

# RELATIONS BETWEEN MOTORIC ABILITIES AND SPECIFIC MOTORIC BASKETBALL SKILLS IN PHYSICAL EDUCATION CLASSES

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**Abstract.** The aim of this study was to determine the relation between motoric and specific motoric basketball skills in physical education classes for elementary school students. The sample was taken from a population of boys and girls in four elementary schools in Niš. Boys (66) and girls (58), have been students of elementary school, 10 years old and all of them have been attending regular physical education classes three times a week. For the assessment of motoric abilities, a set of 12 motoric tests was applied: Explosive strength: squat jump, squat jump arms swing and drop jump; Speed: 20m running from a low start, orbiting hand and orbiting leg; Coordination: jumping over the horizontal rope, envelope test and figure „8“ with bending; Accuracy: darts, shooting with the ball at horizontal target and stiletto. For the assessment of specific motoric basketball skills a set of six tests was applied: elevations precision of ball passing with two hands, horizontal precision of ball passing with two hands, orbiting ball around the body, orbiting ball through the legs (figure „8“), dribble around a central circle of the basketball court and dribble two „small eights“ around two adjacent circles of basketball court. In data processing canonical correlation and regression analysis were used. The results showed that motoric abilities significantly contributed to success of specific motoric tests performance both with boys and also with girls.

**Keywords:** *Physical education, Teaching process, Motoric abilities, Specific motoric basketball skills, Students.*

## 1. INTRODUCTION

The essence of physical education teaching process, in addition to optimal development of anthropological characteristics of students and the adoption of sport-technical

education contents, is also to act towards including the process of physical exercise in everyday life, ie. by systematic application, physical exercise to become part of students' value system. It is necessary for the process of physical education to cause adaptive changes in motoric abilities and organic systems with students, especially cardiovascular and respiratory system, and this is only possible by adequately choosing the means of physical exercises, using the appropriate method, load, methodical and organizational forms of work (Višnjić, Jovanović and Miletić, 2004). „The goal of physical education teaching process is settling the basic biopsychosocial needs of students for physical activity, the formation of proper understanding and attitude towards them and continuously encouraging students to incorporate physical activity into everyday life and culture of living in general“ (Matić et al., 1992, 64).

Physical education is a complex pedagogical process which must have been without mistakes. It must be performed properly due to results we all want to see, proper growth and development of students. Through physical exercises, physical abilities are methodically and systematically developing, health is strengthening, moral characteristics are developing, in a word, complete person is building up. In order to achieve this, the student has to be the subject of a teaching process. For that reason, physical education programme needs to be precise, the goal has to be exactly defined, every component of anthropological space has to have its own place and prediction of its level it needs to be developed.

It should also have to take into account the the individual abilities of each student, because since the Middle Ages, humanists-educators have considered the harmony of body and spirit and that the children should be treated patiently, by respecting their

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individuality. They also said that the physical education was in the primary education of each child as one of the components, with intellectual, moral and aesthetic education (Grandić, 1997).

The process of physical exercise certainly affects changing the human abilities and qualities within anthropological space. This is followed by maximum adjustment to interests and needs of students. In order to achieve this, there must be information about anthropological status of students. It includes all abilities and characteristics of anthropological space: morphological characteristics, motoric and situational-motoric abilities, functional abilities, cognitive abilities, conative characteristics, etc. Knowing the structure of mentioned anthropological abilities and characteristics of students and their development, is the basic requirement for successful management of physical education process.

For the purpose of this study the testing was performed, and also comparing of two parts of anthropological space in the form of motoric abilities and specific motoric basketball skills. Basic motoric abilities as the basis of human motorics have great impact on their sub-variant defined as situational-motoric abilities. Specific motoric abilities are abilities acquired as conditional reflexes and they are relevant to a particular sport, they are made up from exactly certain combinations of basic motoric abilities and with smaller part from functional and cognitive abilities and conative characteristics (Golubović-Jovanović and Jovanović, 2003). Therefore, the intention of this paper is to determine the level of that impact on success in results of some tests of specific motoric basketball skills.

## 2. WORKING METHOD

The sample was drawn from a population of boys and girls in four elementary schools in Niš. Boys (66) and girls (58), have been students of elementary school, 10 years old and all of them have been attending regular physical education classes three times a week. The aim of this study was to determine the relation between motoric abilities and specific motoric basketball skills in physical education classes with both groups.

For the assessment of motoric abilities, a set of 12 motoric tests was applied: Explosive strength: squat jump (SKVAT), squat jump arms swing (SKVATZ) and drop jump (DROP); Speed: 20m running from a low

start (TR20N), orbiting hand (KRUŽR) and orbiting leg (KRUŽN); Coordination: jumping over the horizontal rope (PRHV), envelope test (KOVV) and figure „8“ with bending (OSMSS); Accuracy: darts (PIKAD), shooting with the ball at horizontal target (GHLOP) and stiletto (STIL).

Applied set of motoric tests was taken from the researches of Kurelić, Momirović, Stojanović, Radojević and Viskiće-Štalec (1975), Bosco, Komi and Luhtanen (1983), Soše and Rađo (1998).

For the assessment of specific motoric basketball skills a set of six tests was applied: elevational precision of ball passing with two hands (PER2), horizontal precision of ball passing with two hands (PHOR), orbiting ball around the body (KRTE), orbiting ball through the legs (figure „8“) (KRNO), dribble around a central circle of the basketball court (SVKR) and dribble two „small eights“ around two adjacent circles of basketball court (SVMO).

Applied set of specific motoric basketball skills tests was taken from the research of Golubović-Jovanović and Jovanović (2003).

The testings were conducted at the school gyms. Respondents were wearing adequate sports equipment. The following instruments were used:

### Motoric abilities

Roller of 35 cm diameter, 40 cm high chest, stopwatch, jumping rope, seven stands of 120 cm height, elastic band, tennis balls, darts, steel measuring tape, tape measure, Chronojump system (chronopic v3.0, contact platform, chronojump software 0.9.3).

### Specific motoric basketball skills

Basketballs, basketball court (length 28 m) with mounted boards, stopwatch.

Data analysis was performed with the statistical package Statistica 7.0, and canonical correlation and regression analysis were used. Processing of the raw data was performed separately for boys and for girls in particular, and the results were particularly presented.

## 3. RESEARCH RESULTS

### 3.1. Canonical correlation analysis

**Table 1.** Canonical correlation analysis between motoric specific motoric basketball skills

		Can.R	Can.R <sup>2</sup>	Chi-sqr.	df	p
Boys	0	.790	.624	121.89	72	.000**
Girls	0	.748	.560	123.51	72	.000**
	1	.668	.446	84.53	55	.006**

Table 1 shows the level of connection between the predictor set of motoric abilities and criterion set of specific motoric basketball skills with boys and with girls.

With boys group, one significant canonical correlation of these two sets at the level of  $p < .01$  was found. It has been explained by the size of the canonical correlation coefficient (Can.R = .790), having turned into a significant function amounts as  $p = .000$ . The coefficient of determination (Can.R2 = .624) explains the percentage relation of the two sets, and the influence of motoric abilities on specific motoric basketball skills is 62.4%. The structure of canonical factors (Table 2), for the motoric abilities shows figure „8” with bending (OSMSS -0.45) as the most affecting factor, while dribble around a central circle of the basketball court (SVKR 0.83) is the specific motoric factor with the greatest influence.

It may be noted that there is a single general factor explaining the success in specific motoric basketball skills with boys.

With girls group, two significant canonical correlations of these sets at the level of  $p < .01$  were found. The first canonical correlation is explained by the size of the canonical correlation coefficient (Can.R = .748), having turned into a significant function amounts as  $p = .000$ . The coefficient of determination (Can.R2 = .560) explains the percentage relation

of the two sets, and the influence of motoric abilities on specific motoric basketball skills is 56%. The structure of the first canonical factor (Table 2) for the motoric abilities again shows figure „8” with bending (OSMSS -0.54), as well as with boys groups, as the most affecting factor, and at the side of specific motoric basketball skills, dribble around a central circle of the basketball court (SVKR -0.87) is the most affecting factor. The second canonical correlation indicates the size of the canonical correlation coefficient (Can.R = .668), having turned into a significant function amounts as  $p = .006$ . The percentage relation of two sets is smaller than in the former case and it is 44.6% which has been obtained on the basis of the coefficient of determination (Can.R2 = .446). The structure of the second canonical factor (Table 2) on the side of motoric abilities shows the strongest factor in drop jump (DROP -0.55), while dribble around a central circle of the basketball court (SVKR -0.84) is this time also the most affecting factor among specific motoric basketball skills tests.

In the case of connection of motoric abilities and specific motoric basketball skills with girls, it cannot be defined one general factor that significantly defines these areas, but it has been noted the existence of two significant factors with complementarity.

**Table 2.** Canonical factors

	<i>Boys</i>			<i>Girls</i>					
	<i>Root 1</i>		<i>Root 1</i>	<i>Root 1</i>	<i>Root 2</i>		<i>Root 1</i>	<i>Root 2</i>	
<i>SKVAT</i>	-0.29	<i>PER2</i>	0.60	<i>SKVAT</i>	0.36	0.39	<i>PER2</i>	0.07	0.37
<i>SKVATZ</i>	-0.28	<i>PHOR</i>	-0.27	<i>SKVATZ</i>	0.10	-0.21	<i>PHOR</i>	-0.08	-0.81
<i>DROP</i>	-0.18	<i>KRTE</i>	0.15	<i>DROP</i>	-0.05	-0.55	<i>KRTE</i>	0.01	0.03
<i>TR20N</i>	0.23	<i>KRNO</i>	-0.57	<i>TR20N</i>	-0.44	0.02	<i>KRNO</i>	0.03	-0.72
<i>KRUŽR</i>	-0.06	<i>SVKR</i>	0.83	<i>KRUŽR</i>	-0.04	-0.10	<i>SVKR</i>	-0.87	-0.84
<i>KRUŽN</i>	-0.03	<i>SVMO</i>	-0.17	<i>KRUŽN</i>	0.28	-0.17	<i>SVMO</i>	0.20	0.70
<i>PRHV</i>	-0.26			<i>PRHV</i>	0.18	0.47			
<i>KOVT</i>	0.23			<i>KOVT</i>	0.10	0.36			
<i>OSMSS</i>	-0.45			<i>OSMSS</i>	-0.54	-0.42			
<i>PIKAD</i>	-0.26			<i>PIKAD</i>	0.41	-0.31			
<i>GHLOP</i>	-0.19			<i>GHLOP</i>	-0.20	-0.27			
<i>STIL</i>	-0.07			<i>STIL</i>	-0.19	-0.25			

### 3.2. Regressional analysis

**Table 3.** Regressional analysis between motoric and specific motoric basketball skills with boys

Variables	PER2 (q)	PHOR (q)	KRTE (q)	KRNO (q)	SVKR (q)	SVMO (q)
SKVAT	.111	.533	.229	.325	.926	.462
SKVATZ	.153	.875	.741	.827	.221	.502
DROP	.772	.732	.785	.864	.020*	.522
TR20N	.202	.490	.874	.727	.007**	.027*
KRUŽR	.206	.921	.147	.273	.240	.256
KRUŽN	.248	.995	.165	.028*	.831	.891
PRHV	.561	.177	.030*	.027*	.237	.021*
KOVT	.045*	.314	.038*	.671	.332	.233
OSMSS	.046*	.986	.251	.040*	.538	.853
PIKAD	.430	.582	.009**	.356	.017*	.045*
GHLOP	.275	.288	.207	.189	.629	.861
STIL	.002**	.398	.340	.004	.310	.498
Q	.011*	.748	.005**	.001**	.000**	.002**

Results of regressional analysis with boys indicates a statistically significant influence of motoric abilities as a multivariate area on most specific motoric basketball skills tests (PER2.011; KRTE.005; KRNO.001; SVKR.000; SVMO.002).

At the individual level, a statistically significant relation can be seen from the following tests:

- drop jump (DROP) has a significant relation with dribble around a central circle of the basketball court (SVKR.020);

- 20m running from a low start (TR20N) with two dribble tests (SVKR.007; SVMO.027);

- orbiting leg (KRUŽN) with orbiting ball through the legs (KRNO.028);

- jumping over the horizontal rope (PRHV) with tests of ball manipulation

(KRTE.030; KRNO.027) and with dribble two „small eights” around two adjacent circles of basketball court (SVMO.021);

- envelope test (KOVT) with elevational precision of ball passing with two hands (PER2.045) and orbiting ball around the body (KRTE.038);

- figure „8“ with bending (OSMSS) with elevational precision of ball passing with two hands (PER2.046) and orbiting ball through the legs (KRNO.040);

- darts (PIKAD) with orbiting ball around the body (KRTE.009) and two dribble tests (SVKR.017; SVMO.045);

- stiletto (STIL) with elevational precision of ball passing with two hands (PER2.002) and orbiting ball through the legs (KRNO.004).

Results of regressional analysis with

**Table 4.** Regressional analysis between motoric and specific motoric basketball skills with girls

Variables	PER2 (q)	PHOR (q)	KRTE (q)	KRNO (q)	SVKR (q)	SVMO (q)
SKVAT	.283	.254	.016*	.277	.031*	.025*
SKVATZ	.203	.047*	.235	.375	.485	.618
DROP	.370	.568	.021*	.048*	.349	.326
TR20N	.234	.528	.226	.421	.010*	.008**
KRUŽR	.295	.529	.449	.345	.361	.244
KRUŽN	.265	.334	.047*	.261	.031*	.163
PRHV	.027*	.542	.734	.025*	.287	.604
KOVT	.400	.010*	.024*	.465	.206	.327
OSMSS	.039*	.210	.643	.261	.027*	.029*
PIKAD	.306	.421	.325	.016*	.030*	.048*
GHLOP	.717	.333	.204	.306	.417	.265
STIL	.279	.006**	.396	.320	.260	.038*
Q	.041*	.006**	.012*	.008**	.000**	.002**

girls indicate a statistically significant influence of motoric abilities as a multivariate area on all the specific motoric basketball skills tests (PER2.041; PHOR.006; KRTE.012; KRNO.008; SVKR.000; SVMO.002).

At the individual level, a statistically significant relationship can be seen from the following tests:

- squat jump (SKVAT) has a significant relation with orbiting ball around the body (KRTE.016) and two dribble tests (SVKR.031; SVMO.025);

- squat jump arms swing (SKVATZ) with horizontal precision of ball passing with two hands (PHOR.047);

- drop jump (DROP) with tests of ball manipulation (KRTE.021; KRNO.048);

- 20m running from a low start (TR20N) with two dribble tests (SVKR.010; SVMO.008);

- orbiting leg (KRUŽN) with orbiting ball around the body (KRTE.047) and dribble around a central circle of the basketball court (SVKR.031);

- jumping over the horizontal rope (PRHV) with elevational precision of ball passing with two hands (PER2.027) and orbiting ball through the legs (KRNO.025);

- envelope test (KOVТ) with horizontal precision of ball passing with two hands (PHOR.010) and orbiting ball around the body (KRTE.024);

- figure „8“ with bending (OSMSS) with elevational precision of ball passing with two hands (PER2.039) and two dribble tests (SVKR.027; SVMO.029);

- darts (PIKAD) with orbiting ball through the legs (figure „8“) (KRNO.016) and two dribble tests (SVKR.030; SVMO.048);

- stiletto (STIL) with horizontal precision of ball passing with two hands (PHOR.006) and dribble two „small eights“ around two adjacent circles of basketball court (SVMO.038).

#### 4. DISCUSSION AND CONCLUSION

In specific motoric abilities associated with any sport, motoric abilities are imposed as the basis in building up the results. With a little help of other components of anthropological space, the final formula for success is obtained.

Motoric abilities are probably the most researched part of anthropological space, whether considered independently (Kocić,

2005; Džajić, 2008; Saygin and Dükanci 2009; Milenković and al., 2011), or compared with other dimensions (Milenković and al., 2008, Šekeljić and Stamatović 2008; Milenković, 2009; Popovski, 2011). In organizing physical education classes, development of motoric abilities has a very important place. They represent the existential qualities of man as a person, because of their manifestation in work, training, competition and in other human activities.

In physical education teaching process it is necessary in order to plan the harmonious development of motoric abilities. Due to their complexity and number, it is not possible to isolate the developing of each ability, because the impact overflow of a given exercise is being occurred on other abilities. As much as the practitioner is at a lower level of physical fitness, the impact overflow will be higher. A versatile approach to development of motoric abilities will ensure the prevention of postural disorders and provide good health of students. The main task is to improve, enhance and sustain the level of physical abilities. The success of the aforementioned task seems the only measure of teaching physical education valuation (Višnjić, Jovanović and Miletić, 2004). The effort needed to be done to successful development of motoric abilities is very small, taking it as a fact that number of classes per week is insufficient and that there are many obstacles in the field of conditions, primarily infrastructure (lack of gyms and teaching means). However, even with these difficulties, lecturer should not be wrapped up with resignation and disinterest, because his role as an educator would be defeated. In this regard, each class must represent the time for developing motoric abilities, and therefore the impact on other parts of anthropological space of each student organism.

Good organization of physical education class provides good results in development of motoric abilities of students as evidenced by many studies (Jovanović, 1999; Bigović 2004; Džajić, 2008; Džibrić, Pojskić and Huremović 2009; Klinčarov, Nikovski and Aceski 2010; Milenković, 2013). By good organization of the class, all aspects presented within the objective of physical education teaching can be fulfilled: settling the need for physical activity, the formation of proper understanding and attitude towards physical activity and encouraging the incorporation of physical activity into everyday life and culture of living.

This research was carried out in physical education classes with male and female

students in fourth grade of elementary school. After testing, the two parts of anthropological space in the form of motoric and specific motoric basketball skills were compared. The aim was to determine the impact level of motoric abilities on success in results of some specific motoric basketball skills. As in many other studies, success of specific motoric basketball skills is highly dependent on the level of motoric abilities. Therefore, even this time it could be determined how significant human motorics could be on other dimensions of anthropological space.

### Conflict of interests

Authors declare no conflict of interest.

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