

Available online at:

<http://proceedings.lumenpublishing.com/ojs/index.php/lumenproceedings>

9th LUMEN International Scientific Conference Communicative Action &
Transdisciplinarity in the Ethical Society | CATES 2017 |
24-25 November 2017 | Targoviste, Romania

Communicative Action & Transdisciplinarity in the Ethical Society

Learning of Breaststroke Swimming Style at Physical Education and Sport Subject in the Higher Education of other Profiles

Elena-Diana SIMA

<https://doi.org/10.18662/lumproc.23>

How to cite: Sima, E. D. (2018). Learning of Breaststroke Swimming Style at Physical Education and Sport Subject in the Higher Education of other Profiles. In T. Ciulei, G. Gorghiu (eds.), *Communicative Action & Transdisciplinarity in the Ethical Society* (pp. 239-250). Iasi, Romania: LUMEN Proceedings.
<https://doi.org/10.18662/lumproc.23>

© The Authors, LUMEN Conference Center & LUMEN Proceedings.
Selection and peer-review under responsibility of the Organizing Committee of the conference



This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited

Learning of Breaststroke Swimming Style at Physical Education and Sport Subject in the Higher Education of other Profiles

Elena-Diana SIMA ^{1*}

Abstract

This paper aims mainly to use efficiently the algorithmic diagram of linear-branched programmed learning of the breaststroke swimming style in the physical education and sport subject for the first-year students at higher education of other profiles. Methods of research used: bibliographic study of specialty literature, pedagogical observation, pedagogical experiment, method of tests, method of linear and branching programmed instruction, statistical-mathematical method and graphical representation method. This scientific approach entailed the organization of an experimental study at „Carol Davila” University of Medicine and Pharmacy of Bucharest during the academic year 2015-2016. The subjects of the research were 27 students of first-year who choose to learn the breaststroke swimming style at physical education and sport subject (13 from the Faculty of Dental Medicine and 14 from General Medicine). The classes focused on improving the muscle strength in the control tests by means of exercises for arms, legs and abdominal muscle strength. These exercises were used in each class during the off-water training of the students. Preparatory, aiding and control exercises were used during the on-water training, for learning and improving the breaststroke swimming style. The results of the study reveal the level of arms, legs and abdominal strength in girls and boys as well, their attendance at classes, participation in sports activities and the final grade. The effective use of the preparatory, aiding and control exercises within the algorithmic diagram for learning the breaststroke swimming style at physical education and sport subject for first-year students contributed to the improvement of technique and the successful participation in competitions.

Keywords: *Swimming; breaststroke; test events; algorithmic learning; performance.*

¹„Carol Davila” University of Medicine and Pharmacy of Bucharest, Romania, dianasima@yahoo.com.

<https://doi.org/10.18662/lumproc.23>

Corresponding Author: Elena-Diana SIMA

Selection and peer-review under responsibility of the Organizing Committee of the conference



1. Introduction

Swimming stimulates the heart and lungs too, in addition to all muscle groups; it improves the circulation of oxygenated blood in the body and thus is considered the healthiest and most relaxing sport [21]. Swimming practice enjoys a general interest, in academic environment inclusively, and is demanded by more and more students in the last few years [23].

The absence of suitable facilities at national level, the rareness of swimming pools in schools and faculties have determined that a significant number of young people lack the minimum motor skills, abilities and knowledge to practice this sport [24]. There is also no sufficient methodological and scientific preoccupation in the higher education of other profiles than sport aiming to present and deepen the basic elements of swimming technique, as well as the methods of their learning and improvement.

Because the material of this study refers to “Swimming” subject in the “Carol Davila” University of Medicine and Pharmacy of Bucharest, where the students can learn a swimming style at their choice, the paper also presents the requirements, norms and test events taken from the “System of Students’ Assessment” to be met.

2. Problem Statement

The activity of physical education and sport in higher education bears the stamp of each institution, including a large range of development forms like [19], [25]: practical classes, training classes, lessons of Medical Physical Culture and internal competitions within the institute. In this respect, a review of the concept of physical education, test events and norms is needed in order to assess the students in their activity of physical education and to practice a more attractive swimming, involving also the students with medical exemption and the swimming at any age in the physical education class and in leisure time as well [10], [14].

The learning of the fundamental elements of swimming technique is very important because its main goal is the body adaptation to the environmental specific conditions [21] and – within the training programs – the metabolic, physiological and psychological adaptations [24].

The training process (intended to strengthen and improve the dominant motor skills and abilities in the swimming styles available for students - freestyle, breaststroke and backstroke) will focus on [12], [21],

[24]: technique of floating and breast or back slipping, movement of arms and legs – their coordination, improvement of respiratory action etc.

Any type of learning involves the procedure of transmission of motor skills, abilities and knowledge from teacher to pupil / student and vice versa, developed in order to obtain a result as qualitative as possible. The “traditional” analysis of the specialized literature and the hierarchical forms of „do like me” type learning are outdated. The emergence of technologies, namely the programmed or program-controlled learning, was the basis for effectiveness in the pedagogic field regarding the improvement of the learning process [5].

Didactical technologies are performed during the instructive-educational process, such as [1], [18]: pedagogical functional equations, polydisciplinary particularities of motor skills development, technology of transfer, algorithms of linear-branched programming of the instructive material, biological reverse connection in learning (verbal-motor, visual-motor, vestibular-motor).

3. Research Questions/Aims of the research

Purpose of the study: efficient use of the algorithmic diagram of linear-branched programmed learning of the breaststroke swimming style by the first-year students in higher education of other profiles than sports during the physical education and sport classes.

Hypothesis of the research: the effective use of the preparatory, aiding and control exercises within the algorithmic diagram for learning the breaststroke swimming style by the first-year students during the physical education and sport classes will contribute to the technique improvement and successful participation in competitions.

4. Research Methods

This scientific approach entailed the organization of an experimental study in the „Carol Davila” University of Medicine and Pharmacy of Bucharest throughout the academic year 2015-2016. The research methods used in this paper were: the bibliographic study of the specialized literature, pedagogical observation, pedagogical experiment, method of tests, method of linear and branching programmed instruction, statistical-mathematical method and graphical representation method. The subjects of the research were 27 first- year students (13 from the Faculty of Dentistry and 14 from

General Medicine) who chose to learn the breaststroke swimming style at Physical Education and Sport discipline.

The swimming lessons aimed at improving the muscle strength for the test events as follows: abdominal strength evaluated by torso raise from supine position in 30 sec.; arms strength (upper limbs) evaluated by continuously executed push-ups and legs strength (lower limbs) evaluated by jump squats in 30 sec. These exercises were used in each class during the off-water training of the students [17]. The training in water used exercises to learn and improve the chosen swimming styles (freestyle, breaststroke and backstroke) and to assess the technique of starting and returning, the work of arms and legs and their coordination with breathing. Students' attendance at classes and their participation in competitions were also monitored.

5. Findings

Tables 1 and 2 show the comparative results of the female and male students at swimming lesson in "Physical Education and Sport" discipline de la Dentistry Medicine and General Medicine of Faculty at „Carol Davila" University of Medicine and Pharmacy of Bucharest.

Table 1. Comparative results of the female students at swimming lesson in "Physical Education and Sport" discipline in the higher education of other profiles

Statist. Ind.	Attendance (no. of lessons)		Improved Breaststroke style (sec)				Test events (reps no in 30 sec)				Final score (pt.)
	DM	GM	Breaststroke style (sec)		Abd		Arms		Legs		
			DM	GM	DM	GM	DM	GM	DM	GM	
Mean	10.56	18.25	77.92	61.89	23.89	18.75	19.22	20.88	13.00	11.75	10.00
SEM	0.71	1.49	6.73	9.25	1.66	2.04	1.06	1.61	1.52	0.70	0
SD	2.13	4.23	20.18	13.08	4.98	5.77	3.19	4.55	4.55	1.98	0
Cv%	20.16	23.20	25.91	24.34	20.87	30.80	16.61	21.79	35.04	16.87	0
N	9	8	9	8	9	8	9	8	9	8	17
t, P	4.823; <0.001		1.798; >0.05		1.969; >0.05		0.875; >0.05		0.716; >0.05		

Note: SEM – standard error mean, SD – standard deviation, Cv – coefficient of variation, N – number of cases, t - t- Parametric Test (Assuming Equal Variances)Unpaired Comparison for Means, DM – Dentistry Medicine, GM – General Medicine, CAI – Championships of first year, CCD –“Carol Davila” Championships, CU – University Championships, reps no - number of reps, Abd – abdomen, Legs – Lower limbs, pt- points.

Table 2. Results of the male students at swimming lesson in “Physical Education and Sport” discipline in the higher education of other profiles

Statist. Ind.	Attendance (no. of lessons)		Improved Breaststroke style (sec)		Test events (reps no in 30 sec)						Final score (pt.)
	DM	GM	DM	GM	Abd		Arms		Legs		
					DM	GM	DM	GM	DM	GM	
Mean	8.75	19.17	56.95	48.7	19.75	27.0	33.5	28.33	19.25	24.33	10.00
SEM	1.03	1.92	7.17	2.87	1.03	1.09	1.44	1.76	0.48	2.80	0
SD	2.06	4.71	14.34	7.02	2.06	2.68	2.88	4.32	0.96	6.86	0
Cv%	23.56	24.56	25.19	14.42	10.44	9.94	8.62	15.24	4.97	28.19	0
N	4	6	4	6	4	6	4	6	4	6	10
t, P	4.106; <0.001		1.229; >0.05		4.549; <0.001		2.081; >0.05		1.444; >0.05		

Note: idem table 1.

Figure 1 presents the comparative results of the attendance in swimming classes of the first-year students according to the number of girls and boys from Dentistry Faculty and General Medicine Faculty.

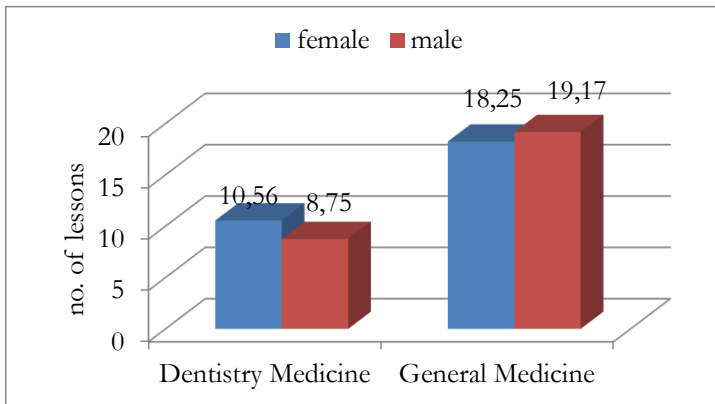


Fig. 1. Comparative results of the attendance in swimming practical lessons of the students-subjects of the study

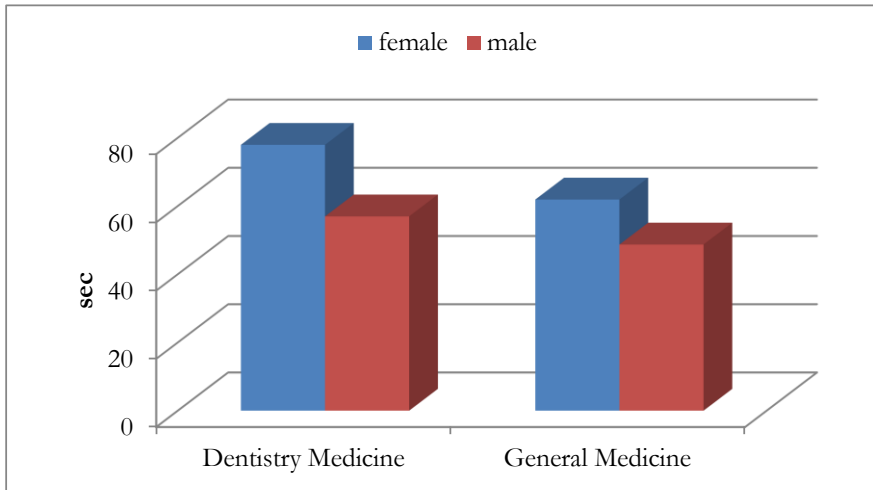


Fig. 2. Comparative results of the performances achieved in breaststroke style by the students-subjects of the study

Figure 2 presents the comparative results of the performances obtained in breaststroke style by the first-year students in terms of average time achieved by girls and boys of the Dentistry Faculty and General Medicine Faculty.

Figure 3 shows the comparative results of the test events of the first-year female students of the Dentistry Faculty and General Medicine Faculty regarding the average values achieved at abdominal strength, arms strength and lower limbs strength (legs).

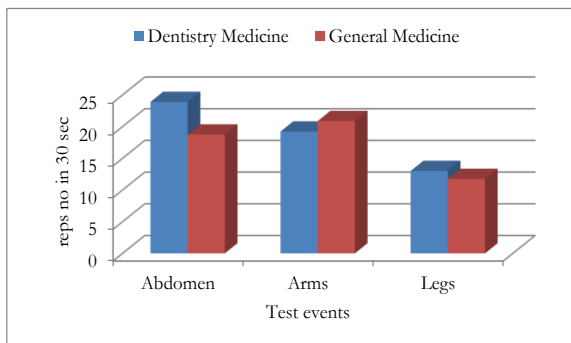


Fig. 3. Comparative results of the test events of the girls under study

Fig. 4 presents the test events comparative results of first-year male students of Dentistry and General Medicine faculties as for the average values in abdominal strength, arms strength and lower limbs strength (legs).

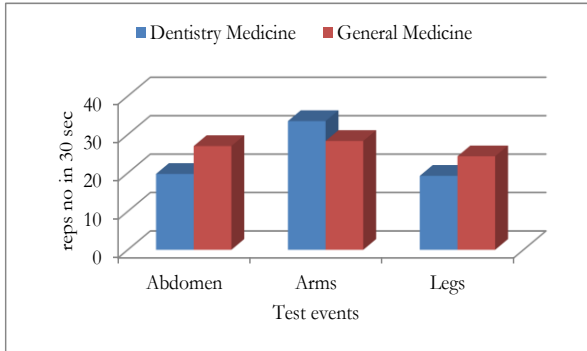


Fig. 4. Comparative results of the test events of the boys

Figure 5 shows the algorithms of linear and branching programmed learning of the swimming style by the first-year students in „Carol Davila” University of Medicine and Pharmacy of Bucharest in terms of purpose of learning, pedagogic tasks, parts of the instructive material with preparatory exercises, additional preparatory-aiding parts, control, correction of the learning process per each technical element of the swimming style and results of the learning.

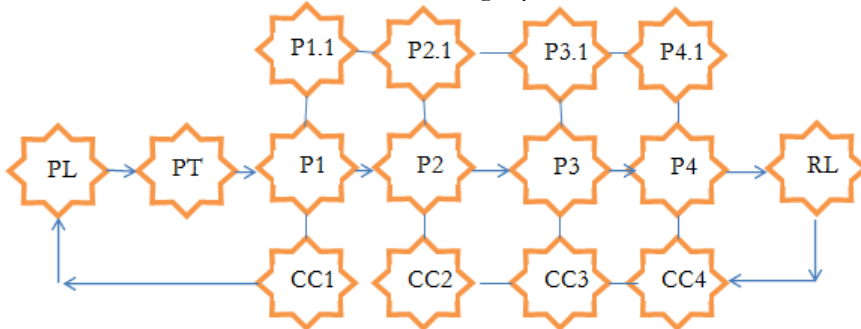


Fig.5. Algorithm of linear and branching programmed learning of breaststroke swimming style by first-year students

Note: PL – purpose of learning, PT – pedagogical tasks, P1-P4 – parts of the instructive material (preparatory exercises): P1- technique of floating and breast slipping, P2- coordination of arms, P3 – coordination of arms and legs, P4 – coordination of arms and breathing; P1.1-4 –supplementary preparatory-aiding parts of the instructive material meant

to improve the contents of the fundamental elements of breaststroke technique; CC – control and correction of the learning process for each technical element of the swimming style; RL – result of learning .

6. Discussions

According to B.I. Onoprienko (1961), the analysis of swimming styles technique must monitor separately the force of stroke movements and the sum of forces revealing the real possibilities of the swimmers in one style or another [15]. These ones are differentiated by energy expenditure which is twice higher in butterfly stroke and breaststroke than in freestyle and backstroke [22]. In this sense, the requirements for muscles development are increasing [20], which ensures the execution of the movement. Therefore the coaches must use in their work [8] those theoretical and practical recommendations presented in the papers of scientific research. The practical recommendations for improvement of the learning of various swimming technical variants are very useful [7], [11].

In order to improve swimmers' technical skills, a special attention is paid to the modeling of the rational movement in swimming styles [7]. The further development of swimming styles sports technique is made according to the particularities of swimming movements, the evolution of swimming styles, the classification of swimming styles etc used in the practical activity [9].

The research on swimmers' technical skills structure, especially the swimmers specialized in complex swimming distances, highlights the fatigue and the switching of progressive movement execution [26] as basic factors that determine changes in the technical parameters [16].

It is also known that the increase of the achievements in swimming depends on the development of speed-strength possibilities and is determined by the ability to perform the strokes. So, during learning and preparation, it is important [6] to pay more attention to the segments of speed-strength development fallen behind in swimmers' training; thus it is possible to enhance the quality of stroking movement even in the stages of sports improvement of the elite swimmers [2], [3].

The analysis of the comparative results of the swimming lesson between the first-year female students of Dental Medicine (DM) and General Medicine (GM) (table 1, figures 1, 2 and 3) highlights (mean; \pm SEM), regarding the attendance in practical lessons, differences of the total number of lessons per semester in DM 10.56; \pm 0.71 no of lessons out of the total 14 / semester and in GM – 18.25; \pm 1.49 no of lessons out of the total number of 28 lessons per semester and significant differences between faculties at

$p < 0.001$; performance at 25 m breaststroke style achieved in competition highlights a value of 77.92 in DM; ± 6.73 sec while in GM – 61.89; ± 9.25 sec and insignificant differences between faculties at $p > 0.05$; the test events regarding abdominal strength in DM have a value of 23.89; ± 1.66 reps while in GM – 18.75; ± 2.04 and insignificant differences between faculties at $p > 0.05$, the arms strength in DM has the value of 19.22; ± 1.06 reps while in GM – 20.88; ± 1.61 reps and insignificant differences at $p > 0.05$, legs strength in DM has the value of 13.00; ± 1.52 reps and in GM – 11.75; ± 0.70 reps and insignificant differences between faculties.

The analysis of the comparative results of the swimming lesson between the first-year male students of Dental Medicine (DM) and General Medicine (GM) (table 2, figures 1, 2 and 4) highlights (mean; \pm SEM), as for the attendance in practical lessons, differences of the total number of hours per semester in DM 8/75; ± 1.03 no of lessons out of the total 14 / semester while in GM – 19.17; ± 1.92 no of lessons out of the total 28 lessons per semester and significant differences between faculties at $p < 0.001$; the performance in 25 m breaststroke style achieved in competition highlights the value of 56.95 in DM; ± 7.17 sec while in GM – 48.7; ± 2.87 sec and insignificant differences between faculties at $p > 0.05$; the test events regarding the abdominal strength in DM have a value of 19.75; ± 1.03 reps while in GM – 27.00; ± 1.09 and significant differences between faculties at $p < 0.001$, arms strength in DM has the value of 33.5; ± 1.44 reps and in GM – 28.33; ± 1.76 reps and insignificant differences at $p > 0.05$, legs strength in DM has the value of 19.25; ± 0.48 reps while in GM – 24.33; ± 2.80 reps and insignificant differences between faculties.

In the practice of the sports exercises learning methodology, the specialized literature uses the notion of “macro-methods” (as in women’s artistic gymnastics material), which involves a dynamic system of theoretical and methods-instructive materials in the process of sports training; the most important structural element is the long-term learning program based on the logical-structural diagrams and the algorithms of the linear and branching programming, necessary for the scientifically-based distribution and accomplishment of the instructive material [1], [18].

In this respect, a linear and branching program for learning the breaststroke style was created for the first-year students of „Carol Davila” University of Medicine and Pharmacy of Bucharest. The development of the algorithms of the linear and branching programming was based on the concept of Prof. Boloban, V. (2013) and adapted to the specifics of swimming [4], [12], [13], [21], [24]. These are divided into three levels: 1) central level: purpose of learning, pedagogical tasks, parts of the instructive material (preparatory exercises) regarding the floating and breast slipping technique,

arms coordination, arms and legs coordination, arms and breathing coordination and the results of learning; 2) higher level – supplementary preparatory-aiding parts meant to improve the contents of the fundamental elements of breaststroke style technique and 3) lower level – control and correction of the learning process for each technical element of the swimming style.

7. Conclusions

The study comparative results highlight differences regarding the total number of classes per week and semester; there are also differences between students and better performances achieved in competitions by the students (female and male) of the General Medicine Faculty.

The comparative analysis of the test events shows significant differences between students in terms of abdominal strength, a different level of training between students and faculties and the positive influence on performances and final grade obtained at physical education subject.

The efficient use of the preparatory, aiding and control exercises within the algorithmic diagram for learning the breaststroke by the first-year students contributed to the improvement of technique and to the successful participation in competitions, which confirms the hypothesis of the research.

Acknowledgement

As author – researcher, we are grateful to the first-year students of the academic year 2015-2016 from the Faculty of Dental Medicine and the Faculty of General Medicine, in the 9th Department –Medical Recovery, discipline of Physical Education and Sport, from “Carol Davila” University of Medicine and Pharmacy of Bucharest, for their agreement to participate in the study conducted. I hereby declare under my own responsibility that the subjects participating in the research have been informed of the voluntary nature of participation in the research, of the understanding of the information received and of the understanding that withdrawal can be done at any time, without any negative consequences on the participant. The research respected the ethical standards of the research, the participants / the next of kin of the participants gave their consent to take part in the research.

References

- [1] Boloban V. N. Reguljacija pozy tela sportsmena. [Regulation of Athlete’s Body Posture]. Monograph. Kiev: Olympic Literature. 2013. p. 231

- [2] Chistova N. A. & Fomichenko T. G. Sovershenstvovanie tehniki plavanija sposobami krol' na grudi sredstvami special'noj silovoj podgotovki (Improving the Swimming Technique in Front Crawl Style by means of Strength Special Training). Methods Recommendation for Coaches and Specialists of Swimming. Moscow: FON. 1996. p. 43
- [3] Fomichenko T. G. Sovershenstvovanie silovoj i tehniceskoi podgotovlennosti plovcov razlichnyh vozrastnyh grupp (Improvement of Strength and Technical Training (Skills) of Swimmers of Different Age Groups). Moscow: SportAcademPress. 2001. p. 104
- [4] Ganchar I. Methods to Teach the Swimming: Technologies of Learning and Improvement), 2nd Edition. Odessa: Druk Publishing House. 2006. p. 696
- [5] Gaverdovskij J. K. Learning Sport Exercises. Biomechanics. Methodology. Didactics. Moscow: Fizkul'tura i sport. 2007. p. 911
- [6] Gilev GA, Ratov IP, Beljaev V.V. O realizacii skorostno-silovogo potenciala v grebkovyh dvizhenijah plovcva (About the Achievement of Speed-Power Potential of Swimmer's Stroke Movements). Teorija i praktika fiz.kul'tury. 1985. 5. pp. 15-17
- [7] Hal'jad R., Tamp T., & Kaal R. Modeli tehniki sportivnyh sposobov plavanija s metodikoi sovershenstvovanija i kontrolja (Models of Swimming Styles Technique. Methods of Improvement and Control). Educational material. Tallinn; 1986. p. 98
- [8] Kistjavskij I. J. Tehnika plavanija i osnovnye tendencii ee sovershenstvovanija. Plavanie (Swimming Technique and its Basic Trends of Improvement). Moscow: Fizkul'tura i sport. 1972, issue 2. pp. 38-41
- [9] Lopuhin V. J. Novye izmeritel'nye i trenazhernye ustrojstva dlja plavanija (New Measuring Devices and Training Machines for Swimming. Methods Material for Teachers, PhD candidates and Spectators FPK- Moscow. GTOLIFK. 1991. p. 56
- [10] Lupu E. Evaluarea calitatilor motrice ale studentilor in universitatile de neprofil Evaluation of Motor Skills of Students in the Universities of Other Profiles. International Scientific Conference. Galați: Zigotto. 2009. pp. 62-65
- [11] Makarenko L. P. Sorevnovatel'naja dejatel'nost' plovcva na distancii 200 m vol'nyj stil'. Plavanie: Vesna-2000. Methodological-Information Collection. Moscow; 2000 (6). pp. 36-40
- [12] Marinescu Gh. & Balan V. Studiu privind eficiența mijloacelor specifice pentru imbunatatirea tehnicii de inot. International Session of Scientific Communications, Bucharest, ASE Publishing House. 2007. pp.10-15
- [13] Marinescu Gh., Balan V. & Ticala L. Mijloace utilizate în optimizarea lectiei de inot din învățământul superior de profil. International Session of Scientific Communications, Bucharest Academy of Economic Studies, Physical Education and Sport Department, Bucharest: ASE Publishing House. 2009. pp. 65-69
- [14] Marinescu Gh, Balan V. & Ticala L. Studiu privind capacitatea de autoevaluare a studenților în raport cu conținutul lecțiilor practice de inot. International Session of Scientific Communications, Bucharest Academy of Economic

- Studies, Physical Education and Sport Department, Bucharest: ASE Publishing House. 2010. pp. 50-55
- [15] Onoprienko B. I. O stile grebkovyh dvizhenij v sportivnyh sposobah plavanija (About Stroke Movements in Swimming Styles). Teorija i praktika fiz. kul'tury. 1961. Vol. 24 (11). pp. 842-847
- [16] Pertrenko J. A. Struktura i diagnos'tika tehniceskoy podgotovlennosti kvalificirovannyh plavcov, specializirujushhihsja v kompleksom plavanii (Structure and Diagnosis of Technical Skills of Elite Swimmers, Specialized in Complex Swimming). Self-account of the thesis...Pedagogy sciences PhD, Leningrad. 1986. p. 22
- [17] Potop V. Gimnastica de baza. Teorie și metodică (Basic Gymnastics. Theory and Methods). Bucharest: Discobolul Publishing House. 2014. p. 180
- [18] Potop V. Bases of Macro-methods for Sports Exercises Learning (material from Women's Artistic Gymnastics). Monograph, Kiev: Education Literature Center; 2015
- [19] Sakizlian M. Evolutia parametrilor motrici la studentele inscise la cursul de gimnastică aerobica. International Session of Scientific Communications. Bucharest: Publishing House of Bucharest University. 2012. pp. 85-89
- [20] Sima E. D. Inotul in lectia de educatie fizica a studentilor din Universitatea de medicina si farmacie "Carol Davila" (Swimming in the Physical Education Class of the Students from „Carol Davila” University of Medicine and Pharmacy). Bucharest: „Carol Davila” University Publishing House, 2011. p. 141
- [21] Shhavlev G. A. Jeksperimental'noe issledovanie silovoj podgotovki plavcov v svjazi s metodikoj ee sovershenstvovanie (Experimental Research on the Particularities of Strength Training of Swimmers. Methods of Improvement). Self-account of the thesis ... PhD pedagogic sciences. Moscow. 1969. p. 24
- [22] Troup D, Sharp R, Plajsh M, et al. Chetyre sposoba plavanija: jenergeticheskie zatraty i myshechnaja sila 11. Moscow: Fizkul'tura i sport. 1982. pp. 19-25
- [23] Urichianu-Toma S. Educatia fizica generala si specifică a studentilor militari (General and Specific Physical Education of Military Students). Bucharest: Publishing House of Military Technical Academy. 2003. p. 238
- [24] Urichianu-Toma S. Inotul la copii, adolescenti si tineri. Bucharest: Publishing House of Military Technical Academy. 2004. p. 244
- [25] Voinea A, Iacobini A, & Iacobini P. Educația fizica și sportul în viața studentilor. International Session of Scientific Communications, Academy of Economic Studies of Bucharest, PES Department, Bucharest: ASE Publishing House. 2013. pp. 85-90
- [26] Volegov V. P. Podgotovka plovcov, specializirujushhihsja v kompleksnom stile plavanija. Plavanie: Vesna 2000 (Training of Swimmers Specialized in Complex Swimming Styles). Methodological-Information Collection. Moscow. 2000(6) pp. 14-24