THE INFLUENCE OF MOTOR ABILITIES ON RESULTS OF SPORT GAMES POLYGON AT PHYSICAL EDUCATION CLASSES

Dejan Milenković[1] and Igor Stanojević[2]

[1] Faculty of Sport and Physical Education, Niš, Serbia
[2] College of Educator Training, Aleksinac, Serbia

Original scientific paper

Abstract
The aim was to determine the influence of motor abilities on results of sport games polygon performing, which consisted of basketball and football technical elements. 30 male fourth grade students of chronological age 10 years ± 6 months, involved in regular physical education classes participated in testing for this research. 10 motor tests were measured: Speed - 20 meters low start running, hand circling, foot circling, foot tapping and hand tapping; Coordination - figure "8" with bending, envelope test, side steps, jumping over the rope, coordination with the bat. Sport games polygon has been made of basketball and football technical elements, which were related to ball manipulation and situational-motor precision. Regression analysis was used in data processing, which showed a statistically significant influence of both motor dimensions (speed and coordination) that were tested in this study, on results of the sport games polygon. At the individual level, except for foot tapping, all speed tests showed a statistically significant influence on results of sport games polygon. In the case of coordination, only coordination with the bat had not statistically significant influence on results of sport games polygon.

Key words*: sport games polygon, motor abilities, physical education classes*

Introduction

Polygon is one of the oldest forms of work organization in physical education, whose name was formed from two Greek words - poly (many) and agon (task). From the name itself it can be estimated the basic characteristics of this type of exercise, as a unique exercise with many tasks to be executed. This form of work organization is used for exercise implementation in complex conditions for training coordination skills of students, as well as a type of fitness exercise, for testing physical abilities, for competition, in recreational purposes, and also for training and evaluation of sport and technical knowledge (Zdanski, 1986; Višnjić et al., 2004). Aplication of this form of work provides great opportunities for physical education teacher in organization of classes in creative aspect. Very interesting and dynamic exercise/tasks can be designed that will be an integral part of the polygon, but at the same time very useful for development of physical fitness and improving of sport-technical education. The good side of the polygon is the fact that efficiently organized exercise may be conducted in a small space for a large number of children, and also a teacher of physical education is not limited by need for standardized objects and accessories, age and gender of students, season and type of playground that is available. Of course, it should be mention the weaknesses of such an organization, related to a reduced ability to control and keep the students during tasks performing, so it can resulted with injury. On the other hand, the desire of each student to complete his tasks as soon as possible frequently leads to an irregular performance of polygon elements and thus to loosing of exercise meaning.

Tasks are performed without a break, because the sudent is constantly moving from obstacle to obstacle, overcoming them with higher or lower speed. The formation of the obstacles in polygon primarily depends on the primary goal of using this work form. A polygon with obstacles can be consisted of a larger or smaller number of obstacles, in other words exercises, which primarily depends on age and number of students involved in exercising process, but also on available space, equipment and accessories. The task schedule in a polygon can be in the form of a semi-circle, circle, square, rectangle, ellipse, eights, straight or dashed zig-zag lines, etc. On the ocassion of forming the polygon it should take into account the choice of place, defining the term, the number of obstacles, device layout, the order of tasks, their distance, etc. Distance between each obstacle and their order are primarily determined by the specific material and spatial conditions. This form of work, at easier form, can also be used in the introductory phase of the class, except in the main one (Branković & Dragić, 2007). There are different types of polygons in the practice of teaching. The divisions can be made (Višnjić et al., 2004):

- according to made method: natural, artificial and combined;
- according to purpose: for movement improving, physical fitness improving, physical fitness testing, competitive, recreational and humorous
- according to the type of physical exercise that dominates: gymnastic polygon, athletic polygon, sport games polygon and mixed polygon;
- according to the number of tracks: one-track polygon and multi-track polygon (spaghetti).

For the purposes of this study sport games polygon was selected, which consisted of two sport games (basketball and football) in which ball manipulation and situational-motor precision were analyzed. With pre-testing of some basic motor skills (speed and coordination), the interest was directed to the fact which abilities of students are the most affected to the results achieved on sport games polygon.

Methods

30 male fourth grade students of chronological age 10 years ± 6 months, involved in regular physical education classes participated in testing for this research. The aim was to determine the influence of motor abilities on results of sport games polygon performing, which consisted of basketball and football technical elements.

10 motorical tests were measured:
Speed
- 20 meters low start running (TR20),
- Hand circling (KRUZR)
- Foot circling (KRUZN),
- Foot tapping (TAPN)
- Hand tapping (TAPR).

Coordination
- Figure "8" with bending (OSMSS)
- Envelope test (KOVER)
- Side steps (KORUS),
- Jumping over the rope (VIJAC)
- Coordination with the bat (PALIC)

Regression analysis was used in data processing.

Sport games polygon (figure 1) - was made up of basketball and football technical elements, which were related to ball manipulation and situational-motor precision: curved (slalom) and straight line dribble of football, vertical target precision of football, curved (slalom) and straight line dribble of basketball, horizontal target precision of basketball.

Description of exercise at sport games polygon:
From point A, which represents the starting position, a 10 meters curved line movement (slalom) around the cones with football is performing. After that, straight line movement is continuing to the next cone at 10 meters distance, going around it and returning the same route and type of movement to the point A, shooting from it to a small football goal of 1.5x0.5 meters dimensions. Movement without the ball is performing to point B, first basketball is being taken from the hoop and shooting at the basket at 5 meters distance.

After that, the second basketball is being taken from the hoop and curved line movement around the cones is performing, as well as straight line movement to point C shooting from it to a basket score. Basketball is being taken again, and it is returning the same route and type of movement to the point B which represents finish. For every failure or incorrect assignment was made, the total time is subtracted by one second.

Results

Table 1 Regression analysis of speed and sport games polygon

	Ro	Ro^2	F-test	Q
	.46	.21	9.09	.000
Speed tests	R	Part-R	t	Q
TR20	.68	.46	5.11	.000
KRUŽR	.34	.30	3.08	.003
KRUŽN	.33	.31	3.15	.002
TAPN	.15	.16	1.63	.107
TAPR	.33	.41	4.41	.000

Influence of speed as predictor system on criterion variable of sport games polygon is shown in table 1 as influence of the whole predictor system, but also the influence of its individual variables. The value of the multiple correlation coefficient is Ro = .46, indicating that there is a strong connection between predictor variables and the criterion. The statistical significance of this connection is Q = .000, and 21% is common variance, as evidenced by the determination coefficient Ro^2 = .21. The remaining 79% is attributed to other anthropological characteristics and abilities. Individual variables through their correlation coefficients (R) and partial correlations (Part-R) are showing the level of connection with the criterion variable, and thus a statistically significant connection is at: 20 meters low start running (TR20 - R = .68, R = Part-.46), hand circling (KRUZR - R = .34, Part R = .30), foot circling (KRUZN - R = .33, Part R = .31) and hand tapping (TAPR - R = .33, Part-R = .41). Significance of partial regression coefficients (Q) confirms the current connection: 20 meters low start running (TR20 .000), hand circling (KRUZR .003), foot circling (KRUZN .002) and hand tapping (TAPR .000). Test foot taping (TAPN) showed no statistically significant influence on results of the sport games polygon.

Table 2 Regression analysis of coordination and sport games polygon

	Ro	Ro^2	F-test	Q
	.82	.67	21.24	.000
Coordination tests	R	Part-R	t	Q
OSMSS	-.21	-.26	-2.62	.010
KOVER	.94	.86	16.79	.000
KORUS	-.54	-.36	-3.78	.000
VIJAC	-.28	-.27	-2.78	.007
PALIC	.16	.18	1.79	.076

In the case of influence of coordination on results of the sport games polygon (table 2), coefficient of multiple correlation is Ro = .82, which indicates a very strong connection between predictor variables and the criterion. The statistical significance of this connection is Q = .000.

On the bases of the value of determination coefficient Ro2 = .67, it can be said that the common variance is 67%. The correlation coefficient (R) and partial correlations (R-Part) at the individual level suggest that a statistically significant connection is at folowing tests: figure "8" with bending (OSMSS - R = - .21, Part-R = - .26), envelope test (KOVER - R = .94, Part R = .86), side steps (KORUS - R = - .54, Part-R = - .36) and jumping over the rope (VIJAC - R = - .28, R = Part- - .27). Significance of partial regression coefficients (Q): figure "8" with bending (OSMSS .010), envelope test (KOVER .000), side steps (KORUS .000) and jumping over the rope (VIJAC .007). Coordination with the bat (PALIC) showed no statistically significant influence on results of the sport games polygon.

Discussion and conclusion

Sport-technical education is one of the subject areas of physical education besides development of physical skills and linking physical education with life and work. Sport technique consists of large number of motor programs that are necessary for performance of the movement structure. It takes a long process of learning motor structures to achieve a certain level of technique acquisition. Only at that point, based on highly developed motor skills, technical preparedness allows the student to purposefully manage his own body movements during the performance of dynamic stereotypes in some particular sport. Learned stereotypes of movement allows repeatition of motion in the same or changeable conditions. Essentially, technique is the result of large number of repetitions to the occurrence of reflex activity level in specific activity *(Branković & Dragić, 2007)*. There are large number of sport techniques: basic sports (gymnastics, athletics, swimming) sport games (volleyball, basketball, soccer and volleyball) at physical education classes. In adopting a specific movement structures it is necessary to perform large number of repetitions to form a habit. The main task teachers are facing with is how to create the conditions for performing as many repetitions as it could in time limit of 45 minutes. This can be done by increasing the number of equipment, number of classes for particular subject matter, and using an appropriate organizational form of work that will largely help the adoption of sport techniques and to show which motor skills they are in greatest relation with. The organizational form of work - polygon is used in teaching practice, as already mentioned, for different purposes and with different contents. There are studies in which the polygons determined the level of physical ability in preschool children *(Veselinović, Milenković & Jorgić, 2009)*, younger school children *(Milanović, 2007; Žuvela, Božanić & Miletić, 2011)*, then sport games polygon were the contents of researches with high school age *(Dzajic & Kuna, 2012)*, as well as comprehensive polygons in faculty teaching with students of physical education *(Obradović, Korovljev & Pantović, 2009; Obradović, Pantović & Korovljev, 2009)*. In this study, polygon was consisted of technical elements of basketball and football, involving ball manipulation and situational-motor precision. The connection of these elements with different dimensions of motor abilities, namely, speed and coordination was searched. Therefore, it can be concluded that both dimensions have statistically significant effects on technical elements of sport games, at multivariate level as well as at individual level of most individual tests.

References

Branković, N., & Dragić, B. (2007). *Theory and methodics of physical education*. Niš: SIA.

Džajić, S., & Kuna, D. (2012). Efficiency of sport games programme on improvement of situational-motoric abilities at physical and health education classes. In I. Jukić, C. Gregov, S. Salaj, L. Milanović & V. Weitheimer (Eds.), *10. annual international conference »Conditional preparation of sportsmen 2012 – specific conditional preparation«* (pp. 142-145). Zagreb: Kinesiological faculty of Zagreb University, Assossiation of Croation Trainers.

Milanović, I. (2007). Effects of programmed physical education classes at younger school age. *Physical culture*, *61*(1-2), 43-56.

Obradović, J., Korovljev, D., & Pantović, M. (2009). Influence of motoric abilities on results of comprehensive polygon at 19 years old men. *Sport Mont*, *VI*(18-20), 172-175.

Obradović, J., Pantović, M., & Korovljev, D. (2009). Influence of motoric abilities on results of comprehensive polygon at 19 years old women. *Sport Mont*, *VI*(18-20), 176-178.

Veselinović, N., Milenković, D., & Jorgić, B. (2009). Relations between morphological characteristics and motorical abilities and results of the skill polygon at pre school children. *Glasnik of Anthropological Society of Serbia, 44*, 237-244.

Višnjić, D., Jovanović, A., & Miletić, K. (2004). *Theory and methodics of physical education*. Belgrade: Personal edition.

Zdanski, I. (1986). *Intensification of physical education class*. Belgrade: IPRO Partizan.

Žuvela, F., Božanić, A., & Miletić, Dj. (2011). Polygon – A new fundamental movement skills test for 8 year old children: construction and validation. *Journal of Sports Science and Medicine*, *10*, 157-163.

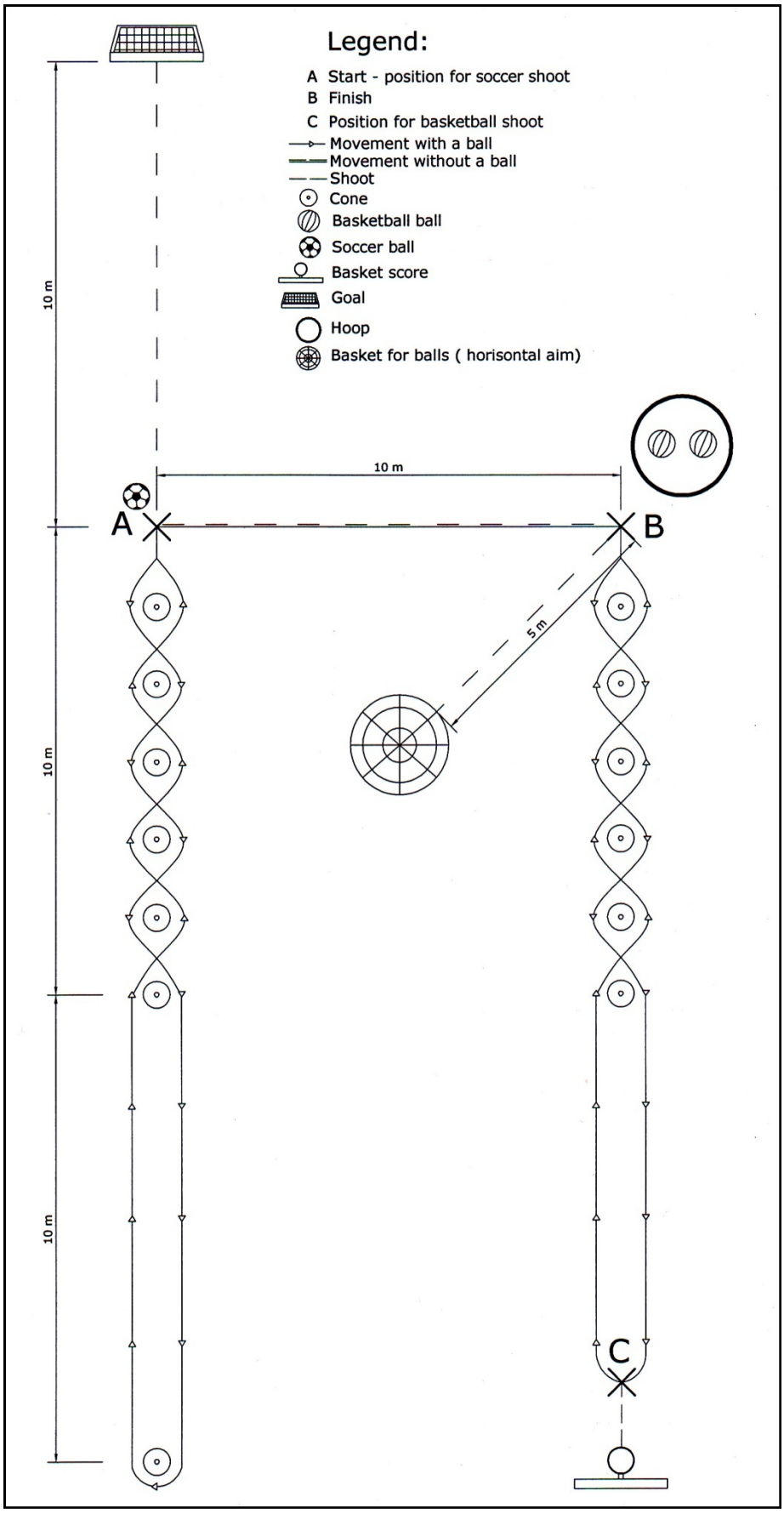

Figure 1 Sport games polygon

UTJECAJ MOTORIČKIH SPOSOBNOSTI NA REZULTATE POLIGONA SPORTSKIH IGARA NA NASTAVI TJELESNOG I ZDRAVSTVENOG ODGOJA

Sažetak

Cilj istraživanja bio je utvrđivanje utjecaja motoričkih sposobnosti na rezultate poligona sportskih igara. U testiranju je sudjelovalo 30 učenika četvrtog razreda osnovne škole, kronološke starosti 10 godina ±6 mjeseci, muškog spola, obuhvaćenih redovnom nastavom tjelesnog vježbanja u školi. Izmjereno je 10 testova za procjenu motoričkih sposobnosti: Brzina – trčanje na 20 metara iz niskog starta, kruženje rukom, kruženje nogom, taping nogom i taping rukom; Koordinacija – osmica sa sagibanjem, koverta test, koraci u stranu, preskakanje horizontalne vijače, koordinacija s palicom. Poligon sportskih igara bio je sastavljen od tehničkih elemenata iz košarke i nogometa koji su se odnosili na manipulaciju loptom i situacijsko-motoričku preciznost. U obradi podataka korištena je regresijska analiza koja je pokazala postojanje statistički značajnog utjecaja obje motoričke dimenzije (brzina i koordinacija) koje su testirane u ovom istraživanju na rezultate poligona sportskih igara. Na pojedinačnoj razini, osim testa taping nogom, svi testovi brzine pokazali su statistički značajan utjecaj na rezultate poligona sportskih igara. U slučaju prostora koordinacije, jedino test koordinacije sa palicom nema statistički značajan utjecaj na rezultate poligona sportskih igara.

Ključne riječi: *poligon sportskih igara, motoričke sposobnosti, nastava tjelesnog i zdravstvenog odgoja*

Received: February 14 2013
Accepted: June 10, 2013
Correspondence to:
Dejan Milenković
University of Niš
Faculty of sport and physical education
18000 Niš, Čarnojevića 10a, Serbia
Phone: +381 (0)18 510 900
E-mail: dejan_milenkovic79@yahoo.com