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**DEVELOPMENT OF SPEED ENDURANCE IN MIDDLE
SCHOOL STUDENTS BY USING BASKETBALL MEANS**

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TABLE OF CONTENTS

| | |
|---|-----------|
| Conceptual benchmarks of the research..... | 4 |
| 1. General conceptual framework of the scientific approach regarding the organization of physical education in middle school | 8 |
| 2. Determining the level of speed development in middle school students by using the basketball means | 10 |
| 3. Argumentation of the efficiency of speed endurance development in middle school students by using basketball means | 20 |
| General conclusions and recommendations..... | 24 |
| Reference list..... | 27 |
| List of publications of the author on the topic of the thesis..... | 29 |
| Annotation (in Romanian, Russian and English) | 30 |

CONCEPTUAL BENCHMARKS OF THE RESEARCH

Topicality of the theme and importance of the issue addressed. The Physical Education system in Romania includes a multitude of activities that contribute to the development of a balanced and harmonious body, starting from young children up to teenagers. Psychophysical abilities, psychomotricity, intellectual potential, along with the motivational, affective and volitional sphere are turned into good account.

It is well-known that sports game, out of all contents of curriculum, is the main point of interest for students of all ages, regardless of the category of gender they belong to. Sports games are important means, not only for physical education but also for the intellectual, moral and aesthetic education of the child.

Thanks to its characteristics and practicing forms (as performance sport, grassroots sport or method used in the lesson of physical education), basketball provides many formative possibilities. It has a recreational, educational, functional, intellectual influence on the practitioners. It also boosts their personal confidence and satisfaction [6, 9, 12, 33, 36].

Basketball has evolved significantly in terms of technique, tactics, need for playing speed and a high level of skills. It was found out that the basic training must take place in adolescence in order to enable further development and improvement of physical qualities, on which the shaping of the basketball players' abilities will depend in the future. Basketball is one of the team games characterized by speed and agility. It is a fun, competitive and exciting game due to its various offensive and defensive skills [18, 25, 38].

In the opinion of Kasabova L. [13], Negulescu C. [21], Tarcău E., Ciordaș A., Boca I. [30], the basketball game is a basic sports game which requires very good physical fitness and dexterity. Also, a high speed of play is necessary for basketball. In addition, basketball is a type of sport played by two opposing teams that aim to throw the ball into the basket of the opponent. Due to its complex movements, this sport needs speed, strength, agility and flexibility, ultimately ensuring an increased development of movement skills for the players.

According to the publications of several specialists [10, 11, 22, 26, 34], there are new trends in modern basketball meant to improve the techniques of general physical training and prevent the injuries of players. The basis of the endurance of basketball players is laid in the general physical training. Ligaments and muscles are strengthened and injury prevention mechanisms are established during the training for competitions.

Thus, Bota I., Colibaba D. [2], Cobzaru F., Jurat T. V. [5], Mandache G. [15], Popescu F. [24], demonstrated that the efficiency of the game in team sports depends to a large extent on the physical capacity of athletes. In the game of basketball, the muscle strength of lower limbs is highly important because it determines the height of the jump and the acceleration during short sprints. The ability to move fast and to jump as high as possible (at touch) determines the performance of the player and the quality of other technical actions that are important in basketball: quick pauses, rapid transitions from defense to attack, jumps, fighting for the ball and defense activities.

The motor performance of basketball players and the skill-related physical fitness are significant traits that could influence their competitive performance. For this reason, coaches are working to determine the most effective means enabling the players to acquire these essential fitness components while training [14, 23, 27, 35].

An issue that remains unknown in the specialized literature is the structure of the training patterns and their impact on the physical fitness of the players. In fact, to fulfill the training specificity principle, it seems that basketball training models should be based on the physiological determinants of competition. Basketball practices should prepare players to adequately meet these requirements. In that regard, the available research leads to two different approaches in modeling the basketball training: first, coaches could use a training model based on strength endurance; the second – a training model based on general endurance [31, 32, 37].

From the analysis of the specialized literature, it has been observed that several authors are reserved in their works in correlating their studies with the actual content of the game. Indeed, it is very difficult to present this content in a succinct definition, because sport can be and must be taken into consideration in its complexity, depending on numerous parameters belonging to the interdisciplinary approach of different scientific fields: biological, pedagogical, sociological, psychological etc.

The topicality of the study is represented by a confirmatory research based on the necessity of an analysis regarding the manifestation of "speed" motor skill – specific to basketball game – within the physical education lesson and extracurricular activities in middle school girls (12-14 years old). Therefore, it will be possible to select the most effective teaching methods and means for improving the content of the lesson on the scientific basis of the formative experimental research.

Description of the research field situation and identification of the research issues. The problem of optimizing the process of physical education at all levels has been and still is analyzed and discussed in various national forums and not only. This was permanently the theme of the researches of several authors from Romania but also from abroad, such as: Boncea A. G., Boncea G. [1], Calalb M. [13], Dragnea A., [7], Măzărariu A. L., Chirazi M. [17], Mocanu G. [19], Scarlat T., Scarlat M. [28] and others.

In order to achieve the objectives and tasks proposed for realizing the educational ideal in school physical education and sport, a decisive role is played by the combination of specific and non-specific means and, at the same time, the choice of the necessary didactic strategy. It is good that the entire activity of physical education is carried out according to present-time methodological trends and guidelines, to ensure a modern education [3, 19, 29, 32].

Due to its dynamism, the game of basketball contributes to the achievement of School Physical Education (SPE) objectives. According to SPE curriculum, the basketball game fully attains the framework objectives. In this regard, our research intended to address the development of motor skills and the assimilation of the technical procedures and tactical actions specific to the basketball game played in school and outside of it [4, 18, 20, 34, 35].

Analyzing the results of the research conducted by several domestic specialists [9, 10, 16, 18, 20, 22, 25] and foreign ones [4, 14, 27, 34, 36, 37], it can be observed that most of them, both at the level of middle school and competitive activity, focus on the curricular and extracurricular content, but also on the psychological training needed to understand the team strategy. In this context, very little research is focused on the development of the combined motor skills, such as speed strength, strength endurance, speed dexterity and others. At the same time, the combined motor skill "speed endurance" is scarcely studied. That is why this topic became our research subject.

The problem of the research consists in the low development of the combined motor skills, especially of the speed endurance, as well as in the lack of research on the effectiveness of using didactic technologies for the development of speed endurance by applying the means from basketball game.

Hypothesis of the paper: The efficient use of the didactic technologies, by diversifying the basketball means during the physical education lesson and the extracurricular activity in middle school, will contribute to the improvement of the indices of the general and specific motor skills (especially the speed endurance) and of the basketball motor skills as well.

The aim of the paper is to make the use of the didactic technologies more efficient for the development of the speed endurance in the middle school girls by applying the basketball means.

Objectives of the research:

1. Studying the general conceptual framework regarding the organization of physical education at the level of middle school education.
2. Determining the level of speed training in middle school students.
3. Analysis of the opinions of specialists on the development of the speed endurance by using the basketball means in the students of middle school.
4. Elaboration and implementation of the experimental program for developing the speed endurance in the middle school students by applying the means of basketball game.
5. Experimental validation of the effectiveness of speed endurance capability development in the middle school students by using the basketball means.

Experimental facilities: gymnasium of the "Mircea cel Bătrân" Middle School of Pitești, sports equipment, apparatus and materials belonging to the institution, as well as the measuring instruments of the Human Performance Research Laboratory within the Department of Physical Education and Sports of the University of Pitești.

Scientific originality and novelty of the paper: it consists in the alternation of the learning units both through development of motor skills and learning the basketball game. This can be realized by implementing an experimental program, based on basketball specific means, in the curricular and extracurricular lessons of physical education at middle school level. The indices of general and specific motricity were assessed in the middle school girls through a correlation analysis of the influence exerted by motor capabilities on the level of assimilation of the basketball basic elements.

Scientific results: they demonstrate, experimentally, the effectiveness of using didactic technologies for the development of speed endurance capability in middle school students, by using basketball means. The implementation of the proposed experimental program will help to increase the general and specific motor skills, as well as the level of technical training in basketball game.

Theoretical significance of the paper: it derives from the fact that a new concept of development of motor skills (speed endurance mainly) was elaborated and implemented for the middle school girls. This concept is focused on the use of the means specific to basketball game. It is significant that these means can be successfully applied in all forms of physical education organization at middle school level.

Applicative value of the paper: it offers the possibility of implementing the experimental program and methodological guidelines at middle school level, developed on the basis of the means taken over from basketball game. The obtained results can be used as a methodological guide by teachers within the school physical and sports education. They offer a variety of possibilities for the development of motor skills, with an emphasis on speed endurance, by applying the means of basketball, taking into account their value and place in the curricular and extracurricular lesson of physical education.

Implementation of the scientific results: it was carried in the process of teaching-learning and evaluation of the middle school girls from the „Mircea cel Bătrân” Middle School of Pitești and some school units such as: Middle School no. 136 of Bucharest, „Grigore Tocilescu” Middle School of Bucharest, Middle School no. 28 of Bucharest and within the courses on the „Methodology of teaching basketball in school” at the Ecological University of Bucharest, Faculty of Physical Education and Sports. The results were presented in the implementation documents and, last but not least, were demonstrated by the sports performances achieved in the Argeș National Zonal Championship – the title of vice champion, 2023.

Putting the results of the research into practice

The proposed experimental methodology was approved and implemented in the instructional and educational process of the 12-14-year-old female students of the „Mircea cel Bătrân” Middle School of Pitești. The research results were also presented and published in the form of articles and reports at several national and international scientific conferences and events. Following the carried out research and the recorded results, papers were published in the specialized journals „Discobolul-Physical Education, Sport & Kinetotherapy Journal” and „Health, Sports & Rehabilitation Medicine”. Papers were also presented in the Session of Scientific Communications “Physical Education and Sport, factors promoting a healthy lifestyle”, Ecological University of Bucharest, 2018, 2019; at the International Scientific Conference, University of Bucharest – Department of Physical Education and Sport, 2018; at the International Congress „Sport. Olympism. Health” - USEFS, 2019, Chișinău, Republic of Moldova; also at the International Scientific Conference „Actualities and perspectives of physical education and sport sciences”, 4th edition, April 5, 2023, Bucharest.

Thesis structure: annotation, introduction, 3 chapters, conclusions and recommendations, bibliography - 195 sources, 15 annexes, 20 tables, 55 de figuri, 121 pages of basic text. The results were published in 9 scientific papers.

Key words: female students, middle school, physical education, lesson, didactic strategies, planning, learning units, means, basketball, evaluation.

1. General conceptual framework of the scientific approach regarding the organization of physical education in middle school

The analysis of the organization forms of physical exercise practice, specific to the subsystems of physical education, leads to the conclusion that the lesson is the basic and mandatory form. Thus, the basic form of work with classes, groups, teams etc. is the lesson. This one remains the most flexible organization way, because it meets the requirements of structural mobility and adaptability to the conditions imposed by the achievement of objectives, the material conditions, levels etc. The malleable character, structural mobility and high adaptability to the concrete conditions give the lesson of physical education the status of main organizational form of teaching physical exercises within school physical education.

Various points of view of the practical disciplines that give the thematic content in terms of motor habits and skills must be present in the lesson of physical education. The following clarifications regarding the methodology for achieving the main objectives of sports and physical education in middle school education must be understood in this light.

As a typology, the lessons for learning the motor habits and skills specific to sports branches predominate, especially in the first grades (5th and 6th). Mixed lessons are also present, in a fairly large proportion; they are needed when some topics belong to the basic motor skills and other topics belong to motor habits. In the absence of specific material conditions, mainly in the cold season, there are lessons of general physical training, dealing with basic motor skills only.

Motor skills constitute lesson topics (speed or dexterity as the first topic; strength or endurance as the last topic). It is important to remember that all motor skills can be developed very well in this education cycle, although the emphasis is on speed and dexterity. Any special action for the development of a basic motor skill has also certain effects on the improvement of the indices of the other motor skills.

„Speed endurance” motor skill, which is also our research direction, can and must be developed specifically during the period from 10 to 14 years old. This is the sensitive period for this skill and fully corresponds to the age of middle school students.

Movement games, shuttle runs and applicative routes are particularly important for the development of motor skills in this education cycle. Any basic motor skill can be scheduled to be specifically developed in any school term. However, it will be taken into account that endurance, namely the capacity for aerobic effort of children, is mainly trained outdoors [1, 5, 28].

Sports games, as a means of physical education, provide students with an improvement of physical development and an increase of their motor ability. A more dynamic sports activity in school and a more diverse content of this desideratum can also be achieved by practicing sports games. Due to their characteristics, sports games have an effective contribution to the process of social integration of the students. Sports games positively influence personality, develop creative thinking and imagination and they have as fundamental objective the improvement of human being.

One of the most requested sports games by middle school students is the basketball, which is a very dynamic, attractive and fun game. The basketball game has a diverse range of technical procedures, tactical actions, from the simplest to the most complex ones. It gives students the opportunity to show off the level of their motor skills, physical development, imagination and inventive capability that offer spectacular moments. The playing field, as well as the simple equipment and the small number of players who compete on the field determine very fast movements and circulation of the ball. The players participate permanently and equally in both attack and defense game. Playing basketball makes a significant contribution to the fulfillment of the other objectives of physical education and sports, such as improving health, cultivating will and moral values and sportsmanship [4, 10, 16, 22, 34, 36].

Thus, the basic objective of this research was the development of motor skills, especially the speed endurance, in middle school girls through the large-scale application of basketball specific means.

2. Determining the level of speed development in middle school students by using the basketball means

The research was conducted during the classes of physical education in the „Mircea cel Bătrân” Middle School of Pitești and the extracurricular classes of basketball.

The pedagogical experiment was carried out along two stages. The first stage was preliminary and confirmatory one, meant to obtain the data regarding the topic addressed in the research. A number of 24 students of 6th and 7th grade, from the the „Mircea cel Bătrân” Middle School of Pitești, participated in this stage. In the second stage of the experiment, the formative one, the subjects were divided into two groups: *experimental* one (n=12), which followed the path of the specific program and the *control* group, which followed the usual program.

The activity was organized during the 2022-2023 school year. The pedagogical experiment was conducted within the module 4 (13.02.2023 – 6.04.2023) and module 5 (19.04.2023 – 16.06.2023).

Stages of the research:

First stage (September 2022 – February 2023) had as main objectives: approval of the subject for the new scientific approaches, preparation of the work plan, conducting the sociological survey, investigation of the specialized literature, application of the questionnaire.

The second stage (February – March 2023) involved the analysis of the instructional-educational programs and the confirmatory experiment.

The third stage (April – June 2023) included the following tasks:

- Proposal and application of the experimental program;
- Interpretation of the results obtained from the tests performed during the confirmatory stage.

The fourth stage (June - July 2023) involved giving the final tests, in order to evaluate and appreciate the level of development of the general and specific motor skills of the basketball game.

All along the basic pedagogical experiment, the activity in the experimental group was carried out according the proposed program. This one included means specific to basketball game, selected in accordance with the objectives and the intended goal.

It should be mentioned that in the control classes the development of motor skills was achieved through classic methods. The didactic activities were carried out according to the usual methodical strategies, specific to class lessons, with objectives and contents stipulated by the school curriculum for the “Physical Education” subject for the 5th – 8th grades.

In order to investigate the level of motor skills development (especially the speed endurance) during the lessons of physical education and the extracurricular lessons with middle school students, there were used research methods meant to provide clear data on the utilization of didactical strategies by applying the means from basketball game [8, 19, 28, 30].

One of the objectives of the confirmatory experiment was to highlight the level of motor training of the middle school students. This is also, in fact, one of the basic objectives of physical education in middle school. A number of 7 fitness tests were used for this purpose. These tests aimed to evaluate the speed in the conditions of other motor skills, by using the means of basketball. They are presented in detail in the second chapter of the thesis.

Table 1 presents the results of testing the chest pass skill in middle school girls.

Table 1. Results of testing the chest pass skill in middle school girls (n=24)

| Indices | Min | Max | X | ±m | S | Cv (%) |
|--------------------------------|-------------|-------------|-------------|------|------|--------|
| Time (sec) | 42.94 | 52.13 | 48.06 | 0.47 | 2.28 | 4.74 |
| Lap L1 (sec) | 4.27 | 7.61 | 4.96 | 0.13 | 0.65 | 13.08 |
| Lap L2 (sec) | 4.09 | 8.30 | 5.02 | 0.17 | 0.82 | 16.28 |
| Lap L3 (sec) | 3.89 | 6.71 | 4.82 | 0.12 | 0.59 | 12.34 |
| Lap L4 (sec) | 4.28 | 5.91 | 4.83 | 0.09 | 0.43 | 8.85 |
| Lap L5 (sec) | 4.22 | 5.84 | 4.73 | 0.08 | 0.39 | 8.26 |
| Lap L6 (sec) | 3.93 | 5.32 | 4.58 | 0.07 | 0.33 | 7.24 |
| Lap L7 (sec) | 4.11 | 5.99 | 4.74 | 0.09 | 0.45 | 9.49 |
| Lap L8 (sec) | 4.15 | 6.86 | 4.86 | 0.12 | 0.59 | 12.32 |
| Lap L9 (sec) | 4.15 | 5.51 | 4.82 | 0.08 | 0.39 | 8.27 |
| Lap L10 (sec) | 3.91 | 5.47 | 4.69 | 0.07 | 0.37 | 7.78 |
| X_{L1-10} (sec) | 4.10 | 6.35 | 4.81 | - | - | - |
| ±m | 0.04 | 0.31 | 0.04 | - | - | - |
| S | 0.14 | 0.99 | 0.13 | - | - | - |
| Cv (%) | 3.54 | 15.65 | 2.67 | - | - | - |

As this test is specific to basketball game, the most part of middle school girls had poor results, a fact that shows the low development of this motor skill. Further interventions will be needed to increase this level of development.

The following test (table 2) demonstrates the level of development of speed endurance, which is the principal objective of our research.

Table 2. Results of testing the dexterity in 5x10 m shuttle run with dribbling in middle school girls (n=24)

| Indices | Min | Max | X | ±m | S | Cv (%) |
|-------------------------|-------------|-------------|-------------|------|------|--------|
| Time (sec) | 14.99 | 21.72 | 17.76 | 0.41 | 1.99 | 11.22 |
| Lap L1 (sec) | 2.14 | 3.64 | 2.87 | 0.09 | 0.45 | 15.55 |
| Lap L2 (sec) | 3.12 | 4.62 | 3.73 | 0.09 | 0.45 | 12.11 |
| Lap L3 (sec) | 3.09 | 5.07 | 3.77 | 0.11 | 0.56 | 14.78 |
| Lap L4 (sec) | 3.24 | 4.53 | 3.72 | 0.08 | 0.41 | 11.11 |
| Lap L5 (sec) | 3.02 | 4.73 | 3.66 | 0.09 | 0.43 | 11.76 |
| X _{L1-5} (sec) | 2.92 | 4.52 | 3.55 | - | - | - |
| ±m | 0.19 | 0.24 | 0.17 | - | - | - |
| S | 0.44 | 0.53 | 0.38 | - | - | - |
| Cv (%) | 15.20 | 11.77 | 10.76 | - | - | - |

The recorded results prove that the level of development of dribbling speed endurance in the middle school girls needs improvement. It is recommended to use the basketball means both in the physical education lesson and in extracurricular basketball activities.

Given that the execution of movements in the basketball game also involves maintaining balance (static and dynamic one), the results of two-feet static balance testing (bipedal balance) in middle school girls are shown below - Table 3 and 4.

Table 3. Results of static balance testing on both feet in middle school girls (n=24)

| Indices | Min | Max | X | ±m | S | Cv (%) |
|-----------------------------------|-------|-------|-------|------|------|--------|
| Performance (%) | 62 | 96 | 86.29 | 1.59 | 7.78 | 9.02 |
| Front average deviation (degrees) | 0.05 | 2.15 | 0.81 | 0.11 | 0.55 | 68.1 |
| Back average deviation (degrees) | -2.99 | 0.00 | -0.84 | 0.14 | 0.69 | -82.2 |
| Left average deviation (degrees) | -2.09 | -0.17 | -0.67 | 0.09 | 0.45 | -67.2 |
| Right average deviation (degrees) | 0.22 | 1.7 | 0.72 | 0.08 | 0.38 | 53.32 |

Table 4. Results of lateral dynamic balance testing on both feet in middle school girls (n=24)

| Indices | Min | Max | X | ±m | S | Cv (%) |
|-----------------------------------|-------|-------|-------|------|-------|--------|
| Performance (%) | 67 | 100 | 88.79 | 1.86 | 9.09 | 10.24 |
| Front, inside (%) | 15 | 66 | 41.17 | 2.83 | 13.87 | 33.69 |
| Back, inside (%) | 31 | 84 | 47.92 | 2.91 | 14.23 | 29.71 |
| Front average deviation (degrees) | 0.53 | 1.72 | 1.09 | 0.06 | 0.31 | 28.73 |
| Back average deviation (degrees) | -2.24 | -0.6 | -1.29 | 0.09 | 0.45 | -34.95 |
| Left average deviation (degrees) | -5.25 | -2.06 | -3.75 | 0.19 | 0.97 | -25.80 |
| Right average deviation (degrees) | 2.37 | 5.56 | 3.92 | 0.19 | 0.97 | 24.81 |

Analyzing the results listed in the two tables above, a better performance can be observed in terms of dynamic balance compared to static balance. The first one is a motor ability quite common in several motor activities; that is why better average values were obtained in dynamic balance than in static balance.

Another test used during the confirmatory experiment was meant to determine the specific strength, by means of the "30-sec jump test". The results are shown in table 5.

The results of the 30-sec jump test in middle school girls reveal the level of strength-(explosive) speed endurance, the relation of contact time, flight time and jump height, in accordance with power, jump rate and index of reactive power.

Table 5. Results of determining the specific strength using the " 30-second jump test" in middle school girls (n=24)

| Indices | Min | Max | X | ±m | S | Cv (%) |
|----------------------------------|-------|-------|-------|------|------|--------|
| Jumps (no. of executions) | 45 | 61 | 52.42 | 0.80 | 3.93 | 7.50 |
| Contact time (sec) | 0.205 | 0.354 | 0.25 | 0.01 | 0.03 | 12.56 |
| Flight time (sec) | 0.242 | 0.423 | 0.34 | 0.01 | 0.04 | 12.63 |
| Jump height (cm) | 7.4 | 21.90 | 14.23 | 0.69 | 3.41 | 23.95 |
| Power (w/kg) | 11.35 | 28.97 | 19.66 | 0.87 | 4.27 | 21.70 |
| Rate (jumps/sec) | 1.49 | 2.00 | 1.72 | 0.03 | 0.13 | 7.48 |
| RSI (m/s) | 0.28 | 0.96 | 0.59 | 0.03 | 0.17 | 28.73 |

The results of this test, as in the case of many previous tests, prove to be below the national scales regarding the development of explosive strength, a combined motor skill absolutely necessary at the middle school age.

Thus, through the application of the general motor tests, as well as specific ones in middle school students, a relatively weak level was highlighted in: development of reaction speed, movement speed and speed endurance; performance and keeping within space, in relation to the average deviations in static and dynamic lateral balance; strength of lower limbs muscles in different forms of manifestation. This fact shows that new methodological interventions are needed from the part of the specialists in the field, in order to optimize the level of general motor training in the middle school students.

Basketball is one of the means of physical education through which its tasks, as well as the framework objectives of the school physical education curriculum regarding the development of students' general motor skills (necessary for carrying out sports activities), are monitored and achieved [35]. The assimilation of the technical procedures and tactical actions specific to basketball playing by students, at school or outside of it, is also monitored. The evaluation of the students participating in the research aimed at finding out information about the parameters achieved during the instructional-educational process, based on which to change the strategies of learning and teaching [18, 32, 68, 78, 83, 193].

In this sense, 5 fitness tests, taken from the content of basketball means, were selected and developed within the research. The tests were needed for determining the technical training level of the female students of middle school classes (table 6.). The tests are described in the second chapter of the thesis.

According to the data in table 6, the results were predictable. They were quite low because the girls were at the beginning of the basketball course and obviously the fitness tests could not record very good results.

In the case of the middle school girls, the analysis of the specific and general motricity testing, as well as of the basketball technical tests, compared to the individual values and the mean of the group, highlights that the subjects have an average level. This fact recommends the development of an experimental program and methodological guidelines. These ones will offer a variety of possibilities for the development of motor skills, especially the speed endurance, by using basketball means, taking into consideration their place and value within the curricular and extracurricular lesson of physical education.

Table 6. Results of determining the technical training level of the students of middle school classes (n=24)

| Indices | Min | Max | X | ±m | S | Cv (%) |
|----------------------|-------|-------|-------|------|------|--------|
| Test 1 (points) | 6.6 | 9.2 | 8.13 | 0.15 | 0.74 | 9.16 |
| Test 2 (points) | 6.6 | 9.3 | 8.08 | 0.15 | 0.76 | 9.34 |
| Test 3 (points) | 6.6 | 9.3 | 8.02 | 0.16 | 0.78 | 9.74 |
| Test 4 (no. of reps) | 13 | 16 | 14.67 | 0.24 | 1.67 | 7.96 |
| Test 5 (sec) | 33.76 | 38.94 | 35.67 | 0.34 | 1.66 | 4.66 |

In order to achieve the objective of the research, the creation and implementation of the experimental program for developing speed endurance in middle school students by means of basketball was targeted. Considering the age of the students in the research (12-14 years old), the content of the program was composed according to the 6th and 7th grades (Annex 13).

The following training contents were planned for attaining the specific skills within the design of the learning units included in the experimental program:

Module IV, 6th grade:

1) Motor skills:

Sprint running (no. of weeks 3; no. of lessons 6):

- Contents:

- o Fly run,
- o Crouch start and flying start;
- Allocated time / total time: 15 min / 90 min

2) Sports disciplines:

2.1. Athletics:

Throwing the whiffle ball (no. of weeks 3; no. of lessons 6):

- Contents:

- o Repetition of some structures from the "throwing school",
- o Throwing the whiffle ball, at a distance, from the place;
- Allocated time / total time: 10 min / 60 min;

2.2. Sports game – Basketball (no. of weeks 6, no. of lessons 12):

- Contents:
 - Penetration,
 - Outrunning,
 - „Give-and-go” tactical action.
- Allocated time / total time: 20 min / 240 min.

Module IV, 7th grade:

1) Motor skills:

Sprint running (no. of weeks 3; no. of lessons 6):

- Contents:
 - Fly run,
 - Crouch start and flying start;
- Allocated time / total time: 15 min / 90 min

2) Sports disciplines:

2.1. Athletics:

Throwing the whiffle ball, with side/crossed step, average run up, at a distance (no. of weeks 3; no. of lessons 6):

- Contents:
 - Repetition of some structures from the” throwing school”
 - Throwing the whiffle ball, at a distance, from the place;
 - Throwing the whiffle ball, with side/crossed step, average run up, at a distance;
- Allocated time / total time: 10 min / 50 min;

2.2. Sports game – Basketball (no. of weeks 6, no. of lessons 12):

- Contents:
 - Penetration,
 - Outrunning,
 - „ Give-and-go” tactical action.
- Allocated time / total time: 20 min / 240 min.

Module V, 6th grade:

1) Sports skills:

1.1. Athletics:

Long jump with run-up and 1½ steps in the air (no. of weeks 4, no. of lessons 8):

- Contents:
 - Standing long jump,
 - Drop jumps from a platform,
 - Run up 3-5 steps – takeoff,
 - Flight,
 - Run and pace,
- Allocated time / total time: 10 and 20 min / 180 min.

2) Sports skills:

2.1. Sports game – Basketball (no. of weeks 8, no. of lessons 16):

- Contents:

- Man-to-man defense in own half of the field;
- Tactical actions specific to attack positioning;
- Variants of theme games;
- Preparation of the evaluation test depending on the options:
 - Isolated technical procedures;
 - Technical and tactical structure;
 - Bilateral game.
- Allocated time / total time: 20 min / 280 min

Module V, 7th grade:

1) Sports skills:

1.2. Athletics:

Long jump with run-up and 1½ steps in the air (no. of weeks 4, no. of lessons 8):

- Contents:
 - Standing long jumps;
 - Drop jumps from a platform
 - Run up 3-5 steps - takeoff
 - Flight
 - Run and pace
- Allocated time / total time: 10 and 20 min / 180 min.

2) Sports skills:

2.1. Sports game – Basketball (no. of weeks 8, no. of lessons 16):

- Contents:
 - Sports game-basketball
 - Man-to-man defense in own half of the field
 - Tactical actions specific to attack positioning
 - Variants of theme games
 - Preparation of the evaluation test depending on the options:
 - Isolated technical procedures
 - Technical and tactical structure
 - Bilateral game
- Allocated time / total time: 20 min / 280 min

The analysis of the time allocated to the content of learning units highlighted a total of 390 min in Module IV, where 38.46% were assigned to motor skills and athletics tests (150 min) and 61.54% to sports game – Basketball (240 min). As for the Module V (total of 460 min), the values are 39.16% for athletics (180 min) and 60.87% for the sports game - Basketball (280 min).

Regarding the time allocated to the development of "speed" motor skill and the sprint running test from athletics, the module IV has 60% (90 min), while the speed endurance has 33.3% (60 min) in module V in both classes of girls.

The training of the students included in the experiment was also carried out during *optional classes* at performance level. The general objective is to develop the bio-psycho-motor skills and build the capacity of the students to act on these skills in order to turn them into good account at the maximum level in competitive

activity. The groups of students were made up from different classes; they had an open character in terms of progressing to a higher level.

Within the mandatory program, the following elements are addressed: general and specific skills, values and attitude, contents of each specific skill, depending on the particularities of the group and the professional competence of the teacher.

In order to achieve the specific competence in making the general efforts during training sessions, competitions etc., there were selected contents for the development of the basic motor skills such as: speed of movement, reaction and execution, anaerobic and mixed efforts endurance and absolute strength of the lower limbs and trunk.

The analysis of the results obtained in the confirmatory experiment enabled the identification of different problems within the didactic route. In this regard, there were carried out the planning and the design of the learning units, also the selection of the content of the means and actuation systems meant to accomplish the specific skills within the curricular and extracurricular activities.

3. Argumentation of the efficiency of speed endurance development in middle school students by using basketball means

For obtaining some data necessary for the analysis of the efficiency of speed endurance development in middle school students using the basketball means, a formative pedagogic experiment was conducted with a group of 24 students – girls. The students were separated into: the control group (CG, n = 12) and the experimental group (EG, n = 12).

The subjects included in the pedagogic experiment were submitted to evaluations of general motricity (table 7) and specific motricity (table 8), selected from the „Eurofit” test battery. The assessment was carried out both at the beginning of the experiment (formative stage) and at the end of the experiment (formative stage).

Table 7. Dynamics of the assessment of general motricity tests in the students participating in the experiment

| Motor tests | I. G. | Initial testing | Final testing | Statistical significance | |
|---------------------------|-------|---------------------|---------------------|--------------------------|-----------|
| | | ($\bar{X} \pm m$) | ($\bar{X} \pm m$) | t | P |
| 50 m sprint running (sec) | CG | 8.74; ± 0.06 | 8.58; ± 0.07 | 6.62 | 0.001*** |
| | EG | 8.74; ± 0.08 | 8.54; ± 0.09 | 4.97 | 0.001*** |
| t; P | | 0.02; 0.99 | 0.30; 0.76 | - | - |
| Standing long jump (cm) | CG | 165.5; ± 3.44 | 167.2; ± 3.24 | -6.50 | 0.0001*** |
| | EG | 157.0; ± 3.31 | 159.8; ± 2.99 | -6.69 | 0.0001*** |
| t; P | | 1.78; 0.089 | 1.68; 0.107 | - | - |

Starting from the results of the general and specific motor ability indices obtained, the descriptive statistical indices were calculated and interpreted regarding the arithmetic mean and the error of the mean. The comparison of the means was made by using the tests for the independent and dependent groups.

The analysis and interpretation of the data was performed for all tests included in the initial and final testing, both for CG and EG. The results were presented in tables and figures.

Only two specific tests were given for determining the general motor training level: 50-meter sprint running and standing long jump. The first test shows the level of general speed development; the second test– speed strength, namely explosive strength.

Therefore, by using the chosen path for the development of the general motor ability and for the acquisition of technical procedures from the basketball game during the physical education lessons and the extracurricular classes too, optimal indices of manifestation in basketball practice were obtained.

The superior factological data got at the end of the experiment confirm the effectiveness of applying the program in EG. The means of basketball game have a positive impact on the development of general motricity and also on the multilateral development of the personality of middle school girls.

One of the main objectives of the research was the dynamics of the assessment of specific motricity indices in the students of middle school. For this reason, it was proposed to compare the initial data of the confirmatory research with results of the final testing, following the application of the experimental program.

Specific motricity was assessed by testing the indices of the ball chest pass skill (table 8).

The specific motricity was assessed within the experiment by means of 7 tests and some specialized devices and instruments for the evaluation of the motor skills such as: dexterity (reaction time after ball passing), speed endurance (5x10 m shuttle run with dribbling), static and dynamic balance, strength of lower limbs.

The analysis of the differences both between tests and between groups reveals the dynamics of the assessment of the indices of "speed dexterity" motor skill testing, regarding the reaction time to the visual stimulus after the two-handed chest pass. The lower or higher values of the differences of the indices tested at EG show the degree of significance and the level of performance reached after implementing the experimental program.

Table 8. Dynamics of the assessment of chest pass testing indices in the girls included in the experiment

| Indices | I. G. | Initial testing | Final testing | Statistical significance | |
|-------------|-------|---------------------|---------------------|--------------------------|--------|
| | | ($\bar{X} \pm m$) | ($\bar{X} \pm m$) | t | P |
| Time (sec) | CG | 48.33; ± 0.66 | 47.86; ± 0.54 | 0.66 | 0.523 |
| | EG | 47.80; ± 0.68 | 47.12; ± 0.80 | 0.99 | 0.345 |
| t; P | | 0.55; 0.59 | 0.76; 0.45 | - | - |
| Lap (sec) | L1 CG | 5.09; ± 0.25 | 4.93; ± 0.17 | 0.44 | 0.665 |
| | EG | 4.83; ± 0.08 | 4.92; ± 0.31 | -0.27 | 0.787 |
| t; P | | 0.98; 0.338 | 0.03; 0.975 | - | - |
| Lap (sec) | L2 CG | 4.85; ± 0.14 | 4.52; ± 0.09 | 2.39 | 0.035* |
| | EG | 5.21; ± 0.30 | 4.69; ± 0.17 | 2.26 | 0.045* |

| | | | | | | |
|------------------|------------|----|---------------|------------------|-------|--------|
| t; P | | | -1.07; 0.297 | -2.16; 0.042* | - | - |
| Lap (sec) | L3 | CG | 4.84; ±0.14 | 4.72; ±0.10 | 0.70 | 0.497 |
| | | EG | 4.79; ±0.20 | 4.76; ±0.15 | 0.21 | 0.840 |
| t; P | | | 0.19; 0.852 | -0.23; 0.823 | - | - |
| Lap (sec) | L4 | CG | 5.01; ±0.14 | 4.89; ±0.12 | 0.64 | 0.535 |
| | | EG | 4.64; ±0.09 | 4.69; ±0.16 | -0.36 | 0.725 |
| t; P | | | 2.28; 0.032* | 0.97; 0.345 | - | - |
| Lap (sec) | L5 | CG | 4.82; ±0.14 | 4.79; ±0.12 | 0.24 | 0.811 |
| | | EG | 4.63; ±0.08 | 4.66; ±0.08 | -0.26 | 0.798 |
| t; P | | | 1.19; 0.248 | 0.89; 0.378 | - | - |
| Lap (sec) | L6 | CG | 4.59; ±0.144 | 4.78; ±0.12 | -1.57 | 0.144 |
| | | EG | 4.57; ±0.11 | 4.76; ±0.09 | -2.04 | 0.066 |
| t; P | | | 0.11; 0.912 | 0.16; 0.876 | - | - |
| Lap (sec) | L7 | CG | 4.79; ±0.15 | 4.59; ±0.08 | 1.20 | 0.254 |
| | | EG | 4.69; ±0.11 | 4.59; ±0.09 | 0.73 | 0.482 |
| t; P | | | 0.55; 0.587 | 0.02; 0.982 | - | - |
| Lap (sec) | L8 | CG | 4.87; ±0.19 | 4.69; ±0.08 | 0.86 | 0.407 |
| | | EG | 4.84; ±0.15 | 4.67; ±0.12 | 1.03 | 0.326 |
| t; P | | | 0.11; 0.916 | 0.07; 0.945 | - | - |
| Lap (sec) | L9 | CG | 4.83; 0.10 | 4.88; 0.11 | -0.59 | 0.566 |
| | | EG | 4.82; 0.13 | 4.71; 0.14 | 0.66 | 0.517 |
| t; P | | | 0.08; 0.940 | 0.97; 0.340 | - | - |
| Lap (sec) | L10 | CG | 4.62; 0.11 | 5.07; 0.21 | -2.21 | 0.049* |
| | | EG | 4.76; 0.09 | 4.67; 0.11 | 0.63 | 0.541 |

The following test for assessing the specific motricity of the students who participated in the experiment was the 5x10 m shuttle run with dribbling (table 9). This test assesses the speed endurance by 5x10 m sprint running with dribbling, monitoring the total time and duration on each 10 m side (Lap L₁₋₅). Time measurement was done using the „Wetty” wireless electronic timing system.

Table 9. Dynamics of the assessment of indices in 5x10 m shuttle run with dribbling in the students participating in the experiment

| Indices | I. G. | Initial testing | Final testing | Statistical significance | |
|---------------------|-------|-----------------|---------------|--------------------------|-------|
| | | (X; ±m) | (X; ±m) | t | P |
| Time (sec) | CG | 17.55; ±0.55 | 17.54; ±0.52 | 0.01 | 0.989 |
| | EG | 17.96; ±0.62 | 17.41; ±0.58 | 1.82 | 0.096 |
| t; P | | -0.49; 0.628 | 0.18; 0.859 | - | - |
| Lap L1 (sec) | CG | 2.84; ±0.13 | 2,96; ±0.08 | -1.20 | 0.255 |
| | EG | 2.89; ±0.13 | 2.88; ±0.10 | 0.24 | 0.817 |
| t; P | | -0.34; 0.735 | 0.37; 0.716 | - | - |
| Lap L2 (sec) | CG | 3.74; ±0.14 | 3.67; ±0.13 | 1.19 | 0.256 |
| | EG | 3.72; ±0.13 | 3.54; ±0.12 | 1.70 | 0.116 |
| t; P | | 0.09; 0.929 | 0.75; 0.463 | - | - |
| Lap L3 (sec) | CG | 3.70; ±0.16 | 3.71; ±0.15 | -0.05 | 0.963 |
| | EG | 3.84; ±0.17 | 3.67; ±0.13 | 1.18 | 0.262 |
| t; P | | -0.59; 0.564 | 0.23; 0.823 | - | - |
| Lap L4 (sec) | CG | 3.71; ±0.12 | 3.65; ±0.14 | 0.63 | 0.544 |

| | | | | | |
|---------------------|----|--------------|--------------|------|-------|
| | EG | 3.74; ±0.12 | 3.65; ±0.14 | 1.49 | 0.165 |
| t; P | | -0.19; 0.845 | -0.04; 0.969 | - | - |
| Lap L5 (sec) | CG | 3.57; ±0.11 | 3.56; ±0.11 | 0.06 | 0.954 |
| | EG | 3.76; ±0.14 | 3.67; ±0.13 | 1.04 | 0.319 |
| t; P | | -1.08; 0.291 | -0.62; 0.540 | - | - |

The analysis of the differences between the independent and dependent groups highlights the dynamics of the assessment of speed endurance testing indices (5x10 m sprint run with dribbling). These larger differences of the indices tested at EG show better performance on each 10 m side and a higher degree of statistical significance, due to the application of the experimental program.

Balance tests (static and dynamic) on both feet (bipedal) were used for the assessment of the specific motor ability. The assessment of the balance level was done by comparing performance and average front-back and left-right deviations. The comparative analysis of the evaluated indices aimed to scientifically prove the effectiveness of basketball practicing by the middle school students (table 10).

Table 10. Dynamics of the assessment of bipedal static balance indices in the girls included in the experiment

| Indices | I. G. | Initial testing | Final testing | Statistical significance | |
|----------------------------------|-------|-----------------|---------------|--------------------------|---------|
| | | (X; ±m) | (X; ±m) | t | P |
| Performance (%) | CG | 87.17; ±2.16 | 90.25; ±0.79 | -1.35 | 0.204 |
| | EG | 85.42; ±2.40 | 89.08; ±0.96 | -1.98 | 0.074 |
| t; P | | 0.54; 0.593 | 0.94; 0.359 | - | - |
| Front deviation (degrees) | CG | 0.78; ±0.15 | 0.71; ±0.08 | 0.47 | 0.645 |
| | EG | 0.83; ±0.17 | 0.69; ±0.06 | 0.87 | 0.401 |
| t; P | | -0.24; 0.809 | 0.15; 0.878 | - | - |
| Back deviation (degrees) | CG | -0.83; ±0.19 | -0.52; ±0.07 | -1.69 | 0.119 |
| | EG | -0.86; ±0.21 | -0.82; ±0.13 | -0.17 | 0.871 |
| t; P | | 0.09; 0.932 | 2.18; 0.040 | - | - |
| Left deviation (degrees) | CG | -0.67; ±0.13 | -0.54; ±0.06 | -0.87 | 0.402 |
| | EG | -0.67; ±0.14 | -0.62; ±0.07 | -0.46 | 0.653 |
| t; P | | 0.01; 0.993 | 0.87; 0.392 | - | - |
| Right deviation (degrees) | CG | 0.69; ±0.11 | 0.57; ±0.04 | 0.94 | 0.367 |
| | EG | 0.74; ±0.11 | 0.56; ±0.07 | 3.26 | 0.007** |
| t; P | | -0.36; 0.726 | 0.11; 0.911 | - | - |

The analysis of the comparative differences between groups and tests concerning the indices of the static balance test highlights better performances by 1.17% in the CG and smaller average front and right deviations in the CG. These decreases of the deviations in EG can be explained by the effective application of the basketball game means during the physical education lessons and during the extracurricular activities as well.

The results of the comparative analysis of the indices of the dynamic lateral balance assessment test in the female students who participated in the experiment are shown in Table 11.

Table 11. Dynamics of the assessment of the dynamic balance on both feet indices in the students participating in the experiment

| Indices | I. G. | Initial testing | Final testing | Statistical significance | |
|--------------------------------|-------|-----------------|---------------|--------------------------|--------|
| | | (X; ±m) | (X; ±m) | t | P |
| Performance (%) | CG | 87.42; ±2.91 | 94.17; ±1.71 | -2.19 | 0.051 |
| | EG | 90.17; ±2.36 | 91.83; ±3.00 | -0.52 | 0.616 |
| t; P | | -0.73; 0.471 | 0.68; 0.507 | - | - |
| Front, inside (%) | CG | 36.92; ±4.46 | 47.42; ±3.09 | -1.85 | 0.092 |
| | EG | 45.42; ±3.21 | 48.58; ±4.07 | -0.59 | 0.567 |
| t; P | | -1.54; 0.136 | -0.23; 0.821 | - | - |
| Back, inside (%) | CG | 50.67; ±4.34 | 46.92; ±2.78 | 0.76 | 0.461 |
| | EG | 45.17; ±3.88 | 43.17; ±3.58 | 0.33 | 0.751 |
| t; P | | 0.94; 0.36 | 0.83; 0.417 | - | - |
| Front avg. deviation (degrees) | CG | 1.67; ±0.09 | 0.97; ±0.08 | 1.80 | 0.099 |
| | EG | 1.01; ±0.08 | 1.06; ±0.13 | -0.32 | 0.757 |
| t; P | | 1.22; 0.236 | -0.59; 0.557 | - | - |
| Back avg. deviation (degrees) | CG | -1.35; ±0.13 | -0.93; ±0.09 | -2.69 | 0.021* |
| | EG | -1.24; ±0.13 | -1.08; ±0.12 | -0.98 | 0.346 |
| t; P | | -0.58; 0.568 | 0.98; 0.337 | | |
| Left avg. deviation (degrees) | CG | -3.47; ±0.27 | -3.42; ±0.25 | -0.16 | 0.875 |
| | EG | -4.02; ±0.27 | -3.42; ±0.69 | -1.01 | 0.336 |
| t; P | | 1.42; 0.168 | 0.00; 1.00 | - | - |
| Right avg. deviation (degrees) | CG | 3.69; ±0.27 | 3.64; ±0.33 | 0.14 | 0.894 |
| | EG | 4.15; ±0.29 | 4.32; ±0.28 | -0.36 | 0.722 |
| t; P | | -1.18; 0.251 | -1.54; 0.137 | - | - |

The next index of the specific motor ability of the female students participating in the experiment was the assessment of the lower limbs strength by means of the two-legged and single leg CMJ test (squat with maximum jump) (table 12) and the Squat Jump test (table 13).

Table 12. Dynamics of the assessment of the specific strength indices in the CMJ test for the students included in the experiment

| Execution | Indices | I. G. | Initial testing | Final testing | Statistical significance | |
|-------------|-------------------|-------------|-----------------|---------------|--------------------------|---------|
| | | | (X; ±m) | (X; ±m) | t | P |
| Two feet | Flight time (sec) | CG | 0.44; ±0.02 | 0.47; ±0.01 | -3.63 | 0.004** |
| | | EG | 0.43; ±0.01 | 0.45; ±0.01 | -3.33 | 0.007** |
| | t; P | | 0.69; 0.499 | 1.70; 0.103 | - | - |
| | Jump height (cm) | CG | 24.45; ±1.77 | 27.5; ±1.45 | -3.47 | 0.005** |
| | | EG | 22.85; ±0.91 | 24.32; ±0.78 | -3.41 | 0.006** |
| t; P | | 0.80; 0.430 | 1.93; 0.067 | - | - | |
| Right foot | Flight time (sec) | CG | 0.28; ±0.01 | 0.30; ±0.01 | -3.75 | 0.003** |
| | | EG | 0.27; ±0.01 | 0.28; ±0.01 | -3.38 | 0.006** |
| | t; P | | 0.80; 0.429 | 1.75; 0.095 | - | - |

| | | | | | | | |
|-------------|-------------------------|--------------------------|-------------|--------------|-------------|---------|-----------|
| | Jump height (cm) | CG | 9.72; ±0.61 | 11.35; ±0.73 | -3.39 | 0.006** | |
| | | EG | 9.08; ±0.73 | 9.72; ±0.66 | -2.94 | 0.013* | |
| | t; P | | 0.67; 0.508 | 1.65; 0.113 | - | - | |
| | Left foot | Flight time (sec) | CG | 0.27; ±0.01 | 0.30; ±0.01 | -4.01 | 0.002** |
| | | | EG | 0.26; ±0.01 | 0.29; ±0.01 | -5.16 | 0.0003*** |
| | t; P | | 0.74; 0.468 | 0.39; 0.694 | - | - | |
| | Jump height (cm) | CG | 8.99; ±0.83 | 11.00; ±0.85 | -3.63 | 0.004** | |
| | | EG | 8.22; ±0.49 | 10.47; ±0.74 | -4.37 | 0.001** | |
| t; P | | 0.79; 0.435 | 0.46; 0.646 | - | - | | |

Table 13. Dynamics of the assessment of the specific strength indices in the Squat Jump test applied to the students included in the experiment

| Execution | Indices | I. G. | Initial testing (X; ±m) | Final testing (X; ±m) | t | P |
|-------------------|--------------------------|-------|-------------------------|-----------------------|-----------|-----------|
| Two feet | Flight time (sec) | CG | 0.40; ±0.01 | 0.42; ±0.01 | - 3.81 | 0.003** |
| | | EG | 0.36; ±0.01 | 0.39; ±0.01 | - 4.69 | 0.001*** |
| | t; P | | 2.38; 0.026* | 1.95; 0.064 | - | - |
| | Jump height (cm) | CG | 19.75; ±1.02 | 22.10; ±1.28 | - 3.32 | 0.007** |
| | | EG | 16.56; ±0.88 | 18.87; ±1.09 | - 3.95 | 0.002** |
| | t; P | | 2.37; 0.027* | 1.91; 0.068 | - | - |
| Right foot | Flight time (sec) | CG | 0.27; ±0.01 | 0.29; ±0.01 | - 3.77 | 0.003** |
| | | EG | 0.24; ±0.01 | 0.27; ±0.01 | - 4.20 | 0.001** |
| | t; P | | 2.43; 0.023* | 2.67; 0.014* | - | - |
| | Jump height (cm) | CG | 9.16; ±0.45 | 10.70; ±0.39 | - 3.58 | 0.004** |
| | | EG | 7.27; ±0.55 | 8.78; ±0.57 | - 3.99 | 0.002** |
| | t; P | | 2.64; 0.015* | 2.78; 0.011* | - | - |
| Left foot | Flight time (sec) | CG | 0.27; ±0.01 | 0.29; ±0.01 | - 4.70 | 0.001*** |
| | | EG | 0.23; ±0.01 | 0.26; ±0.01 | - 5.49 | 0.0002*** |
| | t; P | | 3.21; 0.004** | 2.63; 0.015* | - | - |
| | Jump height (cm) | CG | 9.01; ±0.49 | 10.21; ±0.58 | - 3.94 | 0.002** |
| | | EG | 6.91; ±0.38 | 8.12; ±0.46 | - 4.47 | 0.001*** |
| | t; P | | 3.34; 0.003** | 2.80; 0.0103* | - | - |

Both in the first case and in the second one, following the statistical calculations, the effectiveness of using the experimental program for the development of lower limbs specific strength was clearly and convincingly

demonstrated. In both cases, the students of the experimental group were superior related to the students of the control group at all the tested indices.

Throughout the didactic process, the methods and procedures of motor skills development can be effectively combined with the specific means of basketball game. These means may be used differently in terms of volume, complexity, proportioning, duration etc. Also, the means specific to the basketball game can be used in different conditions, for the development of the motor skills required by the game (with an emphasis on the speed endurance) and for the education of the personality in the students involved in physical education activities.

The content of the extracurricular lessons in school, organized according to the requirements of sports training and adapted to the particularities of age and training level, ensures a continuity of physical education activity, with influences on the development of aptitudes and motor skills, which favor performance.

The objectives of the instructional-educational process, through the physical education activities (lesson and extracurricular optional class) with basic content from the basketball game, referred to the establishment of concrete ways of assessing the motor abilities, including speed, with its various forms of manifestation.

The content of the program for physical education activities was used for organizing the experiment intended for the middle school girls. The students participated in the extracurricular sports activities of basketball (2 hours/week). They were divided into two groups: control group and experimental one.

Within the extracurricular activity, in addition to the didactic contents of learning and improving the basketball game applied to both groups, it was proposed to use the basketball means for the development of speed endurance in the students belonging to the experimental group, based on the specific program (Annex 13). As for the lessons of physical education, both groups respected the content of the school curriculum and the learning unit – basketball game.

To highlight the effectiveness of the application of program in the experiment, 5 tests were proposed to evaluate the technical training of the students included in the research (table 14). The content of these tests is detailed in the second chapter of the thesis and in the annexes of the paper.

Table 14. Dynamics of the assessment of the technical training tests from the basketball game in the students participating in the experiment

| Indices | I. G. | Initial testing (\bar{X} ; $\pm m$) | Final testing (\bar{X} ; $\pm m$) | t | P |
|--|-------|--|--|--------|-----------|
| Technical test 1 (points) | CG | 8.17; ± 0.21 | 8.46; ± 0.19 | -7.74 | 0.0001*** |
| | EG | 8.07; ± 0.22 | 8.33; ± 0.19 | -7.22 | 0.0001*** |
| t; P | | 0.32; 0.750 | 0.45; 0.658 | - | - |
| Technical test 2 (points) | CG | 8.12; ± 0.22 | 8.33; ± 0.19 | -3.77 | 0.003** |
| | EG | 8.05; ± 0.23 | 8.22; ± 0.19 | -3.16 | 0.009** |
| t; P | | 0.21; 0.834 | 0.42; 0.675 | - | - |
| Technical test 3 (points) | CG | 8.08; ± 0.24 | 8.22; ± 0.19 | -1.83 | 0.094 |
| | EG | 7.96; ± 0.22 | 8.12; ± 0.18 | -3.00 | 0.012* |
| t; P | | 0.38; 0.704 | 0.37; 0.713 | - | - |
| Technical test | CG | 14.58; ± 0.34 | 15.50; ± 0.31 | -11.00 | 0.001*** |

| | | | | | |
|------------------------|----|--------------|--------------|-------|-----------|
| 4 (no. of reps) | EG | 14.75; ±0.35 | 15.67; ±0.35 | -4.00 | 0.002** |
| t; P | | -0.34; 0.735 | -0.35; 0.728 | - | - |
| Technical test | CG | 35.54; ±0.51 | 33.91; ±0.32 | 6.37 | 0.0005*** |
| 3 (sec) | EG | 35.79; ±0.46 | 33,88; ±0.37 | 9.34 | 0.0001*** |
| t; P | | -0.36; 0.723 | 0.07; 0.943 | - | - |

Analyzing the final results of the basketball technical training, it was demonstrated experimentally that the means specific to basketball applied in the process of physical education had a positive impact not only on the motor performance of the middle school girls but also on the level of mastering the technical elements and procedures of the basketball game. This fact can be explained by the involvement of the positive transfer mechanism of the motor skills and abilities associated to basketball means on the learning of the technical elements and procedures of this sports game.

These differences in the directions of the achieved progress are due to the weight of the dominant motor skills within the training. Following the comparative evaluation, it was found out that the CG had better performances in strength and balance, while in the EG there are better results in terms of reaction speed – speed endurance and strength - speed endurance, which confirms the proposed hypothesis of the research.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

At the end of this research about the development of speed endurance in the middle school students by using the means from basketball game, in accordance with the established objectives, the following conclusions were formulated:

1. Following the analysis and generalization of the data of the specialized literature from Romania and abroad, regarding the general conceptual framework of the scientific approach related to the organization of physical education in middle school education, it is observed that sufficient information can be found about the forms of physical education structuring at this age. At the same time, the information refers to the specific didactic strategies used in the instructional and educational process in middle school. In most cases emphasis is placed on learning the movements and on recreation. There are very few publications referring to the development of the combined motor skills, like speed endurance.

2. The results of several researches revealed that, in the majority of cases, the didactic technologies used during the activities of physical education do not ensure a sufficient methodical level of teaching-evaluation of the learning units, able to provide opportunities for the development of the "strength endurance" motor skill by using basketball means within lessons of physical education and extracurricular activities.

3. The preliminary research from the confirmatory experiment proved that the level of somatic development of the middle school students falls within the normal

limits of the age, compared to the values of age particularities and biomotor potential.

4. After carrying out the confirmatory experiment, it was demonstrated that the development level of the general and specific motor abilities in the middle school girls is an average one, with the exception of the “speed endurance” combined motor skill. This skill is assessed through several tests specific to the basketball game.

5. The results of the confirmatory experiment highlighted the important scientific issue solved in this field, namely the low level of development of the motor skills in the middle school students, especially of the speed endurance. This fact imposes a new perspective on providing several varieties and possibilities for the development of the combined motor skills (in the given case - the speed endurance), by using the basketball game means, both in the physical education lesson and the extracurricular activities.

6. Analyzing the dynamics of the general motor ability indices after the implementation of the experimental program, the results of the formative experiment highlighted significant differences at the 50 m sprint running and standing long jump in both groups. As for the indices of the specific motor ability, the EG has better values at test 1, test 2 and test 7, considered to be tests monitoring the speed endurance and its combination with other motor skills. In the CG, better values are recorded at the tests 3 and 4, as well as the tests 5 and 6, considered to be tests for assessing mainly the speed strength (the takeoff).

7. The experimental program focused on the development of the speed endurance during the lessons of physical education and the extracurricular activities. It showed that the students in the experimental group significantly improved their results regarding the acquisition of the elements and technical procedures of the basketball game. This fact is due to the positive transfer of the motor skills and abilities of the means taken from the basketball game.

8. The significant results for most of the indices investigated during the formative experiment are largely due to the experimental program used with the students in the experimental group. This program is focused on the development of the speed endurance by implementing the basketball means during the curricular lessons of physical education and the extracurricular activities.

Thus, by performing the comparative and correlation analysis of the general and specific motor ability indices and of the technical training of the students in middle school grades, the **research problem** was solved. This problem was related to the low level of development of the motor skills in the middle school students, the speed endurance principally.

The results obtained following this research and the conclusions formulated determine us to elaborate some recommendations for the specialists in the "Physical Education and Sport Science" field:

- It is recommended to use extensively the specific basketball means (taking into account the place and value of these means within the lesson) during the curricular and extracurricular lessons of physical education with topics from learning units oriented towards the development of motor skills (mainly of the speed endurance).

- The modular calendar planning of the learning units and of the contents must be done by allocating the number of lessons and the number of weeks granted, through the measures of adjustment and initial and summative assessment.

- The design of the learning units focusing on motor skills is recommended to be used all along the school year, in relation to the lesson topics and the other motor skills.

- When training the students in close age groups, with a differentiated level of motor training, during the extracurricular activity, it is recommended to use diverse training contents within basketball practice.

- The differentiated application of the extracurricular program must take into account the established objectives and attitudinal values in relation to the selected means for the solution of the intended purpose.

- At the middle school age it is recommended to learn the basic technical elements in connection with a partner, in order to improve the technical execution and to acquire optimal indices of the development of both speed endurance and general endurance, where the students are in permanent movement.

- It is recommended to practice and promote specific movement games, which will improve the acquisition of the basketball game technique. The diversification of the used means must contribute to the improvement of the individual behavior within the group of students.

- It will be considered using movement games, shuttle runs and technical-tactical actions of basketball game on a small court, 2x2 and 3x3 or with a theme and/or, in adapted conditions, of the Korfball game, within the extracurricular activities.

- In the instructional-educational process, the teacher must make sure that the motor and cognitive operational objectives are consistent with the age of the students and their level of motor training.

- The introduction of extracurricular classes for the middle school students into their timetable will contribute to the improvement of the general motor ability and to the successful acquisition of the basic elements of the basketball game.

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9. **POTOP L., JURAT V., ȘULEA R., ANASTASIU A.-M., BRUMARU D.** *Predarea și evaluarea unităților de învățare din calitățile motrice (forța) la elevii din clasa a VII-a.* In: Sesiune de Comunicări Științifice „Educația fizică și sportul, factori de promovare a unui stil de viață sănătos”, Universitatea Ecologică din București, Editura Printech, 2019, p. 14-19. ISSN 2601-596X.

ADNOTARE

Anastasiu Andreea – Mădălina: *Dezvoltarea vitezei în regim de rezistență la elevii din gimnaziu prin aplicarea mijloacelor din baschet.* Teză de doctor în științe ale educației, specialitatea 533.04. Educație fizică, sport, kinetoterapie și recreație. Chișinău, 2024.

Structura tezei: adnotare, introducere, 3 capitole, concluzii și recomandări, bibliografie 195 de surse, 15 anexe, 20 tabele, 55 de figuri, 121 de pagini de text de bază. Rezultatele au fost publicate în 9 lucrări științifice.

Cuvinte-cheie: eleve, gimnaziu, educație fizică, lecție, strategii didactice, planificare, unități de învățare, mijloace, baschet, evaluare.

Scopul lucrării constă în cercetarea eficienței dezvoltării vitezei în regim de rezistență la elevele din învățământul gimnazial, prin aplicarea mijloacelor din baschet.

Obiectivele cercetării:

1.Studierea cadrului general conceptual privind organizarea educației fizice la nivelul învățământului gimnazial. 2.Determinarea nivelului dezvoltării vitezei la elevii din învățământul gimnazial. 3.Analiza opiniilor specialiștilor privind dezvoltarea vitezei în regim de rezistență prin aplicarea mijloacelor din baschet la elevii din învățământul gimnazial. 4.Elaborarea și implementarea programului experimental de dezvoltare a vitezei în regim de rezistență la elevii din învățământul gimnazial prin aplicarea mijloacelor din baschet. 5.Validarea experimentală a eficienței dezvoltării capacității de viteză în regim de rezistență la elevii din învățământul gimnazial prin aplicarea mijloacelor din jocul de baschet.

Noutatea și originalitatea științifică constă în alternarea unităților de învățare atât prin dezvoltarea calităților motrice, cât și prin învățarea jocului de baschet, prin implementarea în cadrul formelor curriculare și extracurriculare de educație fizică la nivelul învățământului gimnazial a unui program experimental bazat pe mijloace specifice baschetului. Au fost evaluați indicii motricității generale și specifice la elevele din clasele gimnaziale, prin analiza corelativă a influenței capacităților motrice asupra nivelului însușirii elementelor de bază din jocul de baschet.

Problema științifică importantă soluționată în domeniu vizează nivelul scăzut de dezvoltare a calităților motrice la elevii din învățământul gimnazial, în special al vitezei în regim de rezistență.

Semnificația teoretică se desprinde din faptul că a fost elaborat și implementat un nou concept de dezvoltare a capacităților motrice, în special a vitezei în regim de rezistență, la elevele din învățământul gimnazial, axat pe folosirea mijloacelor din jocul de baschet. Semnificativ este faptul că acestea pot fi aplicate cu succes în cadrul tuturor formelor de organizare a educației fizice din învățământului gimnazial.

Valoarea aplicativă a lucrării oferă posibilitatea implementării programului experimental și a reperelor metodologice la nivelul învățământului gimnazial, elaborate pe baza mijloacelor preluate din jocul de baschet. Rezultatele obținute pot fi folosite în calitate de ghid metodologic de către profesori în cadrul educației fizice și sportive școlare, oferind o varietate de posibilități de dezvoltare a calităților motrice cu accent pe viteză în regim de rezistență, prin aplicarea mijloacelor din baschet, ținând cont de locul și valoarea lor în cadrul formelor curriculare și extracurriculare de organizare a educației fizice a elevilor din gimnaziu.

Implementarea rezultatelor științifice. Rezultatele cercetării au fost implementate în procesul de predare-învățare și evaluare a elevilor din învățământul gimnazial din Școala Gimnazială „Mircea cel Bătrân” din Pitești și unele unități școlare din țară, cum ar fi: Școala Gimnazială nr. 136 din București, Școala Gimnazială „Grigore Tocilescu” din București, Școala Gimnazială nr. 28 din București și în cadrul cursurilor la disciplina „Metodica predării baschetului în școală” în cadrul Universității Ecologice din București, Facultatea de Educație Fizică și Sport.

АННОТАЦИЯ

Анастасиу Андрея – Мэдэлина *«Развитие скоростных способностей в режиме выносливости у девушек гимназий с использованием средств из баскетбола»*, Диссертация на соискание степени доктора педагогических наук, специальность 533.04 – Физическое воспитание, спорт, кинетотерапия и рекреация. Кишинёв, 2024.

Структура диссертации: аннотация, введение, 3 главы, выводы и рекомендации, библиография, 195 источников, 15 приложения, 121 страниц основного текста, 55 фигуры, 20 таблиц. Результаты опубликованы в 9 работах..

Ключевые слова: ученицы, гимназий, физическое воспитание, урок, дидактические стратегии, планирование, учебные единицы, средства, баскетбол, измерение.

Область исследования: педагогика.

Цель работы заключается в исследовании эффективности развития скоростных способностей в режиме выносливости у девушек гимназий с использованием средств из баскетбола.

Задачи исследования: 1. Исследование общих концептуальных основ касающиеся организации физического воспитания на уровне гимназий. 2. Определение уровня развития физической подготовленности учащихся гимназий. 3. Анализ мнений специалистов по вопросу развития скоростных способностей у учащихся гимназий с использованием средств из баскетбола. 4. Разработка и внедрение экспериментальной программы по развитию скоростных способностей в режиме выносливости у учащихся гимназий с использованием средств из баскетбола. 5. Экспериментальное обоснование эффективности развития скоростных способностей в режиме выносливости у учащихся гимназий с использованием средств из баскетбола.

Научная новизна и оригинальность исследований заключается в последовательности применения средств как для развития физических качеств, так и для обучения игры в баскетбол с использованием экспериментальной программы в куррикулярных и экстракуррикулярных уроках физического воспитания в гимназий, основана на использование средств из баскетбола. Были исследованы показатели общей и специальной подготовленности учащиеся гимназии посредством коррелятивного анализа воздействия физических качеств на уровень освоения основных элементов игры в баскетбол.

Научная проблема исследования основывается на слабый уровень развития физических качеств у учащихся гимназий, в частности скоростных способностей в режиме выносливости.

Теоретическая значимость данной работы заключается в разработке и внедрения новой концепции по развитию физических качеств, в частности скоростных способностей в режиме выносливости у учащихся гимназий, основана на использование средств из баскетбола. Эффективность заключается в возможности успешного применения во всех формах организации процесса физического воспитания на уровне гимназий.

Практическая значимость работы объясняется возможностью внедрения на практике экспериментальной программы и его методологических основ на уровне гимназий, разработанных на основе использования средств из баскетбола. Полученные данные могут быть использованы в качестве методической разработки учителями в процессе физического и спортивного воспитания, предоставляя возможности развития физических качеств с акцентом на развития скоростных способностей в режиме выносливости, с использованием средств из баскетбола, с учётом место и важности урочных и внеурочных формы организации занятиях по физическому воспитанию с учащимися гимназий.

Внедрение научных результатов. Результаты исследования были использованы в процессе преподавания-обучения учащихся Гимназийской школы «Мирча чел Бэтрын» из Питешт и в некоторых учебных заведениях страны как: Гимназийская школа № 136 города Бухарест, Гимназийская школа «Григоре Точилеску» города Бухарест, Гимназийская школа № 28 города Бухарест, а также на курсах по дисциплине «Методика преподавания баскетбола в школе» в Экологическом Университете Бухареста, на Факультете физического воспитания.

ANNOTATION

Anastasiu Andreea – Mădălina: *Development of speed endurance in middle school students by using basketball means.* Doctoral thesis in educational sciences, specialty 533.04. Physical education, sport, kinesiology and recreation. Chișinău, 2024.

Thesis structure: annotation, introduction, 3 chapters, conclusions and recommendations, bibliography 195 sources, 15 annexes, 20 tables, 55 figures, 121 pages of basic text. The results were published in 9 scientific papers.

Keywords: female students, middle school, physical education, lesson, didactic strategies, planning, learning units, means, basketball, evaluation.

Purpose of the research: it consists in studying the effectiveness of the development of speed endurance in middle school female students by using the basketball means.

Objectives of the research:

1.Studying the general conceptual framework regarding the organization of physical education at middle school level. 2.Determining the level of speed training in middle school students. 3.Analyzing the opinions of specialists on the development of speed endurance by using basketball means in middle school students. 4.Elaboration and implementation of the experimental program of speed endurance development in middle school girls by using basketball means. 5. Experimental validation of the effectiveness of speed endurance capability development by using the basketball game means.

Scientific originality and novelty: it consists in the alternation of the learning units both through the development of motor skills and through learning the basketball game. This can be achieved by implementing an experimental program based on means specific to basketball within the curricular and extracurricular lessons of physical education in middle school. The indices of general and specific motricity were evaluated in the middle school girls, through the correlation analysis of the motor capability influence on the level of acquisition of the basketball game basic elements.

Important scientific issue solved in this field: it is related to the increase of the development level of motor skills in the middle school students, especially the speed endurance.

Theoretical importance: it emerges from the fact that a new concept for the development of motor skills (especially speed endurance) was elaborated and implemented in middle school students. This concept focuses on the use of basketball game means. It is significant that these means can be successfully applied in all forms of physical education organization in the middle school.

Applicative value of the paper: it offers the possibility of implementing the experimental program and methodological guidelines at the level of secondary education, elaborated on the basis of the basketball game means. The results obtained can be used as a methodological guide by teachers in school physical and sports education. These results offer a variety of possibilities to develop the motor skills, with an emphasis on speed endurance, by using the basketball means, taking into account the place and value of these ones within the curricular and extracurricular lessons of physical education of the middle school students.

Implementation of scientific results. The results of the research were implemented in the process of teaching-learning and evaluation of the middle school female students from the „Mircea cel Bătrân” Middle School of Pitești and some school units in the country, such as: Middle School no. 136 of Bucharest; „Grigore Tocilescu” Middle School of Bucharest; Middle School no. 28 of Bucharest and within the courses on the „Methodology of teaching basketball in school” at the Ecological University of Bucharest, Faculty of Physical Education and Sport.

ANASTASIU Andreea – Mădălina

**DEVELOPMENT OF SPEED ENDURANCE IN MIDDLE
SCHOOL STUDENTS BY USING BASKETBALL MEANS**

Specialty 533.04. Physical education, sport, kinesiotherapy and recreation

Summary of the doctoral thesis in education sciences

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