THE EFFECTS OF SPORTS ACTIVITIES CLASSES IN THE PHYSICAL EDUCATION CURRICULUM

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Original scientific paper

Abstract
The basic aim of physical education is to, by means of an organized process of education, carry out a positive influence on the psycho-somatic status of schoolchildren and to use the transformations in the somatic status to correct the influence of biological factors which have been determined to be insufficient during the period of intense growth and development. In this research we will try to study the effects of sports activities classes in the form of a third physical education class per week. The sample of participants consisted of sixth graders, all male, who chose basketball as part of their third class of sports activities per week. The sample of participants consisted of two sub-samples, a control and experimental group, which consisted of 50 participants each. The control group, which had two physical education classes per week, took part in the regular physical education classes, while the experimental group, which in addition to two classes of physical education, also took part in one class of sports activities. The obtained results indicate that the experimental group, at the final measuring, achieved better results than the control group, which leads us to the conclusion that the contents of sports activities class (basketball) during the experimental period which lasted during one school semester, contributed to the improvement in the motor skills of the sixth graders.

Key words: *physical education, sports activities, program effects*

Introduction

The basic aim of the physical education is to, by means of an organized curriculum, have a positive effect on the psycho-somatic status of schoolchildren and to use the transformations in the somatic status to have a corrective influence on the biological factors which have been determined to be insufficient during the period of intense growth and development (Berković, 1978). Physical education classes also play a significant role in the education of an individual, and have as their aim to, by using suitable physical activities, contribute to the development of the abilities of individuals, their growth and development, physical and psycho-social characteristics (Hardman, 2007). Physical education in schools, its practical and educational goals, and the results which are thus achieved represent a very complex phenomenon which requires the planned and systematic study of all of the relevant aspects and constituent parts in the function of the optimalization of the education process (Anastasovski et al., 2000). Numerous studies (Anastasovski, 1979, 1982; Klojčnik, 1979) have unequivocally proven that physical education is used to influence the group of relevant dimensions and it can justifiably be concluded that there is practically no other activity which could be used to perform a transformation of that many dimensions at the same time as physical exercise. Regular physical activity during childhood offers direct health benefits through the positive influence on body build and the development of the muscle and skeletal system (Malina & Bouchard, 1991). Nevertheless, physical education classes do not achieved the desired effects. On the basis of the data obtained from scientific research on the character and quality of physical education classes in schools (Todorovski, 1994; Sallis et al., 1997; Stojanović, 1998; Branković, 2001; Milenković, 2002; Dragić, 2003; Koutedakis & Bouziotas, 2003; Jurg et al., 2006; Stamatović & Šekeljić, 2006), we could conclude that they are not only insufficiently focused on systematic and ubiquitous physical exercise, but that they lack adequate intensity, which could cause stimuli which would be beneficial for the promotion of physical development and the physical abilities of the schoolchildren (Madić & Dragić, 1989; Pate et al., 2006). Some of the aforementioned components were the object of research of a certain number studies by our local researchers and researchers from abroad; nevertheless, the question of the modality and the extent of the load during the classes (Pate et al., 2006), the method used to determine it and the dosing of the load have not been studied to a satisfactory extent, since it represents a very complex process and becomes an inexhaustible source for further study and the design of more and more precise solutions. Current physical education curriculums for eight graders includes the realization of physical education classes with two classes a week which are used to realize the tasks and contents of a common curriculum, with one class of sports activities which are used to realize a special sports program. For these reasons it is necessary to use a pedagogical experiment to test in practice whether the specially programmed curriculum which takes place during the sports activities class (in this case basketball) has a more significant influence on the studied dimensions of the psycho-somatic status of the schoolchildren, when compared to the curriculum which is realized over two physical education classes per week.

On the basis of the attitudes which were previously stated, the goal of the research was defined. It should be used to determine whether the special program based on basketball as part of a third weekly class of sports activities, during one school semester, can significantly influence the increase in the motor skills of the school children.

Methods

The sample of participants
The sample for this study was extracted from the population of sixth-graders from the elementary schools in Niš. The sample included every child from the sixth grade who voluntarily agreed to participate in the study, which was based on a complete program of measuring and testing and physical exercise. An additional condition for their participation was that the sixth-graders had to take part in their physical education classes, and that they were healthy on the day of measuring. For the final processing of the data, we only included only the results of the participants who took part in both measurings (the initial and the final one) and who did not miss more than two classes per month. The sample of participants was divided into two groups: 1. experimental group (ES "Car Konstantin" N=50), and 2. control group (ES "Sveti Sava" N=50).

The tests for the evaluation of motor dimensions
1. Explosive leg strength: the standing depth jump (MSDM), the triple standing jump (MTRS) and the 20m run with a high start (M20V); *2. Repetitive strength of the torso*: hyperextensions on a vaulting box (MDTK) and straightening out the torso (MIST). *3. Arm and shoulder belt strength:* hanging pull-ups (MVIS) and push ups (MSKL); *4. Agility*: the 4x15 m run (M4x15); *5. Speed of alternative movements:* hand tapping (MTAP) and leg tapping (MTAN); *6. Flexibility* : the splits (MSPA) and hyperextensions (MDPK). All of the tests for the evaluation of motor dimensions were realized in accordance with the directions given by Kurelić et al. (1975). The numeric values in the tests were expressed in the number of corrected repetitions, in centimeters and tenths of a second.

Statistical methods
Due to the nature of the experiment, it was necessary for the data to be collected for the experimental and control group at the initial and final measuring. For the analysis of the changes in the results of the dependent variables between the initial and final measuring of both groups at the multivariate level, a multivariate analysis of variance was used for the repeat measures (MANOVA – repeated measures), and the significance of the conclusions was determined at the $p<0.05$ level. To determine the differences between the groups at the final measuring with a partialization of any possible differences between the groups at the initial measuring and the determination of the effects of the experimental program on the development of motor skills of the participants, a multifunctional analysis of covariance was used (MANCOVA).

The data was processed used the statistical package STATISTICA 8.0 for Windows.

The procedure
The research program was conceived of on the basis of the elementary school physical education curriculum, during the winter semester, which was prescribed by the Ministry of Education of the Republic of Serbia. The program lasted for a period of 19 weeks. The control group within its program had two physical education classes, which adhered to the physical education curriculum designed for sixth graders. The experimental group, in addition to the two physical education classes, also had a sports activity class involving basketball (Stojanović, 1998). The control and experimental group were measured at the beginning of the school year (the initial measuring) and at the end of the semester (the final measuring).

Results and the discussion

In order to analyze the changes in the results of the dependent variables between the initial and final measuring of both groups at the multivariate level, a multivariate analysis of variance was used for both repeat measures (MANOVA – repeated measures). Table 1. shows the results for the multivariate analysis of variance for the repeat measures of the experimental group, which was used to test the differences between their results from the initial and final status. By testing the values of Wilk's Lambda coefficient (.262) with the help of the F test (8.91), with degrees of freedom of Effect df=12 and Error df=38, we can conclude that there was a statistically significant difference in the results from the initial and final status. On the basis of the obtained results we can conclude that, after the application of a nineteen-week experimental program, which consisted of two classes of physical education per week and one class of sports activities based on basketball, statistically significant changes in the space of the studied motor skills in experimental group were determined at the p=.000 level.

Table 1. Multivariate differences between the initial and final measuring of the experimental group

Wilks' Lambda	F	Effect df	Error df	P
0.262	8.91	12	38	0.000*

Wilks' Lambda – the values of the coefficient of Wilks's test of the equality of group centroids; F – the values of the F-test coefficient for the significance of Wilks' Lambda; Effect df; Error df – degrees of freedom; p – the coefficient for the significance of the centroid difference

Table 2. shows the results of the univariate analysis of variance for repeat measures of the experimental group, used to test the differences between the results for the initial and final status of each individual variable. By testing the values of the variability within the groups (MS effect) and between them (MS error) means using the F test, we determined a significant difference in nine of the tests, while in three of the tests no significant difference was determined between the results of the initial and final measuring.

We could conclude that the greatest differences were determined for the triple standing jump (MTRS), for which the value of the F test was 53.41 and the standing depth jump (MSDM), for which the value of the F test was 49.86. A somewhat smaller statistically significant difference was determined for the torso lift on a vaulting box test (MDTK), for which the value of the F test was 30.03. A significantly lower statistically significant difference was determined in the hyperextension test (MDPK), for which the value of the F test was 18.42, the 20 m run (M20V), for which the value of the F test was 16.01 and hand tapping (MTAP), for which the value of the F test was 15.41. For all of the aforementioned tests, differences were noted between the initial and final status of the children at the p=.000 level. The smallest, but statistically significant difference can be determined for the torso straightening out test (MIST), for which the value of the F test was 12.14, which gives a statistically significant difference at the p=.001 level, the 4x15 m run (M4x15), for which the value of the F test was 11.05, which creates a statistically significant difference at the p=.002 level and leg tapping (MTAN), for which the value of the F test was 6.70, which creates a statistically significant difference at the p=.013 level.

Table 2. The univariate differences between the results of the initial and final measuring of the participants of the experimental group

Variable	Mean Initial	Mean Final	MS effect	MS error	F	p
MSDM	167.96	194.98	18252.01	366.09	49.86	0.000*
MTRS	495.04	545.56	63806.76	1194.64	53.41	0.000*
M20V	41.28	39.28	100.00	6.24	16.01	0.000*
MDTK	3.98	8.54	519.84	17.31	30.03	0.000*
MIST	30.42	39.78	2190.24	180.38	12.14	0.001*
MVIS	317.18	375.86	86083.56	37249.15	2.31	0.135
MSKL	12.98	14.02	27.04	80.20	0.34	0.564
M4X15	161.56	155.60	888.04	80.39	11.05	0.002*
MTAP	34.04	36.50	151.29	9.82	15.41	0.000*
MTAN	30.72	32.42	72.25	10.78	6.70	0.013*
MSPA	155.94	157.68	75.69	156.69	0.48	0.490
MDPK	19.58	23.56	396.01	21.50	18.42	0.000*

Mean – arithmetic means; MS Effect – the average sum of the square of arithmetic means between the groups; MS Error – the average means of the square of arithmetic means within the groups; F – the value of the F-test for testing the significance of the differences of the arithmetic means; p – the coefficient of the significance of the differences in the arithmetic means

Table 3. shows the results of the multivariate analysis for the repeat measures of the control group, which was used to test the difference between the results for its initial and final status. By testing the values of Wilks' Lambda coefficient (.376) with the help of the F test (5.25), with the degrees of freedom of Effect df=12 and Error df=38, we can conclude that a statistically significant difference in the results of the initial and final status can be determined. On the basis of the obtained results we can conclude that, after the application of nineteen-week program, which consisted of 3 physical education classes per week, statistically significant changes occurred in the space of the studied motor skills of the control group at the p=.000 level. Table 4. shows the results of the univariate analysis of variance for repeat measures of the control group, which was used to test the differences between the results of the initial and final status of each variable individually.

Table 3. Multivariate differences between the results of the initial and final measuring of the participants from the control group

Wilks' Lambda	F	Effect df	Error df	p
0.376	5.25	12	38	0.000*

Wilks' Lambda – the values of the coefficient of Wilks's test of the equality of group centroids; F – the values of the F-test coefficient for the significance of Wilks' Lambda; Effect df; Error df – degrees of freedom; p – the coefficient for the significance of the centroid differences.

By testing the values of the variability within groups (MS effect) and between groups (MS error) means using the F test, we obtained a significant difference in four of the tests, while for eight of the tests no significant difference was determined between the results of the initial and final measuring. We can conclude that the greatest differences were determined for the torso straightening out test (MIST), for which the value of the F test was 7.37, which gives a statistically significant difference at the p=.009, the triple standing jump (MTRS), for which the value of the F test was 5.88, which creates a statistically significant difference at the p=.019 level and the 20 m run (M20V), for which the value of the F test was 5.03, which creates a statistically significant difference at the p=.029 level. A somewhat smaller, but statistically significant difference was determined for the hand tapping test (MTAP), for which the value of the F test was 4.12, which creates a statistically significant difference at the p=.048 level. The values of the differences between the other tests were not statistically significant. The increase in the numeric values of the motor dimensions is evident for both groups of participants; nevertheless, it is still necessary to determine whether there is any difference in the increase in the results between the experimental and control group, which could be used to determine the effect of the experimental treatment.

Table 4. The univariate differences between the results of the initial and final measuring of the participants of the control group

Variable	Mean Initial	Mean Final	MS effect	MS error	F	p
MSDM	171.54	176.10	519.84	611.39	0.85	0.361
MTRS	485.60	511.40	16641.00	2828.71	5.88	0.019*
M20V	41.78	40.10	70.56	14.03	5.03	0.029*
MDTK	5.64	6.90	39.69	26.04	1.52	0.223
MIST	26.66	32.44	835.21	113.33	7.37	0.009*
MVIS	264.48	309.34	50310.49	51411.08	0.98	0.327
MSKL	8.42	10.38	96.04	35.28	2.72	0.105
M4X15	159.20	162.12	213.16	108.30	1.97	0.167
MTAP	33.92	35.52	64.00	15.53	4.12	0.048*
MTAN	30.58	31.42	17.64	7.09	2.49	0.121
MSPA	153.44	148.84	529.00	147.73	3.58	0.064
MDPK	20.90	21.02	0.36	29.67	0.01	0.913

Mean – arithmetic means; MS Effect – the average sum of the square of arithmetic means between the groups; MS Error – the average means of the square of arithmetic means within the groups; F – the value of the F-test for testing the significance of the differences of the arithmetic means; p – the coefficient of the significance of the differences in the arithmetic means.

For this purpose we used the analysis of covariance, where the dependent variables were the results of the groups at the final measuring, and the covariates were the results of the initial measuring of the groups, so as to partialize and neutralize the differences between the groups at the initial measuring. The results of the analysis of covariance at the multivariate level are shown in Table 5. They indicate that it can be concluded that the difference between the groups would be statistically significant, if the groups scored the same results at the initial measuring. The value of Wilks' Lambda coefficient was 0.757, which with an F-approximation of 2.006 and degrees of freedom of 12 and 75 creates a statistically significant difference between the experimental and control group at the p=0.035 level.

Table 5. A test of the significance of the effects of the physical education program at the multivariate level – the MANCOVA model

Wilks' Lambda	F	Effect df	Error df	P
0.757	2.006	12	75	0.035*

Wilks' Lambda – the values of the coefficient of Wilks's test of the equality of group centroids; F – the values of the F-test coefficient for the significance of Wilks' Lambda; Effect df; Error df – degrees of freedom; p – the coefficient for the significance of the centroid differences.

Table 6. The univariate analysis of covariance for testing the significance of the effects of the physical education program – the ANCOVA univariate model

Variable	Adj. Mean - EKS	Adj. Mean - KON	F(1, 86)	p
MSDM	194.42	176.66	10.83	0.001*
MTRS	545.02	511.94	7.59	0.007*
M20V	38.99	40.39	3.13	0.081
MDTK	8.69	6.75	2.33	0.130
MIST	40.54	31.68	8.33	0.005*
MVIS	398.04	287.16	4.88	0.030*
MSKL	14.27	10.13	5.77	0.018*
M4X15	155.15	162.57	8.77	0.004*
MTAP	36.49	35.53	1.29	0.259
MTAN	32.34	31.50	1.40	0.240
MSPA	157.10	149.42	5.78	0.018*
MDPK	23.78	20.80	5.11	0.026*

Adj. Mean – mathematically adjusted arithmetic means; F – the value of the F-test for testing the significance of the differences in the arithmetic means; p – the coefficient of the significance of the differences in arithmetic means

The greatest contribution to the difference between the groups at the final measuring (table 6), with a neutralization of the differences at the initial measuring, was found for the standing depth jump (MSDM), for which the value of the F test was 10.83, then the 4x15 m run (M4x15) F=8.77 and torso straightening out test (MIST) F=8.33. A contribution to the difference between the groups is statistically significant, but significantly smaller in comparison to the cited abilities was determined for the standing triple jump (MTRS), for which the value of the F tests was F=7.59, followed by the splits (MSPA) with F=5.78, push-ups (MSKL) with F=5.77, hyperextensions on a vaulting box (MDPK) with F=5.11 and hanging pull-ups (MVIS) with F=4.88. For all of the aforementioned dependent variables, the statistical significance of the difference was determined at the p=0.001 level up to the p=0.030 level, and so it can be assumed that it is a consequence of the application of an experimental program consisting of two physical education classes and one class of sports activities with basketball content, which was used by the experimental group for a period of nineteen weeks For the remaining abilities there were no differences between the groups, that is, if there were any differences, they were not statistically significant. But it must be concluded that in all of the tests, the experimental group had numerically better result. These results are in agreement the results of earlier research (Košničar, 1975; Arunović, 1978; Anastasovski, 1979, 1982; Klojčnik, 1979; Todorovski, 1994; Stojiljković, 1998; Perić, 2004; Vukajlović, 2005; Stamatović & Šekeljić, 2006; Šekeljić, 2007; Petrović, 2010). In the discussion of the statistical analyses, we can point out that through the application of two weekly physical education classes, which were organized in accordance with the physical education curriculum for sixth graders and one class of sports activities based on basketball (Stojanović, 1998), an increase was determined in the experimental group, in all the monitored motor dimensions, except for arm and shoulder belt strength, while in the case of the control group, which had two physical education classes per week, which were organized according to the physical education curriculum for the sixth grade, a partial increase in explosive and repetitive strength and speed of alternative movements was determined, while there was no significant increase in arm and shoulder belt strength and flexibility, which can be ascribed to the effect of physical education, but also to the increased biological development of children in this period (Đurašković, 2001). By simultaneous analyzing the results from the final measuring of experimental and control group, with a partialization of the possible differences which occur at the initial measuring between the groups, a statistically significant difference in the effects of the experimental program on both groups was determined. We can determine that the experimental program which included two physical education classes and one class of sports activities involving basketball, which was realized by the experimental group, led to significantly greater effects on all of the studied motor skills (except speed of alternative movements) than those of the physical education program, which was realized as part of two classes a week, in accordance with the curriculum.

Conclusion

In this paper we studied the effects of a specially defined program with basketball content, in the form of a third physical education class a week, on the transformation of motor skills. The applied experimental procedure had a positive effect in the analyzed motor space of the participants of the experimental group in all of the applied dimensions, except for arm and shoulder belt strength. In the case of the control group, changes were determined only in the space of explosive and repetitive strength, as well as psychomotor speed, which are a result of the regular physical education

program, but also the increased biological development of children in this period. The applied experimental program led to the occurrence of statistically significant differences between the experimental and control group in all of the applied motor dimensions, except for psychomotor speed. Generally speaking we can conclude the application of such an experimental program, which consists of additional activities with a basketball content, as a third physical education class per week, has a positive influence on the development of the motor skills of thirteen-year-old male schoolchildren. The physical activity of children of this age, who find themselves in the period of increased biological development, represents an important factor in the development of the bio- psychosocial features of children's personalities. The additional physical activity outside of the regular physical education classes, based on basketball, considering the conditions and certainly the interest of the children for this extremely popular sport, is to a great extent practically applicable, which has been confirmed in that paper, and is useful for the development and improvement of the biomotor qualities of students. For these reasons, physical education curriculums should, by means of pedagogical experiments based on scientific knowledge, permanently be innovated and modernized. Physical education classes should focus their research on the effectiveness of the methods and content of organized physical education classes, or in other words, the intensification of physical education classes.

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UČINCI NASTAVE SPORTSKIH AKTIVNOSTI U KURIKULUMU TJELESNOG ODGOJA

Sažetak

Osnovni cilj nastave tjelesnog odgoja je da se organiziranim procesom izvrši pozitivan utjecaj na psihosomatski status učenika i da se pomoću transformacije somatskog statusa vrši korektiv na djelovanje bioloških faktora za koje je utvrđeno da u vrijeme intenzivnog rasta i razvoja nisu dovoljni. U ovom istraživanju se nastojalo ispitati učinkei sata sportskih aktivnosti u sklopu trosatnog tjednog fonda programa nastave TO. Uzorak ispitanika su činili učenici šestog razreda muškog spola, koji su se opredijelili da u sklopu trećeg sata nastave TO realiziraju program sadržaja iz košarke. Uzorak ispitanika su činila dva subuzorka, kontrolna i eksperimentalne grupa, sa po 50 ispitanika. U kontrolnoj grupi je provedena nastava sa dva sata TO tjedno, dok je eksperimentalna grupa uz dva sata TO imala i sat sportskih aktivnosti. Dobiveni rezultati pokazuju da je eksperimentalna grupa na finalnom mjerenju postigla bolje rezultate od kontrolne grupe, što dovodi do zaključka da su sadržaji sata sportskih aktivnosti (košarke) u eksperimentalnom razdoblju u toku jednog polugodišta doprinijeli poboljšanju motoričkih sposobnosti učenika šestog razreda.

Ključne riječi: *tjelesni odgoj, sportske aktivnosti, efekti programa*

Received: July 18, 2012
Accepted: December 20, 2012
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