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COMPARATIVE ANALYSIS OF MOTOR SKILLS OF SECONDARY SCHOOL FIRST GRADE PUPILS BY APPLICATION OF EUROFIT BATTERY TESTS

Summary

Seven tests from Eurofit battery were applied on the sample of 30 boys of the first grade of the Banja Luka High School, age 15 years +/- 6 months, and 28 students of the first grade of the Secondary Technical School in Gradiška. The aim of this research is to use Eurofit to determine the differences in the motor skills of first-grade pupils between two secondary schools for the purpose of assessing their current motor status and further programming of work based on the results obtained. The results showed that long-range jumping tests and abs exercises in 30 seconds gave the most discriminating results between two schools. It can also be argued that High School pupils had better results in most tests.

Key words: pupils, motor skills, Eurofit battery tests.

1.INTRODUCTION

The problem of choosing the method, content and organization of training work is a continuing interest in research, and in recent years extensive research at home and abroad have been conducted in order to make organized physical activity contribute to the optimal development of anthropological characteristics of both sexes at all ages, regardless of their abilities and qualities . Human abilities and qualities can be developed most successfully in the so-called "sensitive stages". Most of authors agrees with this (Stojanović 1987; Matvejev 2000; Spame and Caetzee (2002); Višnjić, Jovanović and Miletić, (2004), indicating that these are the periods of ontogenesis when most significant rate of development of certain skills and characteristics of individuals is achieved based on the natural laws, including also increase of adaptive capabilities and creation of especially favorable conditions for the formation of certain motor skills. That is why in recent years there has been increased interest to involve children and adolescents in sports activity because the process of growing up, according to some researchers (Aoron et al. 1995; Drabik 1996; Markus et al. 2000; Malacko 2002; Stewart et al., 2004; cited in Batrićević, 2008) is particularly sensitive to the possibility of expressing negative impact. Up to the eighties different battery tests were used in Europe when testing motor skills of children and young people. One of them, which may have been most systematically developed and used in the study „Leuven Longitudinal Study of Belgian boys" in Belgium, served as the basis for the creation of EUROFIT battery tests (Malina & Katzmarzyk, 2006, according to the Council of Europe, Committee for the Development of Sport: European Test of Physical Fitness, 1988). In cooperation with several European countries, "The Eurofit Physical Fitness Test Battery" was created as a standardized test battery recommended by the Council of Europe (Council of Europe, Committee for the

Development of Sport: European test of physical fitness) for the evaluation of physical development and motoring ability of children of school age. The idea for this battery originated in 1987, with the desire to create a battery of tests that would be easy to use, economical and applicable in different school settings, and that it contains the tests which are standardized, so that the results can be compared across Europe.

2. RESEARCH METHODOLOGY

The sample consists of 30 first-grade boys from Banja Luka High School, ages 15 years + / _ 6 months, and 28 first-grade pupils from the secondary technical school in Gradiška. Methods used in this paper have a quality and quantitative approach. Namely, quality approach implies description and observation, and quantitative implies measurement and testing. The sample of variables in this paper represents the motor skills to assess speed, agility, explosive strength, repetitive strength, flexibility and muscle endurance. Assessment of motor abilities of pupils included application of EUROFIT battery of tests i.e. a group of motor tasks that are considered to bear the relevant information on motor skills of respondents. The EUROFIT tests battery (Eurofit, 1993), prescribed by the Committee for the Development of Sport of the Council of Europe, is a set of nine simple tests that relate to flexibility, strength, endurance and power. The standardized test battery was proposed by the Council of Europe as an effective tool for monitoring the condition of school children and has been used in many schools around the world since 1988.

The following tests were used:
1. Flamingo test
2. Plate tapping
3. Sit and reach
4. Standing broad jump
5. Handgrip test – dynamometry
6. Sit-ups in 30 seconds (abdominal)
7. Bent arm hang
8. 20 m endurance shuttle-run
9. 10x5 meter shuttle run

3. RESEARCH RESULTS

Table 1. Results of descriptive statistics between the first grade of two secondary schools

		N	Mean	Std. Dev	Std.Er	95% Confidence Interval for Mean		Min	Max
						Lower	Upper		
FLB	Technical school	28	19.263	2.892	.546	18.141	20.385	15.04	25.00
	BL High School	30	19.401	2.988	.545	18.285	20.517	15.25	25.22
	Total	58	19.334	2.917	.383	18.567	20.102	15.04	25.22
PLT	Technical school	28	11.867	1.372	.259	11.335	12.399	9.52	15.80
	BL High School	30	11.174	1.442	.263	10.636	11.713	8.35	16.29
	Total	58	11.509	1.439	.189	11.130	11.887	8.35	16.29

SAR	Technical school	28	5.821	3.732	.705	4.374	7.268	.00	11.70
	BL High School	30	6.933	6.236	1.138	4.604	9.262	.00	23.00
	Total	58	6.396	5.167	.678	5.037	7.755	.00	23.00
SBJ	Technical school	28	1.825	.218	.041	1.740	1.910	1.30	2.23
	BL High School	30	2.031	.293	.053	1.921	2.140	1.52	2.80
	Total	58	1.931	.277	.036	1.858	2.004	1.30	2.80
SUP	Technical school	28	19.54	3.249	.614	18.28	20.80	15	27
	BL High School	30	22.33	2.893	.528	21.25	23.41	18	30
	Total	58	20.98	3.353	.440	20.10	21.86	15	30
BAH	Technical school	28	39.635	11.913	2.2514	35.0162	44.2552	8.00	57.00
	BL High School	30	40.052	8.587	1.5677	36.8456	43.2584	13.10	54.44
	Total	58	39.851	10.236	1.3441	37.1595	42.5426	8.00	57.00
SHR 10x5	Technical school	28	21.252	1.707	.322	20.590	21.914	18.52	25.14
	BL High School	30	21.284	1.768	.322	20.624	21.945	18.34	25.32
	Total	58	21.269	1.724	.226	20.815	21.722	18.34	25.32

Table 2. *Analysis of the variance between the two groups of a first-grade of secondary schools*

		Sum of Squar	Df	MeanSquare	F	Sig.
FLB	BetweenGroups	.275	1	.275	.032	**.859**
	WithinGroups	484.965	56	8.660		
	Total	485.240	57			
PLT	BetweenGroups	6.952	1	6.952	3.500	**.067**
	WithinGroups	111.219	56	1.986		
	Total	118.171	57			
SAR	BetweenGroups	17.906	1	17.906	.667	**.418**
	WithinGroups	1503.974	56	26.857		
	Total	1521.879	57			
SBJ	BetweenGroups	.614	1	.614	9.106	**.004**
	WithinGroups	3.779	56	.067		
	Total	4.393	57			
SUP	BetweenGroups	113.352	1	113.352	12.031	**.001**
	WithinGroups	527.631	56	9.422		
	Total	640.983	57			
BAH	BetweenGroups	2.510	1	2.510	.024	**.879**

	WithinGroups	5970.393	56	106.614		
	Total	5972.902	57			
SHR	BetweenGroups	.015	1	.015	.005	**.944**
	WithinGroups	169.437	56	3.026		
	Total	169.452	57			

Table 2 shows the results of the one-factor analysis of variances with the first-grade pupils fromthe High School in Banjaluka and first-grade pupils from the secondary Technical School in Gradiška. Based on the results, it is evident that the statistically significant difference between the two schools has appeared in variables of standing broad jump and sit-ups for 30 seconds, while in other variables the difference is not statistically significant. There is a significant difference in athletic disciplines given that a large number of students from High School go in for athletics.

Table 3. *Factor structure of discriminant functions matrix*

	Function
	1
Sit-ups in 30 seconds	.692
Standing broad jump	.602
Plate tapping	-.373
Sit and reach	.163
Flamingo test	.036
Bent arm hang	.031
10x5 meter shuttle run	.014

Table 3 shows that in terms of discriminatory function the difference in motor abilities is mostly affeceted by tests of repetitive strength and explosive power. It can also be seen that other tests have less influence on the discriminant function. The intensity of differences between these groups is examined by the canonical correlation value. The closer this value is to zero the closer the group centroids are to each other (less difference between groups) and vice cersa.

Chart 1 *Result allocation for Secondary Technical School in Gradiška*
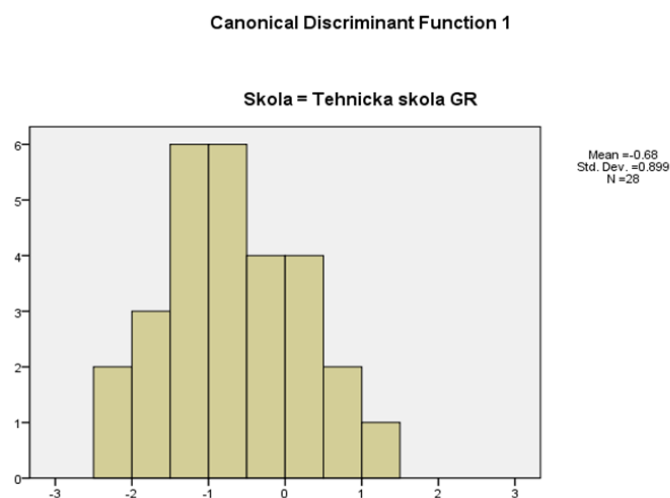
Chart 2 *Result allocation for the High School in Banja Luka*
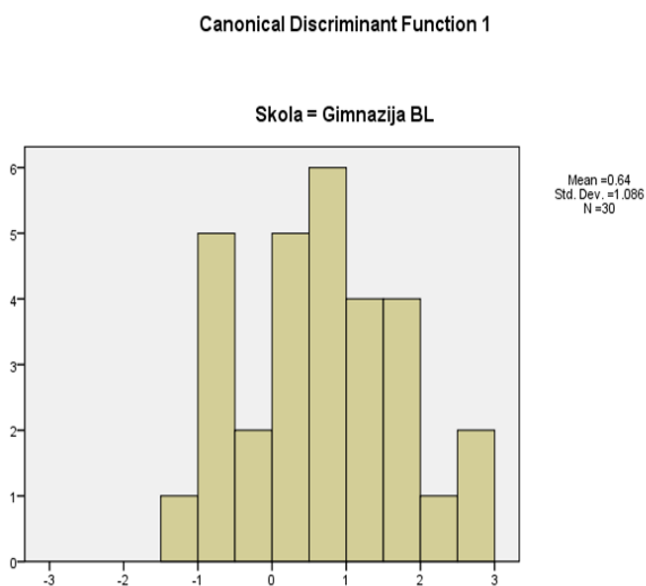
4. DISCUSSION

Looking at the descriptive parameters /Table 1/, it is noticeable that in the majority of variables, high school pupils from the High School in Banja Luka achieved better results. It can be assumed that such a relationship arose due to the fact that in this class a greater number of pupils had a higher quality selection in terms of motor skills. Also, pupils in Banja Luka have more accessible sports facilities that can influence the manifestation of motor skills. It can be assumed that the morphological characteristics are one of the factors that could affect the results, because this is a puberty period where morphologically dominant children have an advantage in the manifestation of motor abilities, i.e. the maturity biological factor can be crucial. Biological growth and development of children takes place according to certain laws. Secondary school age is the period of intensive growth and development of children of both

sexes. Since the children are in the stage of accelerated development, the influence of the outer environment is increased. Physical education is a basic organizational exogenous factor affecting the children development changes (Gojković, 2010). It is therefore necessary to measure, monitor and correct the anthropometric characteristics during the teaching process. The beginnings of research of anthropometric characteristics, particularly by foreign authors, mostly relate to the factor structure (until later, except for the factor structure, here were studies of relations, differences and development of anthropometric characteristics (Momirović et al, 1969; N. Viskić - Štalec, 1974; and Kurelić et al, 1975; A. Hošek and B. Jeričević, 1982; Radovanović et al., 1998; Ivanović, 2002; T. Krsmanović and Radosav, 2008).

Radulović and Krivokapić (2013) state that morphological indicators of physical development, nutrition status and structure of the body composition of fourteen year old boys and girls in Montenegrohave satisfactory values in relation to the standards of growth and development and peers from some European countries. Above the average body height and body weight characterize both sexes, whereby the proportion of fat component is quite low, especially in boys, so that 3-6% of respondents with overweight are registered, while about 1% of respondents are classified as obese. In relation to the criteria and orientational values of motor skills for the given age followed by the eurofit battery tests, and by comparing these values with peers from other countries, boys have achieved average, and girls below average results. An exception is the motor skills that are largely genetically determined (the speed of alternative movements and explosive force) that had above average values with te boys, and generally average values with the girls. Montenegro, Serbia, Belgium, Spain, Slovakia, Lithuania, Estonia, Albania (Radulović and Krivokapić, 2013). Compared to the mentioned countries, the results of this study are somewhat weaker, although this is a small sample compared to research carried out in these countries.

By analyzing the obtained results, it is necessary to analyze the school curriculum and the way teachers conduct it, as this could certainly be a discriminant factor in the achieved results of children in both schools. It is always assumed that children are trained for this kind of testing, their motivation, or exogenous and endogenous factors that can influence the testing. A higher level of motor and functional abilities of athletes compared to non-sportsmen can be attributed to endogenous factors, and predominantly exogenous, i.e. transformational processes in sports clubs and the physical education in relation to non-sportsmen, which were covered only by physical education (Batričević, 2008).

By analysis of the variance it was determined that statistically significant differences occurred between tests of standing board jump and sit-ups in 30 seconds, and as we have stated in favor of the High School in Banja Luka. On the basis of age and tests in which there is a significant difference between schools, it can be assumed that students from the High School are biologically more mature and more involved in sports, which has resulted in significantly better results in tests of explosive strength and muscular endurance, or repetitive force. Branković et al. (2012) found a significant influence of morphological characteristics on the performance of repetitive force. It is obvious that the pupils of the Banja Luka High Schoo, or the tested class, were physically more dominant in relation to their peers from Gradiška, and thus we can conclude that these children had previously entered puberty, where the boy started to have secretion of testosterone and the development of musculature, which certainly has a large impact on the manifestation of motor abilities tested with these two tests. Athletes involved in the training cycle are better able to achieve better results in motor skills tests, and better or worse results can be attributed to this effect. The results showed that athletes statistically significantly differ in their level of motor and functional abilities from non-sportsmen (Kostić, 2008). The higher level of motor and functional abilities of athletes respondents in comparison to non-sportsmen can be attributed to endogenous factors, and

predominantly exogenous, i.e. ransformational processes in sports clubs and physical education in relation to non-sportsmen who were covered only by physical education classes. It is well known that in training with athletes, the gradual increase in load to the upper limit of motor-functional capabilities is characteristic, which enabled supercompensation processes for every athlete (Batričević, 2008). The results showed that athletes statistically significantly differ in their higher levels of motor and functional abilities than non-sportsmen.

As indicated, the impact of the environment in which children live and go to school can influence their development of motor skills and in relation to that Tadić (2013) in his master's thesis found that some motor skills have a significant difference when it comes to children living in urban and rural areas. Previous research in our region conducted by Mitić (1980), Bala and Krsmanović (1982, according to Marić, 2010), Sredić (2003, Šegrugur et al (2010), Gačić (2011) indicate that the expected conclusion is that students fromurban areas show better results, whereas research carried out by Krsmanović et al (2000, according to Marić, 2010), Badrić and Petračić (2007), Petrić and Blažević (2008), Herasina et al (2011) showed the opposite. "Based on the results we can see that the results are most discriminate with the muscular endurance and explosive strength tests. Betričević (2008) came to similar results in his research. When it comes to the results of repetitive strength, we can conclude that there is a great influence of anthropometric measures on the outcome result in tests that test the abilities mentioned. Branković et al., conducted research in 2012 that confirm this statement and point out that the results of morphological dimensions and repetitive strength will contribute to the individualisation of teaching work by making planning, programming, implementing and controlling teaching work appropriate to individual abilities and characteristics of students. "Bajrić et al found in their research that children who have the advantage in morphological characteristics also achieve better results in motor skills. They also found that children who have a high percentage of fat perform poorer tests in speed and and explosive strength. Mofological dimensions as an integral part of the motor chain function may be a limiting or mitigating factor in the exercise of motor abilities. There were few such studies on the population of high school students, aged 15, covered only by regular teaching in physical education. "In this regard, it is well known that while in some motor activity one type of bodybuilding directly interferes with the realization of the kinetic program, that same physical body in another shows up (Branković, 2012). Research has shown that there is statistically significant association of morphological characteristics with the results of the motor abilities of secondary school students covered by regular teaching of physical education (Stojanović et al., 1980 Stojiljković, 2005; Višnjić, 2006, Janković, 2009 Projević, 2009). "Milanović (2011) Based on the empirical check of reliability and sensitivity of the most frequently used tests in different models of monitoring the motor skills of children and young in the world, it can be concluded that they have satisfactory reliability and sensitivity for all ages, both sexes from the III to the VIII grade of the primary school. On the basis of the results of the research it can be concluded that the monitoring of physical development and the development of motor skills of students in the course of physical education will basically follow the concept of the so-called "health related physical fitness" model, and the actual application of the battery tests for monitoring physical development and the development of motor skills of students from the 3rd to the 8th grade of elementary school in the conditions of our school system should be performed based on data on physical growth and composition of the body, general endurance, strength, flexibility and agility.

5. INSTEAD OF CONCLUSION

The research of the anthropological characteristics of children and young people is increasingly present in teaching practice, in order to apply the methods and forms of work that most contribute to increasing the efficiency of regular and additional teaching of physical

education (Branković, 2012). Monitoring of the realization of regular physical education programs and assessment of the actual results are important for the improvement of educational practice of teaching physical education and encouraging teachers to be more responsible and creative in their work. This procedure provides reliable data for taking corrective interventions in the practical implementation of the curriculum (Zdanski and Galić, 2002; Višnjić, 2006; Bompa, 2006).

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