-
			P	>0,05	<0,01	-	-	-

Note: Girls $df=12$ $t = 2,179$ 3,055 4,318 $df=24$ $t = 2,064$ 2,797 3,745
Boys $df= 19$ $t = 2,093$ 2,861 3,883 $df=38$ $t = 2,021$ 2,704 3,551
 $p < 0,05$ 0,01 0,001 $p < 0,05$ 0,01 0,001

Table 3.4 presents the analysis of the initial and final results obtained by the fourth grade pupils involved in the research.

Table 3.4. Analysis of the indicators of motor training of fourth grade pupils (n=66)

Nr. crt.	Tests	Gender	Groups	Initial Testing	Final Testing	t	P	r
				$\bar{X} \pm m$	$\bar{X} \pm m$			
1.	Flamingo Balance (FB) - no. attempts	Girls	E	3 $\pm$ 0,37	1,07 $\pm$ 0,23	7,25	<0,001	0,69
			C	3,13 $\pm$ 0,26	2,53 $\pm$ 0,24	3,67	<0,01	0,78
			t	-0,30	-4,46	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	3,17 $\pm$ 0,23	1,11 $\pm$ 0,20	12,02	<0,001	0,69
			C	3,44 $\pm$ 0,18	2,22 $\pm$ 0,24	8,02	<0,001	0,76
			t	0,93	3,61	-	-	-
			P	>0,05	<0,001	-	-	-
2.	Tap the Tiles (TT) – sec.	Girls	E	13,47 $\pm$ 0,11	12,47 $\pm$ 0,11	14,64	<0,001	0,81
			C	13,5 $\pm$ 0,14	13,20 $\pm$ 0,15	2,74	<0,05	0,72
			t	0,18	3,98	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	13,47 $\pm$ 0,10	12,37 $\pm$ 0,10	15,49	<0,001	0,74
			C	13,55 $\pm$ 0,09	13,44 $\pm$ 0,09	2,97	<0,01	0,91
			t	0,57	7,80	-	-	-
			P	>0,05	<0,001	-	-	-
3.	Mobility (M) - cm	Girls	E	10 $\pm$ 0,74	13,2 $\pm$ 0,69	8,70	<0,001	0,87
			C	9,73 $\pm$ 0,75	10,47 $\pm$ 0,70	1,75	>0,05	0,83
			t	0,25	2,79	-	-	-
			P	>0,05	<0,01	-	-	-
		Boys	E	8,89 $\pm$ 0,34	12,37 $\pm$ 0,10	5,86	<0,001	0,62
			C	9 $\pm$ 0,53	8,94 $\pm$ 0,40	0,11	>0,05	0,48
			t	0,18	3,41	-	-	-
			P	>0,05	<0,01	-	-	-
4.	Long Jump (LJ) - cm	Girls	E	129 $\pm$ 1,96	142,67 $\pm$ 1,94	11,98	<0,001	0,83
			C	129,33 $\pm$ 1,75	133,67 $\pm$ 1,72	9,54	<0,001	0,97
			t	0,13	3,47	-	-	-
			P	>0,05	<0,01	-	-	-
		Boys	E	137 $\pm$ 1,20	147,89 $\pm$ 1,24	14,79	<0,001	0,82
			C	136,17 $\pm$ 1,25	141,33 $\pm$ 1,27	10,20	<0,001	0,92
			t	0,48	3,69	-	-	-
			P	>0,05	<0,001	-	-	-
5.	Torso Elevations (TE)/no. elevations	Girls	E	17,53 $\pm$ 0,29	19,87 $\pm$ 0,27	14,64	<0,001	0,84
			C	17,4 $\pm$ 0,21	18,07 $\pm$ 0,23	5,29	<0,001	0,84
			t	0,37	5,05	-	-	-
			P	>0,05	<0,001	-	-	-
		Boys	E	18,56 $\pm$ 0,23	21,78 $\pm$ 0,31	15,57	<0,001	0,74
			C	18,5 $\pm$ 0,22	19,33 $\pm$ 0,25	6,87	<0,001	0,87
			t	0,17	6,23	-	-	-
			P	>0,05	<0,001	-	-	-
6.	Shuttle 5x5m (S) – sec.	Girls	E	19,39 $\pm$ 0,09	18,79 $\pm$ 0,10	14,21	<0,001	0,92
			C	19,44 $\pm$ 0,05	19,17 $\pm$ 0,57	6,09	<0,001	0,65
			t	0,53	3,19	-	-	-
			P	>0,05	<0,01	-	-	-
		Boys	E	19,20 $\pm$ 0,10	18,42 $\pm$ 0,10	19,72	<0,001	0,93
			C	19,19 $\pm$ 0,04	18,88 $\pm$ 0,08	5,45	<0,001	0,70
			t	0,09	3,60	-	-	-
			P	>0,05	<0,001	-	-	-

Note: Girls $df=14$ $t=2,145$ $2,977$ $4,140$ $df=28$ $t=2,048$ $2,763$ $3,674$
Boys $df=17$ $t=2,110$ $2,898$ $3,965$ $df=34$ $t=2,042$ $2,750$ $3,646$
 $p < 0,05$ $0,01$ $0,001$ $p < 0,05$ $0,01$ $0,001$

The comparative analysis of IT presents a comparable starting level at almost all tests and at all groups, the differences between them being statistically insignificant ($p > 0.05$). The only statistically significant difference ($p < 0.01$) between the groups at IT is in the M test, in first class, between GEG and GCG, which is most likely influenced by the individual genetic background of the pupils.

The statistical analysis of the final results obtained in the **FB test** shows improvements in the balance capacity in all the groups investigated, but the progress is higher in the experimental groups compared to the control groups, in all the groups and classes analyzed. After the FT significant, very significant or extremely statistically significant differences were highlighted in favor of the experimental groups ($p < 0.05$; $p < 0.01$; $p < 0.001$), corresponding to probabilities of over 95%, 99% and 99.9% regarding the reality of the results obtained.

The evaluation of the performance of the **TT test** indicates an improvement in the indices of reaction speed and segmental coordination for the entire sample investigated, the positive dynamics being superior among the experimental groups compared to the control ones. The final values recorded showed extremely statistically significant progress ($p < 0.001$) in favor of the experimental groups of both genders for first, second and fourth grades, with a probability of certainty of over 99.9% regarding the real nature of the obtained results. The experimental groups in the third grade obtained very statistically significant differences ($p < 0.01$) in girls and significant differences in boys ($p < 0.05$), respectively probabilities of over 99% and 95% that the progress obtained by them is real.

The centralization of the data from the FT in the case *of the M test* highlights an obvious progress of the pupils in the experimental groups. This major progress is extremely statistically significant ($p < 0.001$) at the level of first and third grade, regardless of gender, demonstrating with a probability of over 99.9% that the integrated movement games generated effects superior to those applied to the control groups. Very statistically significant differences ($p < 0.01$), with a probability of certainty of over 99%, were recorded in second grade BEG and both experimental groups in fourth grade. A more moderate evolution, but also with a statistically significant difference ($p < 0.05$) and with a 95% probability of real progress, is found in girls in the second grade, which confirms the practical usefulness of our approach.

The final evaluation of the performance at the **SL test** confirms here again the efficiency of our pedagogical model with integrated movement games, applied to the subjects in the experimental groups. This positive evolution is extremely statistically significant ($p < 0.001$) at the level of first and second grades and for boys in third and fourth grades, demonstrating with a probability of over 99.9% that the used games have superior effects to the means applied to the control groups. Very statistically significant differences ($p < 0.01$), with a probability of certainty of over 99% of the results obtained were also recorded in FT between GEG and GCG in third and fourth grades, in favor of GEG.

The analysis of the results of the TE test after FT highlights the progress of abdominal muscle strength, especially among students in the experimental groups. This positive evolution materializes in extremely statistically significant differences ($p < 0.001$), between the experiment and control groups, for second, third, fourth grades (in both sexes) and for boys in first grade, confirming with a probability of over 99.9% that the integrated movement games led to the higher final values obtained. The only more moderate evolution is recorded in girls in first grade, where the difference in FT

between groups remains very statistically significant ($p < 0,01$), which confirms with a probability of over 99% the real nature of the progress achieved by GEG.

The analysis of the speed indices recorded in the *S test* after FT demonstrates a clear improvement among the students in the experimental groups. The efficiency of our intervention program is observed in FT by the extremely statistically significant values ($p < 0,001$) obtained at the level of the second grades (both gender), as well as in the boys in the first and fourth grades, which guarantees with a certainty of over 99.9% the superiority of the implemented integrated movement games. For the rest of the analyzed groups, girls in first and fourth grades, respectively both genders in third grades, the reduction in FT times retains very statistically significant values ($p < 0,01$), the probability that these advances are real being over 99% in favor of the mentioned experimental groups.

The possibility of integrated assessment stimulates the development of key competences and validates the hypothesis proposed for the research. The integrated tests proposed for the primary cycle have been selected so as to be representative by age levels, to integrate motor and cognitive components and to be applicable in real life. A model test was chosen for each grade, taking into account both the requirements of the school curricula and the national evaluation system, as well as the possibilities of carrying out. The emphasis was placed on simplicity, clarity and attractiveness, so that the activities are achievable without additional pressure, stimulate pupil involvement and to not generate frustration.

Integrated test *The Numbers Shuttle 5x5m with application to first grade pupils* represents an applicative extension of the classical test Shuttle 5×5 m, which aims to develop the motor quality of speed, preserving its basic motor structure, but enriching the task by integrating cognitive demands of a mathematical nature.

Integrated test *Jump to the letters applied to the students of the second grade* refers to performing jumps on both legs similar to the classic long jump test used in the assessment of motor quality strength, and acts in conjunction with the performance of a letter recognition task to form a word specific to the key literacy competence [152].

Integrated test *Throws the syllables* applied to third grade pupils integrates the development of propulsive manipulation skills, with cognitive and socio-emotional tasks, approached interdisciplinary with the Romanian language in the context of primary education [58]. Through this test, pupils are stimulated to develop precision, coordination and force control, simultaneously with attention, working memory and logical thinking, in an organized and structured framework.

Integrated test *Move the colored balls*, aims to adapt motor skills in the context of an integrated curriculum adapted to fourth grade pupils. This test has elements in common with the standardised leg lift test provided for in the national assessment system for the primary cycle, in particular as regards the use of the abdominal muscles and postural control in the seated position. The activity of the integrated test combines coordination, balance and strength exercises with tasks of reception and application of instructions in English displayed on the interactive whiteboard.

Elaboration and application of these four *integrated tests* allowed to capitalize on the interdisciplinary dimensions of the *pedagogical model with integrated movement games*, highlighting

the fact that integrated motor activities can become evaluation tools for cognitive-motor acquisitions. The use of the analytical grid structured on seven qualitative criteria demonstrates the complexity of the evaluation and validates *the potential of the pedagogical model with integrated movement games*, as a learning environment adapted to current school curricula.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

1. The analysis of the literature on our researched problem underlined the importance of primary school physical education, especially of the movement game in cognitive-motor development, on the integration of disciplines for the formation of key competences as well as for stimulating active learning. Key competences provide the necessary framework for combining motor and cognitive competences, facilitating the transfer of educational acquisitions in diverse school contexts.

2. The questionnaire applied to teachers revealed a clear perception of the need for teacher training for the implementation of the integrated curriculum, highlighting both the practical challenges and the benefits of integrated teaching in student assessment and development. The low share (below 10%) of the responses "to a small and very small extent" to all the items included in the survey demonstrates the interest and need to permanently adapt the educational process to the contemporary society.

3. Following the application of the knowledge test in the preliminary research, the influence of the movement game in the development of attention, memory, thinking, imagination and the ability to solve motor tasks is noted. The data analysis highlights a clear advantage of the experimental group compared to the control group, the difference in the total mean being 2.84 points (9.11 compared to 6.27). The superior performance of the experiment group is found in most of the items, especially in those that required application, transfer, analysis and creativity (items 2, 4, 6 and 10), which indicates not only the memorization of the contents, but also the ability to adapt and build motor tasks.

4. The analysis of the particularities of the physical development of primary school pupils is essential for the design and application of the integrated activities in the present research. The results of the anthropometric analysis from the preliminary stage show a normal physical development, perfectly consistent with the age particularities (9–10 years) of the subjects, all groups falling within the normo-weight limits (mean AMI between 1.63 and 1.74). Statistically, the high homogeneity of the data was determined by the close values of the DS and confirmed by the location of the CV indices below the critical threshold of 10%. This uniformity allowed the elimination of the risks of somatic asymmetry and provided increased objectivity to the analysis of the motor indicators obtained subsequently.

5. The analysis of the results of the six motor tests in the preliminary experiment shows a positive evolution of the performance of GEG and BEG at FT, given the level close to and comparable to GCG and BCG observed after IT. SD values range from 0.32 (for FB and S tests, for GEG) to 5.58 (for LJ tests for GCG). CV values remain below the critical threshold of 10% for most TT, LJ, TE, S samples and above 10%, with a peak of 31.05% (for FB tests for BCG) for M and FB tests.

6. The data obtained on physical development in the basic experiment show that, between IT and FT, all groups registered an extremely statistically significant increase in height and weight ($p < 0.001$), with a probability of over 99.9% that this somatic progress is real, due to the natural rate of growth. The analysis of the AMI index between the two tests shows stability, the internal differences being statistically insignificant ($p > 0.05$). The absence of these statistically significant differences between groups in FT confirms that physical education lessons do not interfere with the genetic program of biological growth, all groups evolving based on hereditary background or other factors.

7. Probele motrice *FB, TT, M, LJ, TE and S* constituted an objective component on the analysis of the motor progress of the groups participating in the experiment. The results obtained by the students during the application of these tests indicated an improvement in the motor qualities indices in all experimental groups of all classes. If after IT, there were no statistically significant differences in almost all samples between the experiment and control groups ($p > 0.05$, $> 5\%$), only GEG had very statistically significant differences in sample M ($p < 0.01$, $> 99\%$), after FT there were significant, very significant or statistically extremely significant differences in favor of all experimental groups ($p < 0.05$; $p < 0.01$; $p < 0.001$). These values correspond to probabilities of certainty of over 95%, 99% and 99.9% that the results obtained are due to *the pedagogical model with integrated movement games* on the experimental groups and validate the proposed hypothesis.

8. The proposed didactic intervention represented a practical concretization of the competency-centered curricular orientation. *The pedagogical model with integrated movement games* emphasized the combination of motor skills with cognitive tasks, maintaining the playful and attractive character for pupils, but without compromising the evaluative rigor.

9. The obtained results show that the pupils in the experimental groups, regardless of gender or age level, showed progress both on the motor and cognitive levels, showing increased attention, memory, thinking and ability to solve tasks. Also, the increase in socio-emotional involvement was observed, through compliance with rules, cooperation and behavioral self-regulation, which confirms the role of implementing *the pedagogical model with integrated movement games* as a versatile tool for achieving progress.

10. In relation to the available infrastructure and the school's resources, the integrated tests demonstrated a high level of pedagogical flexibility and contextual applicability, providing a sustainable support to the traditional assessment in physical education. Assessment becomes a holistic process, which allows not only to quantify the physical progress, but also the cognitive development of the student, acting effectively to the requirements of the integrated curriculum.

11. Finally, our research proves to be an effective and balanced teaching-evaluation strategy, which validly responds to the hypothesis and the proposed objectives. The positive results obtained on all levels, based on the specialized literature, which support the idea that the integrated curriculum in the discipline of physical education is a necessary pillar in the didactic design at the primary cycle, contributing significantly to the development of the student's cognitive-motor capacity, with finality on his overall development and preparation for secondary education.

As a result of the conclusions presented, we consider it necessary to present the following **recommendations**:

1. Expansion of the area of investigation: the positive results obtained open new research perspectives, and it is recommended to apply the researched pedagogical model at the level of secondary education (grades V-VIII), in order to ensure the continuity of the stimulation of cognitive functions through directed physical effort and to monitor the impact of these strategies in the long term.

2. Dissemination of the pedagogical model with integrated movement games and integrated tests within pedagogical circles and presenting in the continuous training programs of teachers, in order to encourage integrated teaching in physical education and sports classes.

3. Proposing the use of multidimensional monitoring sheets (similar to those proposed in the thesis) in the evaluations, in order to capture the holistic progress of the student, not just the motor one.

4. Increasing communication between the primary school teacher and the physical education teacher, so that the homework or lessons of Romanian, Mathematics or English are reinforced through movement games at close intervals.

5. Optimization and adaptation of school infrastructure: adaptation of sports halls and schoolyards with permanent markings (letters, numbers, geometric shapes) that facilitate the quick organization of integrated games without spending time with the arrangement of materials.

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ADNOTARE (in Romanian and English)

Macovei Raluca-Andreea, *Dezvoltarea capacităților cognitiv-motrice la elevii claselor primare în cadrul curriculumului integrat*, teză de doctor în științe ale educației, Chișinău, 2026.

Structura tezei: Lucrarea cuprinde adnotări în limbile română și engleză, lista abrevierilor, introducere, trei capitole, concluzii generale și recomandări, bibliografie din 235 de titluri, 13 anexe, 151 de pagini de text de bază, 45 de figuri și 23 tabele. Rezultatele obținute sunt publicate în 8 lucrări științifice.

Cuvinte-cheie: educație fizică școlară, învățământ primar, jocuri de mișcare, dezvoltarea capacităților cognitiv-motrice, curriculum integrat, competențe-cheie.

Scopul lucrării: fundamentarea și validarea unui model de instruire prin educație fizică, ce integrează jocurile de mișcare pentru a stimula dezvoltarea cognitiv-motrică și competențială a elevilor din clasele primare.

Obiectivele cercetării: Fundamentarea teoretico-metodologică privind abordarea integrată a conținuturilor educaționale prin mijloace specifice educației fizice, cu accent pe formarea competențelor-cheie și dezvoltarea cognitiv-motrică a elevilor din ciclul primar; analiza opiniilor cadrelor didactice privind nivelul de formare și implicare al acestora în procesul educațional, utilizând strategii didactice integrate; aprecierea nivelului de dezvoltare fizică și cognitiv-motrică a elevilor claselor primare; argumentarea și valorificarea eficienței *modelului pedagogic cu jocuri de mișcare integrate* care să susțină dezvoltarea capacităților cognitiv-motrice și a competențelor-cheie, prin analizarea rezultatelor obținute și elaborarea unui sistem de evaluare integrat.

Noutatea și originalitatea științifică: proiectarea conceptuală a unui model pedagogic cu jocuri de mișcare integrate pentru elevii din ciclul primar, care să urmărească dezvoltarea capacităților cognitiv-motrice, formarea competențelor-cheie și validarea unui instrument de evaluare cu specific integrat care să contribuie la formarea profilului absolventului de ciclu primar.

Rezultatele obținute care contribuie la soluționarea problemei științifice importante: elaborarea și aplicarea unui model pedagogic cu jocuri de mișcare integrate, concretizat prin probe specifice, având ca efect optimizarea procesului de evaluare a elevilor prin monitorizarea progresului și dezvoltarea competențelor cognitiv-motrice, în vederea asigurării unui demers educațional coerent, adaptat cerințelor curriculumului integrat pentru învățământul primar.

Semnificația teoretică: argumentarea teoretico-aplicativă a necesității aplicării unui model pedagogic cu jocuri de mișcare integrate în cadrul lecțiilor de educație fizică școlară primară, în contextul societății contemporane actuale, bazată pe dezvoltarea multilaterală și competențială a elevilor de vârstă școlară mică.

Valoarea aplicativă: rezultatele cercetării pot fi aplicate de către profesorii de educație fizică ca metodă, atât în mediul formal cât și în cel nonformal, fiind ușor de adaptat la resursele materiale și la particularitățile individuale ale elevilor de clasă primară.

Implementarea rezultatelor științifice: rezultatele științifice au fost implementate în cadrul lecțiilor de educație fizică școlară primară de la Școala Gimnazială nr. 1 Hilișeu-Horia, Școala Gimnazială “Mihail Sadoveanu” Dumbravița, Școala Gimnazială “Academician Alexandru Zub” Vârfu Câmpului din județul Botoșani și Școala Gimnazială “Iulia Hălăucescu” Tarcău, din județul Neamț, în scopul determinării unui cadru coerent pentru aplicarea practică a cercetării, asigurând relevanță pedagogică și contribuind la îmbunătățirea sistemului educațional de educație fizică din ciclul primar.

ANNOTATION

Macovei Raluca-Andreea, *Development of cognitive-motor capacities in primary school students within the integrated curriculum*, doctoral thesis in educational sciences, Chisinau, 2026.

Structure of the thesis: The work includes annotations in Romanian and English, list of abbreviations, introduction, three chapters, general conclusions and recommendations, bibliography of 235 titles, 13 annexes, 151 pages of basic text, 45 figures and 23 tables. The results obtained are published in 8 scientific papers.

Keywords: school physical education, primary education, movement games, development of cognitive-motor capacities, integrated curriculum, key competences.

The aim of the paper: to substantiate and validate a physical education training model, which integrates movement games to stimulate the cognitive-motor and competencial development of primary school students.

Research objectives: Theoretical-methodological substantiation regarding the integrated approach of educational contents through means specific to physical education, with emphasis on the formation of key competences and cognitive-motor development of primary school students; analysis of teachers' opinions on the level of training and their involvement in the educational process, using integrated didactic strategies; assessment of the level of physical and cognitive-motor development of the primary school students; arguing and capitalizing on the efficiency of *the pedagogical model with integrated movement games* that support the development of cognitive-motor capacities and key competences, by analysing the results obtained and developing an integrated evaluation system.

Scientific novelty and originality: conceptual design of a pedagogical model with integrated movement games for primary school students, aiming at the development of cognitive-motor skills, the formation of key competences and the validation of an integrated assessment tool that would contribute to the formation of the profile of the primary school graduate.

The results obtained that contribute to solving the important scientific problem: the development and application of a pedagogical model with integrated movement games, materialized through specific tests, having the effect of optimizing the students' evaluation process by monitoring the progress and developing the cognitive-motor skills, in order to ensure a coherent educational approach, adapted to the requirements of the integrated curriculum for primary education.

Theoretical significance: theoretical-applicative argumentation of the need to apply a pedagogical model with integrated movement games within primary school physical education lessons, in the context of the current contemporary society, based on the multilateral and competencial development of young school-age students.

Applicative value: the research results can be applied by physical education teachers as a method, both in the formal and non-formal environments, being easy to adapt to the material resources and individual particularities of primary school students.

Implementation of the scientific results: the scientific results were implemented in the primary school physical education lessons at the Secondary School no. 1 Hilișeu-Horia, the "Mihail Sadoveanu" Secondary School Dumbravița, the "Academician Alexandru Zub" Vârfu Câmpului Secondary School in Botoșani County and the "Iulia Hălăucescu" Tarcău Secondary School, in Neamț County, in order to determine a coherent framework for the practical application of the research, ensuring pedagogical relevance and contributing to the improvement of the physical education education system in the primary cycle.

MACOVEI Raluca-Andreea

**DEVELOPMENT OF COGNITIVE-MOTOR CAPACITIES IN
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CURRICULUM**

**Specialty: 533.04 – Physical Education, Sports, Physical Therapy and
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