GLOBAL QUANTITY DIFFERENCES IN MOTOR ABILITIES OF PRE-SCHOOL BOYS

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Abstract
Based on the sample of 58 male respondents (30 respondents were a part of experimental group and 28 of control group) age from five to five and a half years old, initial and final measuring was conducted with the aim to determine global quantitative changes in motor abilities between these two groups. Experimental group carried out specially designed physical education program suitable for pre-school children that lasted for three days, weekly totally 60 minutes in the Gym managed by physical education professor, while control group followed current program for pre-school education in the classroom (playground) managed by kindergarten teacher. Possible differences were determined between experimental and control group in initial and final measuring in a period of three months participation in physical education program To test motor abilities we applied 6 tests. We applied canonic discriminative analysis to determine global quantitative differences between these two groups in the area of motor abilities. Obtained results indicate there are no differences between groups in initial measuring, but in final measuring we noticed statistically significant differences regarding experimental group which means there has been some positive transformations in motor abilities of this group. Possible reason lies in program organized for experimental group as well as different approach to realization of treatment and material working conditions where the classes were carried out.

Key words: *motor abilities, boys, canonic discriminative analysis*

INTRODUCTION

A child of a pre-school age, for healthy psycho-physical development requires satisfaction of basic human needs and the movement is one of the most important needs. During pre-school age the basic of healthy body constitution and positive attitude toward sports is being formed, because abilities and knowledge that are not accepted on time are much more difficult to accept later. (Videmšek, 2002).

For child's optimum development, especially during pre-school age, professional and systematic sports education is necessary that has to be based on scientific and professional discoveries since that is the only way we can develop a child's motor abilities.
Most of motor abilities and habits is being developed and accepted only during childhood and they can be developed or positively influenced in a pre-school age, i.e. from four to seven years of a child's life. During this period, a structure of a motor space according to genetic and environmental factors that influence overall growth and development of children is being formed. (Bala, Kiš, Popović, 1996).

If we want to study motor development of pre-school children scientifically it is necessary to have reliable and valid measuring procedures specialized for children of that age. (Trajkovski Višić, 2004). Motor behavior of pre-school children, as well as their motor abilities has general character but still for manifesting ability of performing motor activities we used terms that are justified for motor abilities of older children and adults. For that reason the sample of motor tests in this research was derived according to the model of motor abilities of older children and teenagers (Kurelić, Momirović,

Stojanović, Šturm, Radojević i Viskić-Štalec, 1975; Gredelj, Metikoš, Hošek i Momirović, 1975). Description of motor tests is presented in Sport schol – development of children's motor behavior handbook. (Bala, 1996), and smaller modifications specialized for mentioned age as well as reliability of presented motor tests can be found at the same author's works (1999). The main goal of this research is to determine global quantity differences in motor abilities of these two groups of respondent's pre-school boys.

METHODS

Participants

The sample of examinees was 58 boys from pre-school centers in Lukavac and Tuzla, age from five to five and a half. They were separated into two groups. Experimental group consist of 30 boys from kindergarten „Lukavac"in Lukavac. Control group consisted of 28 respondents from Kindergarten "Naše dijete" in Tuzla. Program lasted for 3 months, three times a week 60 minutes each time. Initial and final measuring for both groups was conducted.

Instruments

Measuring instruments used for this research were: hand tapping (MBFTAP), forward bow with legs stretched in a sitting position (MFLPRE), long jump from a position (MFESDM), held part in the hang (MSAVIS), sit-ups (MRCLES) and polygon backwards (MREPOL).

Table 1

	Teaching scope	Teaching Unit	Number of frequencies
1 i 2 week	Walking and running	Walking and running alternate, fast, and slow with proper posture. Walking in front of the foot, on the outside of the foot.	3
		Running with high knees in the starting side, with the disavowal legs back. Walking with crossing legs. Running and walking backwards. Fast free 20 m run.	3
3 i 4 week	Jumping and skipping	Skipping bars lined on the floor; Skipping rope with two foot bounce; Two foot bounce over long rope turned by boys; Approach and one bounce on the low bench then landing.	3
		Running long jump with one foot bounce on the mat. Long jump over the "channel" (two lines); High jump, running, one foot bounces, legs clenched and soft landing feet together on the mat.	3
5 i 6 week	Throwing and catching	Throwing the ball far (with stronger and weaker arm); Throwing ball into the basket; Throwing ball using both hands into the air and catching with clapping.	3
		Dribbling standing and moving. Passing the ball with one and two hands in pair (in the level of the chest and over the head; Throwing the hoop up and catching.	3
7 i 8 week	Pulling and pushing	In pairs: pulling and pushing over the line, pushing with hands to move off the position; With bats; pulling and pushing over the line.	3
		Stick: pulling and pushing over the line more pupils at the same time; Rope: pulling in two sides or in the circle.	3
9 i 10 week	Crawling. Squeezing through and climbing	Crawling on the stomach, side and back; Squeezing through ladder frame straight and wriggling. Squeezing through the hoop from above down and the other way around.	3
		Squeezing through the hoop vertically set; Climbing poles, up ladder bars.	3
11 i 12 week	Lifting, carrying and hanging	Carrying ball in many ways. Carrying balls and hoops in many ways. Carrying objects in pair and in group.	3
		Hanging on the high bar and moving left and right with assistance. Hanging on the high bar with legs clenched.	3

Experimental program

Program lasted for 3 months (3 times a week, 60 minutes). Control group managed by kindergarten teacher their current physical education program carried out in the classroom-playground. Experimental group managed by physical education professor carried out specially constructed program of physical education in the Gym. Observing training constructed by physical education professor we could conclude following: suggested experimental program with accent on offered content, better working organization in the beginning, preparing and finish part of a class, as well as applying complex methodic-organization types of work during additional exercise increased class quality. This resulted with more engagement and participant independent work, usage of space, apparatus in the gym, equipment etc. Also, we specially focused on satisfying and development of general and basic motor manipulation) and acceptance of specific motor skills from certain kinesiology activities.

Table 2

Eigenvalues

Function	Eigenvalue	Can.Correl.
Initial	**.047[a]**	**.211**
Final	**.326[a]**	**.496**

Table 3

Wilks' Lambda

Measur.	Wilks' L	Chi-sq	df	Sig.
Initial	**.955**	**2.422**	**6**	**.877**
Final	**.754**	**14.936**	**6**	**.021**

skills (space mastering, overcoming obstacles, overcoming resistance and object

RESULTS

For determination of global quantity variations between these two groups of respondents in the field of motor abilities canonic discriminative analysis in manifest area was applied. The results of discriminative canonic analysis in Table 2 and 3 indicate that in initial measuring there is no statistically significant difference between groups (.877), but in final

measuring there is statistic moment (.021). The results of Bartlett's $\chi 2$ test indicate that statistically significant (.021), obtained discriminative function of final measuring considerably, differs these two researched groups according to selected tests where the value of canonic correlation coefficient is (.496), which explains 24,60% of total variance (0,496 x 0,496 x 100).

Table 4

Functions at Group Centroids	
	Function
Group	1
Experimental	**.542**
Control	**-.580**

The results in Table 4 indicate position of centroid groups in discriminative function. On the negative half of discriminative function there are results of control group and on the positive the results of experimental group.

According to the results in Table 5 the variables that influence the differences between the gorups are following: sit-ups (MRCLES), hand tapping (MBFTAP), held part in the hang (MSAVIS), It is also obvious that negative half is defined with one variable, polygon backwards (MREPOL), that represents control group. However, better results in this variable achieved experimental group since that is the time test where the time signifies better result.

Table 5

Structure Matrix (The final assessment)		
Group	**Variables**	**Function 1**
Experimental	**MRCLES-f**	**.716**
	MBFTAP-f	**.404**
	MSAVIS-f	**.358**
	MFLPRE-f	**.157**
	MFESDM-f	**.004**
Control	**MREPOL-f**	**-.194**

DISCUSSION

Obtained results confirm hypothesis that three month program managed by physical education professor will cause differences between researched groups, in other words better improvement in motor abilities will result in experimental group regarding control group. Obtained differences can be attributed to applied physical education experimental program constructed and realized by physical education professor. Considering earlier surveys we determined both groups had approximately same living conditions and same habits.

According to obtained results it is obvious that experimental group displayed better values in all tested variables. The biggest differences appeared in variables sit-ups (MRCLES), hand tapping (MBFTAP) and held part in the hang (MSAVIS). The reason for so obtained variables is in the structure and presented content of the suggested program. Besides, as additional exercise of the main part of the hour, we used stomach and back exercises; push-ups and dribbling the ball standing. That is one of the reasons the first three variables did not result with statistical significance. In the rest of variables differences were noticed but not statistically significant.

This research only reaffirms previous researches (Živčić, Trajkovski Višić, & Senterdi, 2008), where differences were attained in all motor ability assessment variables in the area of repetitive static strength (MRCLES, MSAVIS).

CONCLUSION

Result analysis in initial and final measuring points out that experimental group regarding control group displayed significant differences in all applied motor ability assessment tests.

According to the obtained results we can conclude that positive influence on motor abilities of pre-school children can be achieved only with well thought, organized and managed programs of physical exercise constructed by educated specialist – physical education professors. Professionally planned and maintained physical education in pre-school institution is extremely significant element in process of child's integral development with variety of impacts on a child's development in their early age (Schmidt & Lee, 1999). Therefore, we should be aware of the fact; if we fail to use the advantage of some psychomatic dimension developments in child's early age it is hard to compensate it later.

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GLOBALNE KVANTITATIVNE RAZLIKE U MOTORIČKIM SPOSOBNOSTIMA DJEČAKA PREDŠKOLSKOG UZRASTA

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Sažetak

Na uzorku od 58 ispitanika muškog pola (30 ispitanika sačinjavalo je eksperimentalnu grupu i 28 ispitanika kontrolnu grupu) starosne dobi 5 – 5,5 godina sprovedeno je inicijalno i finalno merenje s ciljem utvrđivanja globalnih kvantitativnih razlika u motoričkim sposobnostima između ove dvije grupe ispitanika. Eksperimentalna grupa je sprovodila posebno konstruisan program tjelesnog odgoja primjeren djeci predškolskog uzrasta, u trajanju od tri dana, sedmično po 60 minuta, u sportskoj dvorani i pod rukovodstvom profesora tjelesnog odgoja, dok je kontrolna grupa radila po aktuelnom programu za predškolski odgoj u učionici (igraonici) pod rukovodstvom odgajateljice. Utvrđivane su moguće razlike u motoričkim sposobnostima između eksperimentalne i kontrolne grupe na inicijalnom i finalnom merenju u periodu tromjesečnog učestvovanja u programu nastave tjelesnog odgoja. Za provjeru motoričkih sposobnosti primijenjeno je 6 testova. Za utvrđivanje globalnih kvantitativnih razlika između ove dvije grupe ispitanika u prostoru motoričkih sposobnosti primijenjena je kanonička diskriminativna analiza. Dobijeni rezultati ukazuju da nema razlika između grupa na inicijalnom mjerenju dok je na finalnom mjerenju došlo do statistički značajne razlike u korist eksperimentalne grupe, što znači da je došlo do pozitivnih transformascija motoričkih sposobnosti u ovoj grupi. Vjerovatni razlog tome jeste u programu koji je napravljen za eksperimentalnu grupu, kao i različit pristup realizaciji tretmana i materijalnih uslova rada gdje se nastava realizovala.

Ključne riječi: *motoričke sposobnosti, dječaci, kanonička diskriminativna analiza*

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