

ORIGINAL SCIENTIFIC PAPER**Milomir Trivun¹, Jovica Tošić¹, Simo Vuković²**¹Faculty of Physical Education and Sport, University of East Sarajevo²Faculty of Physical Education and Sport, University of Banja Luka**UDK:797.21:371.276**

Doi: 10.7251/SIZ0215044T

**EFFECTS OF PHYSICAL ACTIVITY IN PHYSICAL
EDUCATION ON SWIMMING RESULT****Summary**

During enrollment at the Faculty of Physical Education and Sport, University of East Sarajevo, in addition to other tests, candidates take a test of swimming in length of 50 meters. It is estimated knowledge and skills attainment in freestyle swimming. In the fourth and fifth semester of the second year, according to the curriculum, students have two hours of theory and two hours of practical swimming classes per week.

The aim of this paper is to determine how much classes and other extra-curricular activities have influenced the results of performance in the 50 meters freestyle swimming, while studying in the first year.

Based on the analysis of collected data at the entrance examinations in school years (2010/2011 and 2012/2013) and the initial measurement at the second year of study (the final measurement), for the same respondents at the study program: physical education, we obtained measures of central tendency of descriptive statistics. The t-test analysis for small dependent samples of subjects reflected a difference in the results of the initial and final measurement. Statistical difference has slight level of significance between initial and final measurements of respondents at 50 meters freestyle swimming.

Conclusion

In terms of the entrance examination and the initial measurement of male population at the second year, the exercises provided from other attended subjects, as well as extra-curricular activities of the students themselves, had no statistically significant effect on the result of performance in swimming on 50 meters freestyle.

Key words: *swimming, physical education, exam, result, success*

1. INTRODUCTION

During enrollment at the Faculty of Physical Education and Sport, University of East Sarajevo, in addition to other tests, candidates take a test of swimming in length of 50 meters. It is estimated knowledge and skills attainment in freestyle swimming. In the fourth and fifth semester of the second year, according to the curriculum, students have two hours of theory and two hours of practical swimming classes per week.

The aim of this paper is to determine how much classes and other extra-curricular activities have influenced the results of performance in the 50 meters freestyle swimming, while studying in the first year. We've analyzed swimming results of the same male population at the entrance examination and the initial measurement at the beginning of the second year of study.

Previous research:

Parfen's (1978) stands out that front crawl stroke technique is the fastest swimming style. The official competitions in freestyle swimming (where all qualified swimmers apply crawl) carried out at distances of 50, 100, 200, 400, 800, 1500 meters, as well as swimming on the relays 4x100 and 4x200 meters. Crawl is also applied in the mixed relay and at the complex swimming in the overall stages.

As major specific advantage at the crawl style is that swimmer in the water produces uniformly accelerated motion in a horizontal posture.

The position of the body and head. The swimmer's body takes a horizontal position, angle of attack reaches 4-8° in the long distances swimming, while at the short distances swimming decreases at 0-3°. The angle of attack size depends on the following: swimming compliance, head position, the strength and frequency of the leg work, ability of hand work and also of the body position.

According Nikitski (1981) basic principles of rational swimming techniques appeared: high level of swimming experience, the initial horizontal position of the body in the water, uniformly accelerated motion of the hand at the time of traction and transmission (optimal movement), harmonized rhythm of the hands and legs movement, hands movement at twisted trajectory in the water, expression of pulling force in the hand motion, the formation of such a movement coordination that will ensure the development and maintenance of high-tempo moving hands and more.

Towards Findak (2001) the objectives and tasks of physical and health education on the one hand derive from the objectives and tasks of educational areas, and on the other hand, from the perspective that this area has on the possible and necessary effect of the change in the anthropological status of students. Consequently, the aim of physical and health education areas is to satisfy biopsychosocial motives for movement as an expression of satisfaction of certain human needs which increase adaptive and creative capabilities in modern conditions of life and work.

The content of the program of physical and health education, ie material, is shown according to the following principles:

- In accordance with the objectives and tasks of physical and health education, in particular according to the data for each development period,
- Motoric information in all programs are treated as a means for accomplishing specific tasks, not as a goal of educational work,
- Program basis consists of motoric information that have the status of basic structures of movement,
- The program also includes basic and modified structures of movement that primarily affect the development of the qualities and abilities of students, and the degree of mastering motor tasks in the function of the transformation of these abilities and other dimensions of anthropological status of students,
- The adoption of the basic structure during the physical and health education classes is the basis and precondition for faster overcoming of other facilities and to facilitate the inclusion of students in other organizational forms of work.

On the basis of previous exposure it can be concluded that the program of physical and health education was developed in accordance with the latest scientific achievements and that new scientific knowledge was fully used in the selection of organizational forms of work, their development and defining their contents.

According Vukovic (2006), training of swimming may include primary, secondary, university education and the training of adults. Furthermore, the training of swimming can be done in the pool, both indoor and outdoor, sea, river and lake (implies that water must not be contaminated). Disparity of working methods, as well as a variety of assessment of knowledge, does not support the development of the swimming sport. The number of planned hours it takes for teaching swimming lessons is not the same for all age groups. It should take into account the age of the participants, as well as the optimal number of training hours, moreover, should carry out an initial verification of knowledge and skills in the water, and based on them, group homogenization should be made.

Towards Zaciorski and Kremer (2009), the specificity of adaptation rises with the level of mastering the sport. The higher level of physical condition of athletes results in the better specificity of adaptation. Transfer of training effects is lower in high quality athletes; for beginner athlete almost all exercises are helpful. For people in extreme poor physical shape simple exercises can improve strength, speed, endurance and flexibility. Achievement

beginner cyclists can be improved by squats with weights. Top athletes should apply specific exercises and training to increase the level of competition forms.

According to Jevtic (2011) the reduction of the budget and the number of hours, as well as a large number of unemployed teachers, is one of the images of physical education in many European countries since eighties of last century. This situation, by Naul (Naul, 2003), is associated with the observed phenomenon at social movement, which are reflected in the modern lifestyle, the new parent-child relationships, education and politics, distancing from the school, contemporary activities morals. With this, the previous values and standards in physical education and sport are degraded. The Council of Europe on physical education - sports, as the opportunities it provides and among them stands (Svoboda 1994): meeting and communicate with others; affirmation of different social roles; Learning acceptable social behaviour; guiding individuals towards collective goals (social cohesion); encouraging the development of individuals; create experiences, and develop emotions that are not part of human life outside of sport.

The European Union Report "Sport as a means for social integration" contains highlights to emphasize that there is great width in setting institutional policies of the Member States in the physical education area. In other words, no one in this process do not count on Europe as a single unit. Nevertheless it is possible to notice trends of educational policy in practice (Stegeman, 2004).

The goals and activities of physical education are the subject of trade among theorists (Klein, 2003). Physical education is a theoretical field of conflict within which controversies and compromises are crossing. Status depends on the stability and affirmation of social values through physical education, which are, in some sense, interests of politicians. "The working groups responsible for new programs are conflicting in the field of philosophy of science, and this directly is reflected on the transformation of physical education in the context of the training-learning." Status of the subject is changed, not as the influence of the profession, but as the influence of politics. Ability to solve concrete problems become a criteria for further development of the discipline and the subject orientation (Radojevic, Jevtic, a and b, 2003). Major has seen the sport as a means of development of fair play, team spirit and socialization. In the US, the objectives of physical education are narrowed and the subject is limited to the practical realization (Kidd, 2004). In France, one of the government was going to oriented physical education towards electoral sports in a single playgame, which would affirm its social character (Davis, Henschen, 2004).

Reform of physical education is at the crossroads between humanism of this discipline and profession, which is opposed to realism of politicians who determine the course of reforms in education (Gilliver, 2004). Naul (Naul, 2003) from the University of Essen, Germany, explains the existing concepts of physical education in Europe through "vector model". He makes a collective review of existing concepts as various vectors, 4 main and 4 extra, looking for possible balance between the new programs and orientations of physical education in Europe.

According to Markovic, Trivun (2012), Olympic Games represent the crown of a top athlete career. In the 100m freestyle, where competition is great, result and place in the finals depends on a number of details that determine who are qualified for the finals and who has won a medal. Competitive analysis certainly helps us to display and analyse parameters of swimming in the race. This analysis provides an ideal opportunity for correcting errors and suggestions how to remedy shortcomings in the future. It also contributes to the quality setting up competitive strategies. Competitive strategy, or also called tactical preparation for the exhibition, is developed and perfected in the training process. In the course of this process both the coaches and swimmers have opportunity to choose the most effective preparation for participation in the competition. In the 100 meters freestyle, the result was significantly influenced by the overall speed and timing of pure swimming, and by the turn quality, and entrance to the finish line also.

Toward Ayers and Sariscsany (2013), (American College of Sports Medicine–ACSM, 2006) on the website (www.Acsm.org/AM/Template.cfm?Selection=Home) the programming of physical exercise is defined as the process of designing individualized physical activity program with the aim of improving the physical fitness of the individual, reducing the risk of chronic degenerative diseases and the provision of safe exercise. At programming or prescribing exercise, the practitioner must adhere to the FITT guidelines (frequency, intensity, time and type) for proper activity as well as for adequate progress rate. In making program' decisions will have to be taken into account the following elements such as: health condition of person to whom the practice is prescribed, current physical form, previous experience in training or exercises, physical qualities, objectives in terms of form and so on. FITT guidelines relating to how to apply the basic principles of training in the planning and programming of physical activity. In planning and programming should keep in mind for whom the particular program and plan of physical activity is designed, or whether it is intended for student-athletes, high school student who independently attend certain courses of some form of physical activity (such as aerobics or pilates), or elementary school pupil who is a member of a sport selection. The implementation of selected decisions in specific program is influenced by numerous factors including the program's objectives and outcomes, adjustment of physical activity, readiness and maturity of the person for whom the plan and program is designed and instructor qualifications.

2. RESEARCH METHODS

Kazazovic (2008), stands that initial step in every research (whether that is analysis or report) refers to the identification of research subjects and research problem. The subject and the problem must fit into the behaviour pattern of the studied system. If someone does not have appropriate theoretical model, he cannot have or take adequate sample of respondents,

or sample of variables for this research, adequate methods for data processing and the like. In simple terms, it means that it is necessary to have detailed knowledge of the matter so that it could be further researched. Subject of studies in kinesiology, or any other science, is not a definition in one or two sentences on primary research subject, but it is the whole complex of research activities which aim to establish some principles. Kinesiology examines various aspects of the efficiency of the motor movement from the point of disposition, forming maximum motor efficiency and study the consequences of all processes that have a motor component, which in general form does not study any other science. Subject of research of our science is the man and his motoric component. Man has the motor skills from an early lifetime (babies with few months of life - remember the research of small baby in swimming), but our research are very interesting in younger and older school age children. Plenty of research has been conducted on the population of school age (primary and secondary schools). From the motoric aspects, interesting are student population, adults and mature persons.

The sample of respondents

The total number of respondents referred to the students of the Faculty of Physical Education and Sport, University of East Sarajevo, male and female, who took the entrance exam (as the initial measure), and later enrolled in the second year of study and swim the same part (as the final measurement).

The sample of variables (measuring instruments)

The sample of variables was presented in stylized form of movement (swimming 50 meters), for women breaststroke, and for men crawl (freestyle). The research results were related to the initial (the entrance examination) and final measurement (the start of the second year). The female population results were related to the breaststroke, while the men's results were related to the crawl (freestyle) swimming.

3. RESULTS WITH DISCUSSION

The research results are shown in the tables which are posted in such a way that establishes a logical sequence interpretation.

The tables display basic descriptive statistical parameters (minimum, maximum and mean) as a measures of central tendency. In addition, research shows differences of the results at the initial and final measurements, by using t-test methodological analysis (on small dependent samples of respondents).

Generation of 2010/2011 school year.

Table 1, women 2010/2011, descriptive statistics of initial and final breaststroke swimming, 50 meters

	Valid N	Mean	Minimum	Maximum	Std. Dev
2010ZIP	6	75,50	63,75	80,86	6,58
2010ZIP	6	74,93	62,99	80,61	6,54

Table 1 shows the following results at the initial measurement: minimum (63.75), maximum (80.86), the mean value (Mean = 75.50) and standard deviation (6.58), while the same population at the final measurements have: minimum (62.99), maximum (80.61), the mean value (Mean = 74.93) and standard deviation (6.54).

Table 2, women 2010/2011, t-test of initial and final breaststroke swimming, 50 meters

	Mean	Std. Dv.	N	Diff.	Std.Dv	t	df	p
2010 ZIP	75,50		6		6,58			
2010ZIP	74,92	6,53	6	0,57	0,61	2,32	5	0,06

Presented t-test results in the Table 2, show that difference of the initial and final measurement of 50m breaststroke women swimming do not have the statistical significance ($t = 2.32$) because t value is very low, neither the p value (0.06) shows it.

In this study was not involved 5 women who were at the enrollment exam, but did not pass at the second year of study.

Table 3, men 2010/2011, descriptive statistics of initial and final freestyle (crawl) swimming, 50 meters

	Valid N	Mean	Minimum	Maximum	Std. Dev
2010MIK	50	49,59	35,15	74,61	8,49
2010MIK	50	49,45	34,87	73,63	8,44

Table 3 shows the following results at the initial measurement: minimum (35.13), maximum (74.61), the mean value (Mean = 49.59) and standard deviation (8.49), while the same population at the final measurements have: minimum (34.37), maximum (73.63), the mean value (Mean = 49.43) and standard deviation (8.44).

Table 4, men 2010/2011, t-test of initial and final freestyle (crawl) swimming, 50 meters

	Mean	Std. Dv.	N	Diff.	Std.Dv	t	df	p
2010 MIK	49,58	8,50						
2010MIK	49,44	8,44	50	0,14	0,57	1,73	49	0,09

Presented t-test results in the Table 4, show that difference of the initial and final measurement of 50m breaststroke women swimming do not have the statistical significance ($t = 1.73$) because t value is very low, neither the p value (0.09) shows it.

In this generation, on the entrance exam, 16 candidates did not participate in the measurement of results in 50 meters freestyle (crawl) swimming.

Generation of 2012/2013 school year.

In this generation there is only one female who swam 50 meters breaststroke, and after has pass at the second year of study. Also, 4 male were not involved in the measurement of results in 50 meters freestyle (crawl) swimming.

Table 5, men 2012/2013, descriptive statistics of initial and final freestyle (crawl) swimming, 50 meters

	Valid N	Mean	Minimum	Maximum	Std. Dev
2012MIK	29	54,03	36,38	81,63	9,79
2012MIK	29	53,95	36,43	81,36	9,89

Table 5 shows the following results at the initial measurement: minimum (36.38), maximum (81.63), the mean value (Mean = 54.03) and standard deviation (9.79), while the same population at the final measurements have: minimum (36.43), maximum (81.36), the mean value (Mean = 53.05) and standard deviation (9.89).

Table 6, men 2012/2013, t-test of initial and final freestyle (crawl) swimming, 50 meters

	Mean	Std. Dv.	N	Diff.	Std.Dv	t	df	p
2012 MIK	54,03	9,79						
2012MIK	53,95	9,89	29	0,08	0,45	0,95	28	0,35

Presented t-test results in the Table 6, show that difference of the initial and final measurement of 50m freestyle (crawl) men swimming do not have the statistical significance ($t = 0.95$) because t value is very low, neither the p value (0.35) shows it.

4. DISCUSSION

Towards Kazazović (2008) bronze, silver and gold badge of the Republic Committee for the training of non-swimmers are recognized signs of mastering a certain extent, i.e. criteria of swimming skills. Bronze badge gets everyone who is capable of fulfilling norm in his age category (Table 7). Also, there are norms for all age categories for silver and gold badge (Table 7). At the part of the swimming skills exam for evaluation speed of swimming on 50 meters, and 100 m, swimmer choose swimming technique. Overview of that part of swimming skills can be done in a pool or in improvised space for swimming. It is recomme-

ned that, where possible, to carry out verification in the pool, because the length is defined, and it is possible to begin to swim with start jump on the head from the starting blocks. However, when the verification is performed on an improvised swimming pool, size of swimming area should be correctly and clearly marked and where possible, ensure beginning of swimming with start jump on the head. At the part of the swimming skills exam relating to the evaluation of the length and duration of swimming (200, 300, 400, 500, 600, 800 meters), swimmer, also, choose speed and swimming technique.

Table 7, Criteria for swimming skills assessing for bronze, silver and gold badge (The table is taken from Kazazović, B. 2008, p 153)

Years	50 meters freestyle (crawl) swimming					
	boys			girls		
	bronze	silver	gold	bronze	silver	gold
3	2:45	2:35	2:25	2:45	2:35	2:25
4	2:35	2:25	2:15	2.35	2:25	2.15
5	2:25	2:15	2.05	2.25	2:15	2.05
6	2.15	2:05	1:55	2:15	2:05	1.55

Trivun, Grahovac (2011) have made a research on a sample of 43 respondents of the student population at the Faculty of Physical Education and Sport, University of East Sarajevo, school year 2009/10 enrolled in the third year of study, male, age 23 years \pm 6 months. They've made a comparison of results in the following parameters: stroke rate variations on the one hand and the variables of swimming in natural conditions at the 120 meters. The variables that made up the stroke frequency during freestyle swimming (front crawl technique) expressed its effective value on the results of male and female sections of the crawl technique during outdoor activities at Tjentiste, with large oscillations caused by natural environment at mountain. The value obtained by multivariate regression resulted F-test 4.49 with level of significance $p = 0.04$. Thus, this paper provided information about the stroke efficiency on the performance results in freestyle swimming technique at 120 meters. The results of multiple regression, related to the frequency of strokes interrelated with performance results in freestyle swimming technique in natural conditions, is ($R = .31$), which explains the .098% ($R^2, 098$), the common information between the above mentioned variables. Analysis of individual contributions to variable of stroke rate (t) on the resulting performance in swimming, gives a modest contribution, what concludes that the rest of impact belongs to such as: optimal number of strokes, leg work, swim step and other factors that were not the subject of this

paper. The conclusion is that forcing of high frequency of stroke leads to a dynamic stereotype or mobile panic, when movements, although powerful and fast, become less effective. Steadily swimming at the same pace also leads to a dynamic stereotype, so it is recommended swimming with different stroke frequencies during the training process, but always with a sense of water. Dynamic stereotype can occur during swimming at submaximal or maximal speed during training and techniques improvement.

The results shown in tables 1-6 in this study have slight differences measured by t-test, and were related to the initial (in the entrance exam) and final (at the beginning of the second year of study) measurement of 50 meter freestyle swimming for male and 50 breaststroke swimming for female respondents.

The results are within the scope of half a minute to a little more than one minute, so, can be considered that is caused by genetic, not only by insufficient activity in the period from the entrance examination until beginning of the second year of study.

5. CONCLUSION

In a sample of 50 male respondents in the 2010/2011 academic year, and during the entrance examination (initial) and final measurement (enrollment in the second year), a test of skills and swim ability in freestyle (crawl) at 50 meters, the following measures of central tendency was pointed out: results of the initial measurement: minimum (35.13), maximum (74.61), the mean value (Mean = 49.59), and standard deviation (8.49), while the same population at the final measurement has: minimum (34.37), maximum (73.63), the mean value (Mean = 49.43) and standard deviation (8.44). On the same sample, t-test do not have the statistical significance ($t = 1.73$) because t value is very low, neither the p value (0.09) shows it.

In this generation, on the entrance exam, 16 candidates did not participate in the measurement of results in 50 meters freestyle (crawl) swimming.

Female respondents (6) demonstrated their skills and abilities at 50 meters breaststroke swimming. Descriptive statistical analysis of this test at initial measurements shows: minimum (63.75), maximum (80.86), the mean value (Mean = 75.50) and standard deviation (6.58), while the same population at the final measurements have: minimum (62.99), maximum (80.61), the mean value (Mean = 74.93) and standard deviation (6.54). Results of t-test analyses show that difference of the initial and final measurement of 50m breaststroke women swimming do not have the statistical significance ($t = 2.32$) because t value is very low, neither the p value (0.06) shows it.

In the generation of 2012/2013 school year, in the same survey 29 respondents have the following results of descriptive analysis: minimum (36.38), maximum (81.63), the mean

value (Mean = 54.03) and standard deviation (9.79) at the initial measurement. The same population at the final measurements show: minimum (36.43), maximum (81.36), the mean value (Mean = 53.05) and standard deviation (9.89). Results of t-test analyses show that difference of the initial and final measurement of 50m freestyle (crawl) men swimming do not have the statistical significance ($t = 0.95$) because t value is very low, neither the p value (0.35) shows it.

Based on the analysis of collected data at the entrance examinations in school years (2010/2011 and 2012/2013) and the initial measurement at the second year of study (the final measurement), for the same respondents at the study program: physical education, we obtained measures of central tendency of descriptive statistics. The t-test analysis for small dependent samples of subjects reflected a difference in the results of the initial and final measurement. Statistical difference has slight level of significance between initial and final measurements of respondents at 50 meters freestyle swimming.

In terms of the entrance examination and the initial measurement of male population at the second year, the exercises provided from other attended subjects, as well as extra-curricular activities of the students themselves, had no statistically significant effect on the result of performance in swimming on 50 meters freestyle.

Similar themes relating to the student population are very little researched, because researching in athlete population enables less dispersion of results, so they are more actual for analyses.

6. REFERENCES:

1. Ayers, S.F., Sariscsany M.J., 2011 Physical education for lifelong fitness: the physical best teacher's Davis, H., Henschen, K, (2004). How wil Sport Science and Physical Educatin Continue to Evolve over the Next Decade? *Sport Science & Physical education. Bulletin*. Retrived January 25 from <http://www.icsspe.org>
2. Findak V. (1986). Criteria for assessing the knowledge of swimming and swimming skills. „*Partizan*“, Zagreb,
3. Findak V. (2001). Methodology of physical education. *School books*, Zagreb, p. 23 and 30.
4. Kazazović B. (2008). *Swimming*. University of Sarajevo, Faculty of Sport and Physical Education. Graphic traffic doo Sarajevo pp. 152-153
5. Kazazović B. (2008). *The methodology of kinesiology research*. University of Sarajevo, Faculty of Sport and Physical Education. Graphictraffidoo Sarajevo p. 21

6. Kidd, B. (2004). The necessity of Quality Health and Physical education. A brief to the Ontario Education Equakity Task Force. *Sport Science & Physical education Bulletin*. Retrived May 12 from <http://www.icsspe.org>
7. Jevtic, B. (2011). *Swimming in the education*. Faculty of Sport and Physical Education, University of Belgrade. Pres Kosmajturist, Mladenovac, pp. 73-75
8. Klein, G. (2003). A Future for Physical Education within the International Context: Institutional Fragility or Collective Adjustment. In Hardman Ken (eds). „*Physical Education: deconstruction and Recconstruktion-issus and Directions*“, ICSSPE, Berlin pp. 153-169.
9. Marković, V., Trivun, M. (2012). Analysis of swimming on 100 meters freestyle at the Olympic Games in the period 1992 – 2008, *Sport and Health*, Faculty of Physical Education and Sport, University of East Sarajevo, year VII, No. 1-2, pp. 61 – 70.
10. Naul, R. (2003). Concepts of Physical education in Europe. In Hardman Ken (eds), „*Physical Education: Deconstrction and Reconstruction-issus and directions*“, ICSSPE, Berlin. pp. 35-53.
11. Никитский, Б.Н. (1981). *Плавание*. Учебник для студентов фак. физ. воспитания пед. Ин-топоспец. „Просвещение“, Москва 98
12. Парфенов, В.А. (1978). *Плавание*. Головное издательство издательского объединения „Виша школа“, Киев, стр: 55
13. Radojevic, J., Jevtic, B. (2003 b). The importance of education for working with children and adolescents in sport. In the education of the Faculty of Sport and Physical Education: "Children's sport from practice to an academic area," 14-17 chapter: "*Sport for children and youth and current social processes*", Belgrade
14. Radojevic, J., Jevtic, B. (2003 a). Society and sport of children and youth. In the education of the Faculty of Sport and Physical Education: "Children's sport from practice to an academic area," 18-22 chapter: "*Sport for children and youth and current social processes*", Belgrade
15. Stegeman, H. (2004). Physical education: The importance and the intention. *Sport Socienc & physical education Buletin*, Retrived May 12 from <http://www.icsspe.org>
16. Svoboda, B. (1994). Sport and physical activity as a Socialization Environment: *Sceintificrewiev, part 1*, Concl of Europe, Strasbourg
17. Trivun, M., Grahovac, G. (2011). The effects of stroke frequency on the result of swimming performance in natural conditions, *Sport and Health*, Faculty of Physical Education and Sport, University of East Sarajevo, year VI, No. 1, (2011), p. 33 – 40.

18. Trivun, M. (2013). Performance results of finalists in the 100 meter breaststroke swimming at international meeting 2011. Ur: Bjelica, D. *Journal of Sports, Physical Education and Health, Montenegro Sports Academy*, No. 37, 38, 39 /XI, *Proceedings*, Podgorica, p. 106-111.
19. Vukovic, S. (2006). *Swimming*. Faculty of Physical Education and Sport. „GRAFID“, Banja Luka, pp. 90-91
20. Zatsiorsky, VM, Kraemer, W. J. (2009). *Science and practice in strength training*. DATA STATUS, Belgrade, p. 9
21. *American College of Sports Medicine (ACSM)*, (2006) on the web page: ([www.Acsm.org/AM/Template.cfm? Selection=Home](http://www.Acsm.org/AM/Template.cfm?Selection=Home)) guide. 3rd ed. USA: Human Kinetics, *Data status*, Beograd, p.40
22. Gilliver, K. (2004). Quality physical education. *Sport Scie Physical education Bulletin*. Retrived April 04 from <http://www.icsspe.org>

Correspondence:

PhD. Milomir Trivun

e-mail: milomirtrivun@gmail.com

translation into English

MSc Jelena Micic