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THE MODEL OF TRAINING FROM THE ASPECT OF THE DEVELOPMENT OF MOTORIC ABILITIES OF THE PUPILS

Abstract

The aim of this research is to determine the effect of the model of training process in an experimental period among selected students, involved in the additional classes in the primary schools of Istocno Sarajevo. The realisation of the set aim would enable the application of more rational procedures for optimal planning, programming and control of the regular classes of physical education and the training process during the additional classes. The coherence of their development would be certified and, if possible, better and more valuable guidelines for further motoric development of the children selected for sport would be given. The sample of the examinees was the pupils of primary schools, of male sex, aged 10 years (± 6 months) in Istočno Sarajevo. The sample of 68 examinees was divided into two groups: the experimental and control one. The experimental group consisted of 34 examinees previously selected for sport and involved in the process of exercising within the additional classes for the development of motoric abilities. The control group had the same number of examiness who participated only in the regular classes of physical education. Two measurements (the initial and the final) were done in order to determine the model of the training of the experimental group during the experimental period. Eight tests for defining the motoric dimensions of coordination, speed, explosive power and repetitive power were done. The results of the canonical discriminative analysis have shown that at the end of the experimental period, in the final measurement compared to the initial one, and by applying the training process in working with the experimental group a statistically significant rise in the level of motoric abilities at the multivariate level (P-Level=.000) has occured. The results of the multivariate analysis of variance have shown that the experimental group, at the final measurement, has a significantly higher level of motoric abilities than the control group of the examinees (Q=.000).

Key words: *model of training, initial and final measurement, discriminative analysis, pupils.*

1. INTRODUCTION

The regular and additional classes of physical education as a complex and delicate social activity have the goal to ensure the positive changes in the antropological dimensions and increase the level of motoric knowledge among pupils by applying the means of exercise and specific working methods. For the realisation of such a high

goal the most responsible is the pedagog of physical education, who needs to ensure a rational and appropriate conduct of the regular and additional classes of physical education.

The classes of physical education are usually planned according to the average students, which conditions the negation of the basic biological laws and the lack of accepting the difference in the physical as well as intellectual potentials. Such an approach has a list of negative consequences in relation to the engagement and progress of the pupils, since the teaching material is too hard for some while too easy for others.

The teaching process of the regular as well as additional classes[1] should be in relation to the scientifically determined validity of the biological, psychological and sport development of children and youth in certain phases of their motoric development, since their body represents an anatomically specific physiological and functional system which is in a constant differential and progressive development.

The abilities and characteristics of children, especially at the age of 10 years or so, can develop in the so called „sensible phases" when, according to the natural laws the most significant tempo of development of an individual occurs, the adaptive possibilities increase, in relation to the exogenic factors, and especially favorable preconditions for the formation of certain motoric skills are present. In concordance with that, physical exercise should be organised in the methodological manner and it should in the function of the development of abilities and characteristics, while the content, methods and intensity of trainings should stimulate a dinamic development, all the while having in mind the knowledge of the transformational processes for the development of the anthropological dimensions (*Bala, 1981; Malacko, 2010; Pržulj, 2012*).

Such a transformational approach in the development of the abilities and characteristics can best be perfomed by the application of submaximal and maximal intensity, while the lower intensity is applied with the aim of regeneration or for the recreational activities.

Generally, researchers point out that the gradation of the intensity enables an optimal development of the level of training and the achievement of results among children of certain age. However, one should have in mind, when working on the development of the motoric abilities in younger children, that applying a higher specific intensity can lead to a relativelly fast exhaustion of the physical and psychological potential of the

[1] *Additional classes are organised for the pupils from 3rd to 8th grade primary school, in the form of clubs and the students who show a particular affinity towards the development of motoric abilities or an interest for a certain sports branch are involved in them.*

young athlete's body, which is not rare in the athletics, swimming, tennis, gymnastics and other sports clubs.

The aim of this research is to examine whether the applied model of training with the planned exercises, methods and intensity affects statistically significantly the increase in the motoric abilities at the end of the experimental process (in the final measurement in comparison to the initial one) with the selected pupils attending the additional classes in the primary schools in Istočno Sarajevo.

The main goal of the research is to establish the effect of the application of the model of training in the experimental period with the group of selected pupils who train a certain sport and attend the additional classes in the primary schools of Istočno Sarajevo. The realisation of such a goal would create the possibility of applying more rational procedures for optimal planning, programming and control of the regular classes of physical education and the training process during the additional classes. The coherence of their development would be determined and, if possible, better and more appropriate guidelines for further motoric development of children selected for sports would be given.

2. METHOD OF RESEARCH

The sample of the examiness consisted of the pupils of primary schools, male sex, aged 10 years (± 6 months) in Istočno Sarajevo. The sample of 68 examinees was divided into two groups: experimental and control.

The experimental group was comprised of 34 examinees previously selected for a sport and involved in the training process of the additional classes for the development of motoric abilities. The control group consisted of 34 examinees as well, who attended only the regular classes of physical education.

In order to determine the model of training of the experimental group as well as the regular classes of the physical education for the control group in the experimental period of two measurements (initial-final) 8 tests of motoric dimensions were applied: 1. Coordination: movability in the air (MOKV), slalom with 3 medicine balls (MS3M); 2. Speed: 20 m running with high start (M20VS), 30 m running with high start (M30VS); 3. Explosive strenght: static long jump (MSDM), static triple jump (MTRS); 4. Repetitive strenght: lifting the torso on a Swedish bench (MDTK), squats (MČUČ). The set of motoric variables applied in this research has been taken from the research done by Kurelić and associates (1975).

The results were processed according to the statistics programme „Statistica" 8.0 for Windows for the calculation of the statistic parameters, analysis of the variance and the canonical discriminative analysis of the motoric abilities.

2.1. The programme of exercise in the experimental period

The examination of the effect of the model of training on the development of the motoric abilities of the pupils attending classes, selected for sport, was done in Istočno Sarajevo, outside the regular classes of physical education during the additional classes in the period of 8 weeks with 24 hours of trainings (table 1.). The initial(before the beginnig of the examination) and the final (after the completion of the examination) measurement of motoric abilities of the experimental and control group of the examinees was done in the same time period. The structure of the load was flexibly adapted to the individual adaptational abilities of the examinees, according to the certain reaction of the organism, and those are:

• *the scale of motoric abilities*: estimated by the number of repetitions within one set of repetition.

• *the intensity of the load*: estimated by the number of repetitions as well as the repeated exercises withine one set of repetition, while the pulse was the sign of the reaction of the organism to the given load

Table 1.*Programme of realisation of the structure of the model of sport and recreational content*

PROGRAMME AREAS	**NUMBER OF HOURS**
INITIAL DIAGNOSIS OF THE MOTORIC ABILITY	Before the realisation of the programme
2. running exercises	5
3. coordination exercises	5
3. flexibility exercises	3
4. strength exercises	3
4. agility exercises	5
5. exercises for the development of functional abilities	3
6. stretching exercise programme	Every class
7.shaping exercises	Every class
FINAL DIAGNOSIS OF THE MOTORIC ABILITY	After the realisation of the programme

Sum: 24 hours

During the realization of the trainings with the experimental group of examinees the given exercises were done generally with the submaximal and maximal intensity, with the time limited periods of realization and the intention to have the breathing rhythm as uniform as possible, so as to avoid a great load on the examinee's organism. Research into the efficacy of the regular classes of physical education with the control group of the pupils for the development of motoric abilities was carried out during the regular classes in the period of 8 weeks with 24 classes, and based on the realization of the plan and programme made by the teachers. The structure of the programme

content in the regular classes had a primarily transformational character in relation to the development of motoric abilities.

3. THE RESULTS OF THE RESEARCH

3.1. The differences between the experimental and control group of examiness in motoric abilities during the initial measurement

Table 2. *Multivariant analysis of the variance of motoric abilities between the experimental and control group of examinees during the initial measurement*

WILK'S LAMBDA TEST	.501
RAO's F-approximation	1.37
Q	.104

*Legend***:** Wilk's Lambda values, Rao's F approximation and the level of importance (Q)

By the analysis of table 2 which shows the results of the testing of the importance of the differences in the levels of mean values of all the motoric tests between the initial measurements of the experimental and control group no statistically significant difference was found, since WILK'S LAMBDA is .501, which according to the Rao's F-approximation of 1.37 gives the importance of differences on the level of Q= .104. Accordingly, in the applied system of the motoric abilities of the examinees no statistically significant differences were found.

Table 3. *Univariant analysis of the variance of motoric abilities between the experimental and control group during the initial measurement*

Tests	Mean (E)	Mean (K)	F-relation	Q
MOKV	17.63	18.26	1.75	.174
MS3M	8.45	8.95	1.45	.188
M20VS	4.66	4.87	1.56	.171
M30VS	5.85	5.96	1.84	.099
MSDM	126.34	120.54	1.42	.173
MTRS	392.57	386.28	1.44	.177
MDTK	5.36	6.10	1.49	.108
MČUČ	8.43	7.84	1.41	.124

*Legend***:** mean value for the experimental group (Mean (e)), mean value of the control group (Mean (k)), value of the F-test (F-relation) and the level of importance (Q)

In table 3. the univariant analysis of the variance of the tests for motoric abilities was done by comparing the results of the mean values of the experimental and control group during the initial testing. According to the coefficients of the value

of the F-test and their importance (Q) it could be concluded that there is no statistically significant difference in the levels of motoric abilities between the experimental and control group.

3.2. Canonical discriminative analysis of motoric abilities of the experimental group

Table 4. *The importance of the isolated discriminative function of motoric abilities of the experimental group*

Disc Func.	Eigenvalue	Cannonical R	Wilks' Lambda	Chi-Sqr.	df	P-Level
1	3.142	.80	.177	117.23	8	.000

*Legend***:** squares of the coefficient of discrimination (Eugenvalue), coefficient of canonic correlation (Cannonical R), the value of Bertlet's test (Wilks' Lambda), the value of the Chi square test (Chi-Sqr.), degrees of freedom (df) and the level of significance of the detemination coefficient (P-Level)

A significant discriminative function of a high intensity was found (CR=80%) which shows how the set of information gathered on the basis of discriminative analyses of the achieved results is correlated (table 4.). The results of the discriminative strenght of motoric variables are presented by the Wilks-Lambda test (.177), which points to the fact that the experimental groups are important (P-Level =.000). because the value of the Chi sqaure test is high (Chi-Sqr = 117.23).

Table 5. *Factor structure of the isolated discriminative function of motoric abilities of the experimental group*

Variables	Root 1
MOKV	0.754
MS3M	0.596
M30VS	0.572
M20VS	0.478
MSDM	0.442
MTRS	0.412
MDTK	0.307
MČUČ	0.280

In table 5. the structure of the discriminative function of participation of the variable of motoric abilities in the formation of significant discriminative functions is given. The shown centroids of the groups represent the mean values oof the results gathered from the initial and final mesurement. With the aim of checking the efficacy of the training process for the realisation of the training process of exercise 8 motoric tests have been used, presupposed that they are good predictors of the examined area. The results shown indicate that the greatest contribution to the discriminative function have the movability in space (MOKV 0.754) and slalom with three medicine balls (MS3M 0.596).

Table 6. *Centroids of the measurements of motoric abilities for the experimental group*

Measurement	Root 1
Initial	-4.050
Final	4.050

The results in table 6 represent the discriminative function of the centroids based on all motoric tests which is -4.050 i 4.050. The significance of the shown centroids of measurement, which has been tested through the significance of the discriminative function, points to the fact that their distance (discrimination) is significant.

Tabela 7. *Classification matrix of the experimental group's motoric abilities*

Measurement	Initial	Final	Sum
Initial	40	5	45
Final	3	42	45
Initial	88.88%	11.12%	100%
Final	6.67%	93.33%	100%

Separation of the groups shown in table 7 as a percentage, indicated that the performed separation (discrimination) of the results of the measurements is explained with the preciseness of 91.10% (the mean value of percentages of the groups) of the coefficient of canonical correlation which is CR = 80%.

3.3. Canonical discriminative analysis of the motoric abilities in the control group

Table 8. *The significance of the isolated discriminatory function of the motoric abilities in the control group*

Disc Func.	Eigenvalue	Cannonical R	Wilks' Lambda	Chi-Sqr.	df	P-Level
1	0.514	.24	.690	15.76	8	.359

*Legend***:** squares of the coefficient of discrimination (Eugenvalue), coefficients of the canonical correlation (Cannonical R), the values of the Bertlet's test (Wilks' Lambda), the value of the Chi Square test (Chi-Sqr), the degrees of freedom (df) and the level of significance of the determination coefficient (P-Level)

One discriminative function of a medium intencity CR=24% was gathered and it shows the correlation between the set of information based on which the discriminative analysis of the received results (table 8.). The results of the discriminative strength of the variables are presented with the Wilks' Lambda test (.690), which confirms that the differences between the initial and final measurement in the space of motoric abilities of the control group are not significant (P-Level = .359), because the value of the Chi square test is low (Chi-Sqr = 15.76).

Table 9. *Factor structure of the isolated discriminative function of the control group's motoric abilities*

Variable	Root 1
MOKV	0.145
MS3M	0.122
MČUČ	0.103
M20VS	0.102
MSDM	0.085
MTRS	0.070
MDTK	0.060
M30VS	0.022

In table 9 the structure of the discriminative function of participation of the motoric abilities in the formation of important discriminative functions is given. The shown centroids of the groups represent the mean values of the initial and final measurement results. In order to confirm the significance of the differences between these two measurements for the control group 8 motoric tests have been used, presumed to be good predictors of the examined area. The shown results indicate a lower value coefficient so, based on the overall contribution of all motoric tests, it can be concluded that there are no statistically significant transformation processes in the motoric space of the control group of examinees.

Table 10. *Centroids of the motoric abilities measurement for the control group*

Measurement	Root 1
Initial	0.277
Final	-0.277

The results in table 10 represent the discriminative function of centroid based on the motoric variables which are 0.277 and -0.277. The significance of the shown centroids of measurements which has been tested through the significance of the discriminative function indicates that their distance (discrimination) is not significant.

Table 11. *The classification matrix of the control group's motoric abilities*

Measurement	Initial	Final	Sum
Initial	25	20	45
Final	18	27	45
Initial	55.55%	44.45%	100%
Final	40%	60%	100%

The separation of the groups shown in table 11 as a percentage indicate that the performed separation (discrimination) of the results of the measurement is explained with the preciseness of 57.77% (the mean value of the percentages of the groups) of the coefficient of correlation which is CR = 24%.

3.4. The differences between the experimental and control group during the final measurement of motoric abilities

***Table 12**. Multivariant analysis of the variance of motoric abilities between the experimental and control group during the final testing*

Wilks' Lambda	Rao's R	Q
.122	20.79	.000

*Legend***:** the value of the Bertlet's test (Wilks' Lambda), Rao's F-approximation (Rao's R) and the level of significance (Q)

In table 12 the shown results of the multivariant analysis of the variance of motoric abilities between the experimental and control group during the final testing indicate that a statistically significant intergroup difference in motoric abilities is present since WILK'S LAMBDA is .122, which by Rao's F-approximation of 20.79 gives the difference significance at the level of Q= .000.

Furthermore, in the applied system of the motoric abilities of the examinees statistically significant differences were established.

***Table 13**. Univariant analysis of the variance of motoric abilities between the experimental and control group during the final measurement*

Tests	Means (E)	Means (K)	F-odnos	Q
MOKV	15.24	17.83	4.24	.001
MS3M	6.75	8.54	5.17	.000
M20VS	4.27	4.72	4.54	.002
M30VS	5.28	5.75	5.49	.003
MSDM	138.95	124.34	5.36	.000
MTRS	453.57	395.36	4.28	.000
MDTK	10.83	7.25	6.36	.004
MČUČ	14.65	8.73	6.26	.009

*Legend***:** mean value of the experimental group (Mean (e)), mean value of the control group (Mean (k)), the value of the F-test (F-relation) and the level of significance (Q)

In table 13 the univariant analysis of the variance of the motoric abilities tests is shown by comparing the mean values of the experimental and control group during the final measurement. Based on the coefficients of the F-tests and their significance (P-Level) it can be concluded that there is a statistically significant difference in the levels of motoric abilities between the experimental and control group in the following tests: movability in air (MOKV .001) and slalom with three medicine balls (MS3M .000), 20m running with high start (M20VS .002), 30m running with high start (M30VS .003), static long jump (MSDM .000), static triple jump (MTRS .000), lifting torso on a bench (MDTK .004), squats (MČUČ .009).

4. DISCUSSION

The results of the canonical discriminative analysis of the motoric abilities of the examinees who attend school classes of the experimental group have shown (tables 4-7) that at the end of the experimental period, under the influence of the applied model of training, statistically significant adaptive changes in the observed motoric dimensions have occured (P-Level=.000).

It could be presupposed that these changes occured as a result of the adequate metodical shaping of the experimental model of training in the process of planning, programming, gradual application, distribution and control of the applied loads in keeping with the authentic needs and possibilities of the examinees.

Some researchers (*Željaskov, 2004; Duraković, 2006; Malacko, 2010.)* explain these types of transformational processes by the adaptive processes which through the inner organisation in an organism allow the raised excitation of the muscular system and the development of levers and ligaments.

It is important for the appropriate scientific approaches to determine the structure of the dimensions and their relations to be applied as well as to acknowledge the developmental laws of an organism, in order to achieve certain adaptive changes of the anthropological dimension.

In order for the application of a load to have the expected effect, the volume and intensity of the load should be gradually, progressively increased, in keeping with the age-related characteristics and the functional and motoric condition of the pupil, which allows a greater activity of the central peripheral nervous system, the activation of the greatest number of motoric units, as well as the starting of the function of heart and breathing system, which allows for the transport of oxygen and the aerobic energy process.

It has been scientifically proven that the efficiency of the excercise organisation in the training process is conditioned by the endogenous and exogenous factors of limitation. The endogenous factors of limitation are the genetic potential (coefficient of innateness) and the curve of development (changes) of the anthropological characteristics, and the exogenous factors are the frequency of training, the employers, content-wise and organisational conditions. [2]

[2] *The authors who have studied the genetic determination of motoric abilities point out that the greatest coefficient of genetic determination have: precision – 90%, speed 90-95%, coordination over 85%, explosive strenght over 80%, repetitive and static strenght around 50%, flexibility 80%. These percentages should be accepted as orientational.*

That is why in the process of choosing and guiding children to sports the fact that the inhereted and acquired anthropological characteristics as well as a certain level of functional abilities of organs, organ system and organism in whole are the preconditions of success, would be taken into account. Precisely because of that the knowledge of the values and capacities of those abilities makes the system of candidate selection for a certain sport , as well as planning, programming and control of the effects of training, easier and better.

The results of the mean values of motoric abilities for the experimental and control group of examiness during the final measurement (table 12 and 13), processed using the multivariant an univariant analysis of the variance, have shown that the examinees from the experimental group differed significantly in the raised level of the examined dimensions of motoric abilities in comparison to the control group.

It could be presumed that the differences were present under the influence of the model of training that had a multisided effect on the development of motoric abilities with the experimental group.

5. CONCLUSION

The model of training can be defined, with regard to the aim of this research, as an adaptational process of the development of motoric abilities, health status of certain pupils attending the classes of physical education and the motoric knowledge needed for that purpose.

The trainings were focused on the bettering of the function of the abilities of all the topological areas of the body, raising the efficacy of the organs and organ systems, as well as raising the speed of running, level of coordination, flexibility, strenght, agility and enhancing of functional abilities, so, therefore, it could be defined as a process of proportional and many sided development of abilities and characteristics of the children engaged in a sport.

The raised level of abilities and characteristics among the children selected for a sport cannot be wholy and directly applied to a concrete sport activity, but it is present as a factor of a later development of specific abilities.

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