

EFFECTS OF PROGRAMMED TREATMENT ON QUANTITATIVE TRANSFORMATIONS OF MOTOR DIMENSIONS IN SPORT GAMES

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Abstract

On the sample of 152 examinees (male students) of Catholic School Center (High School) in Sarajevo, a program has been conducted in duration of one school year, from basketball, volleyball, handball and football classes. For estimation of basic motor abilities 24 tests were applied and 12 tests were applied for situational motor abilities (3 per each sport game). Initial and final measurements were also made (in September and May). The goal of this research is to ascertain the quantitative changes in basic mobility and situational mobility after the scheduled action, namely, to ascertain the transformational process. For the estimation of quantitative abilities the following were used: Ssdif analysis, rotation of variables in the promax factor constitution (factorization), uni-variant tests of differences, the analysis of translation and dilatation as well as internal structure of discriminating function. The results of this research show that a unified, systematic and continual reconstruction of general motor abilities has occurred, namely the transformation of the same, but not in a significant measure. The smallest effect has been achieved in the case of football.

Key words: *quantitative changes, sport games, basic and situational motor abilities*

Introduction

In many former researches, it has been ascertained that the usage of specific exercise processes can significantly effect the changes of different human features, abilities and motor proficiencies. In this sphere of education's interests, the number of scientific problems is increasing (Metikoš et al, 1979; Momirović et al, 1987).

Some of the basic scientific questions in this aspect of education problems are what to train, how to train and how much in order for changes to occur, how to control the quantitative and qualitative variability (Momirović, 1972; Momirović, 1984). The changes of motor abilities in education process represent a dynamic, billowy process which is specific for its adequate quantitative and qualitative indicators. It is clear that this is the case of transformational process which occurs during classes, namely through his "most often occurring" units.

It is not necessary to waste words on didactical and methodical protocols such as: planning, programming, feedback info, the intensity and size of the project, etc, which should by all means be valued in case of any longitudinal study.

The quantification of motor abilities represents the foundation for all kinesiological procedures, especially in the light of scientific research (Findak, 1986; Rađo, 1999; Neljak, 1999; Skender, 2001). Quantitative changes are only the ones which bring about the commonality of relations in variables, and the same factor structures as well. With the projection of data measurements, the hypothetical matrix of measurement is defined, and with the explication of the linear motions assembly on the association matrix, a structural vector occurs, which describes quantitative changes, accepting the relations of initial variables. Kinesiological operators (programs) stimulate (in most cases) quantitative effects which are manifested in several directions (factors) in motor space (Rađo i Wolf, 2002). Central and descriptive parameters represent the basis of analytical and mathematical procedure during the registration of the treatment's effects on which the analyses mentioned in this study are added.

Problem and aim

Determining the effect level of quantitative changes has imposed itself as a problem of this research.

The problem is connected with the current condition within the practical part of classes, where the influence of this kind of work should be objectively shown, in order to ensure easier control and more efficient enforcements in diagnoses, programming and direct application of classes, and by doing that to actuate the search for relevant information in Physical Education domain, from the aspect of sport games. The goal of this research was to register the quantitative changes in situational mobility (basketball, volleyball, football and handball) during the classes of Physical Education in duration of a school year (in initial and final measurement). Considering the fact that sport games make 60% of the program in Elementary Schools and High Schools, these results are even more significant.

Methods

The research has been conducted on the sample of 152 examinees (males), students of II and III grade, attending Basic Gymnasium in Sarajevo. The program consisted of standard class units in sport games including dribbling, ball passage, kicking, except volleyball which had ball lifting, smash and serving. The program was realized during one school year at which time initial and final measurement took place. Frequency of classes was two times a week, and each class unit from sport games was realized during 12 classes. Situational motor abilities were estimated by tests: basketball (throwing the ball with both hands against a wall, capturing it in in 30 seconds KOBA, dribbling in slalom KOVO, shooting at the basket in duration of 30 seconds ODOD), volleyball (shooting at the goal across the net from the basic position ODGA, "bat sledge" rejection inside a circle in duration of 30 seconds, tennis serving and scholastic serving ODSE), handball (throwing and capturing of the ball against a wall in duration of 30 s RUBA, dribbling in slalom RUVU penalty throw RUSE), football (ball juggling NGZO, ball dribbling in slalom NGVO, strength of the ball hit NGSU). For the analysis of obtained data the following were used: Ssdif analysis, rotation of variables in the promax factor constitution (factorization), uni-variant tests of differences, the analysis of translation and dilatation as well as internal structure of discriminating function for the registering of quantitative changes and situational motor abilities (Bonacin, 2004).

Results and discussion

Quantitative changes of specific motor ability under the SSDIF model of differences were performed. Table represents the analysis results of quantitative changes in the area of specific motor ability (basketball, volleyball, handball, football).

Table 1. Quantitative changes of specific motor under Ssdif model

	A	D	S	R
KOBA	2.57	0.14	0.60	0.30
KOVO	-0.82	-0.82	-1.01	-0.50
KOST	2.24	0.47	0.96	0.48
ODGA	1.57	0.35	0.81	0.40
ODOD	3.64	0.00	0.30	0.15
ODSE	1.38	0.17	0.51	0.25
RUBA	2.02	0.19	0.55	0.27
RUVU	-0.63	-0.49	-0.66	-0.33
RUSE	1.68	0.06	0.69	0.34
NGZO	1.69	0.05	0.22	0.11
NGVO	-1.23	-0.18	-0.48	-0.24
NGSU	1.07	0.12	0.33	0.16
R(0.01)				0.21
R(0.05)				0.16
MU				4.09
H				622.25
F				48.08
Df1				12
Df2				140
P				0.000

(A=mean differences, D=discriminative coefficients, S=standardized orthogonal projections, R=structure of discriminative factor, R(0.01)=probability at level 99%, R(0.05)=probability at level 95%, MU=Mahalanobis distances, H=Hotelling t-test, F=f-test, DF1,2=degrees of freedom, P=probability)

It can be seen that the entire series of indicators significantly saturates the discriminating function (R). Only in the case of football the saturations are low and insignificant, and dribbling is even less expressed in the second than in the first measurement. However, the importance of quantitative changes is undoubted and it points to the fact of unequal effects in different sport disciplines.

The best effects were certainly achieved in basketball, mediocre in handball and volley ball, and the lowest in football. It seems that this situation was created partly by foreknowledge (football), and partly by the way of work, which had probably different motivation effect on examinees, depending on different sport disciplines.

Table 2. The uni-variant tests of differences Anova) in specific motor ability

ANOVA	F	P
KOBA	54.27	0.00
KOVO	154.52	0.00
KOST	140.38	0.00
ODGA	10.55	0.00
ODOD	13.80	0.00
ODSE	39.08	0.00
RUBA	46.78	0.00
RUVO	65.84	0.00
RUSE	73.13	0.00
NGZO	7.62	0.01
NGVO	34.35	0.00
NGSU	16.22	0.00
DF1		1
DF2		151

(DF1,2=degrees of freedom)

The uni-variant tests of differences (table 2) show literary every individual changes expressed on the 0.01 level, which testifies of important shifts in the treatment period. However, as it can be seen from the values of F-Tests, the highest differences in individual variables were achieved in basketball, especially in dribbling and shooting at the basket.

Table 3. Translation and dilatation analysis of specific motor ability

	M-1	M-2	DL	TL	V-1	V-2	DT
KOBA	38.30	40.87	2.57	1.07	28.50	23.46	0.91
KOVO	9.04	8.22	-0.82	0.91	2.43	1.91	0.89
KOST	4.52	6.76	2.24	1.49	10.41	9.54	0.96
ODGA	7.36	8.92	1.57	1.21	6.53	5.09	0.88
ODOD	26.32	29.97	3.64	1.14	310.82	329.07	1.03
ODSE	5.91	7.28	1.38	1.23	10.57	10.20	0.98
RUBA	33.36	35.38	2.02	1.06	15.85	12.62	0.89
RUVO	8.89	8.26	-0.63	0.93	2.64	2.16	0.91
RUSE	6.94	8.62	1.68	1.24	7.27	5.74	0.89
NGZO	11.95	13.64	1.69	1.14	157.25	217.78	1.18
NGVO	17.84	16.61	-1.23	0.93	25.12	21.05	0.92
NGSU	7.87	8.94	1.07	1.14	15.07	19.10	1.13

(MEAN-1,2=means of 1,2 measurement, DELTA=mean differences, TL=translation coefficients, VAR-1,2=variance 1,2 measurement, DT=dilatation coefficients)

The analysis of translation and dilatation in specific motions (table 3) shows that characteristic improvements have occurred (10%) in the entire series of variables, and even at least in few of all analyzed sport disciplines. What is the most interesting is the fact that the highest shifts were exerted in all goal realizations (basket shooting, serving, penalty throw, leg kicking).

This contributes to the fact that the treatment was in a large measure pointed to the acquisition of such exercises in treated sport disciplines, which would increase the probability of goal achievement in every individual activity.

Table 4. Oblique position of specific motor ability and factor correlation

	PX1	PX2	PX3	PX4	PX5	PX6
KOBA	0.08	0.13	0.24	0.16	0.76	-0.10
KOVO	0.78	-0.08	0.05	-0.12	-0.15	0.07
KOST	0.07	-0.11	0.75	-0.09	-0.03	0.01
ODGA	0.02	0.80	-0.07	-0.24	0.06	-0.13
ODOD	-0.11	0.19	-0.06	0.54	-0.17	-0.43
ODSE	-0.36	0.20	-0.09	-0.06	0.03	0.67
RUBA	0.39	0.40	-0.24	0.33	-0.08	0.23
RUVO	0.77	0.11	0.02	-0.03	0.29	-0.13
RUSE	-0.10	0.53	0.54	0.00	0.08	0.23
NGZO	-0.09	-0.40	-0.02	0.85	0.17	0.06
NGVO	0.20	-0.19	0.13	0.04	-0.09	0.68
NGSU	0.00	0.06	0.43	0.10	-0.67	-0.09
	PX1	PX2	PX3	PX4	PX5	PX6
PX1	1.00	-0.14	-0.02	0.07	-0.03	0.12
PX2		1.00	-0.03	0.18	-0.02	0.03
PX3			1.00	0.04	0.09	0.03
PX4				1.00	-0.10	0.02
PX5					1.00	0.03
PX6						1.00

Table 4. represents the factors of changes as measurements of directionality towards the treatment effects, namely the courses in which these changes have developed. It can be seen that six factors of changes were obtained. The first factor of changes is surely ball dribbling, whether it's in basketball or handball. The other factor is object manipulation with delay, namely bouncing and reception of the ball. The third factor of changes is ball shooting at a goal, namely for basketball, handball and volleyball. The fourth factor of changes is described with variables of "bat sledge" rejection in volleyball and ball juggling in football, and ball bouncing without delay is distinctive for these variables. The fifth factor is obviously represented with variables which are realized only with a substantial amount of energy, so it can be easily presumed that this is the size of influence on the object. Finally, the sixth factor of changes is described with variables of volleyball serving and football dribbling, which together represents an unusual aspect of short and quick influences on the object. It can also be noticed that the correlations of factors are literally zero with only one which is significant, and that one relates to two kinds of object manipulations (the second and third factor).

Table 5. Internal structure of discriminative function (correlations of differences factors with discriminative function)

PX1	-0.46
PX2	0.55
PX3	0.42
PX4	0.23
PX5	0.13
PX6	-0.01

As it was shown with the previous case of basic motor ability, statistics of discriminative function (table 5) show that the changes were made exactly in accordance with individual eco-sensitiveness of every individual examinee, because the distribution's function which positions examinees within the meaning of individual changes, is almost an ideal normal curve, according to all calculated parameters. This means that the examinees had sufficient conditions for development of their dimensions, but since they are different by their adaptation and absorption capabilities, the final distribution was made in an expected way, namely in a divergent way, but still in accordance with normal distribution. This also means that the savors were enough to cause quantitative changes, regardless that these changes were somewhat humbler due to parallel accomplishment of structural effects. The internal structure of discriminative function shows us that the effects distinction between two measurements was made mostly due to first three factors, while the fifth and sixth were irrelevant for the structuring of this function. It can be ascertained that the effects were achieved by the skill of ball manipulation with delay (when possible), and with dribbling and shooting at the goal. All three parameter sets describe an individual technique, so it can be concluded that this was one of the most dominant effects of this treatment, the effect of acquiring individual techniques in sport disciplines with a ball.

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Conclusion

On the sample of 152 examinees (male students) of Catholic School Center (High School) in Sarajevo, a program has been conducted in duration of one school year, from basketball, volleyball, handball and football, through two classes a week. After the realization of the treatment it can be ascertained that importance of quantitative changes in specific motor ability is unmistakable, starting with central and descriptive parameters (which are not shown in this study), but not of equal intensity and effects, which was conformed by all applied analyses. In the sport games are observed individually, the highest effects were achieved in basketball, mediocre in handball and volleyball, and the lowest in football.

These claims are confirmed by Ssdif model of differences, uni-variant model of differences, which shows in table 1 and 2 that the highest quantitative shift in relation to the initial state was achieved in basketball in all three variables and especially in (KOVO) ball dribbling. The uni-variant test of differences literally show every individual changes expressed on the 0.01 level, which testifies of important shifts during the treatment period. The set of promax factors has indicated 6 factors of "change", which have been developing in different courses, by itself an indicator of quantitative shift. The translation and dilatation analysis has indicated that the highest shifts were achieved in the areas (variables) related to goal realization in every individual sport game, which implicates a regular course or flow of the treatment. Although the savors were enough to cause the expected results, one fact is inevitably being imposed, that the future researches of this theme (but not just this) should try and impose more activity or a change of class organization, which would surely create an even better quantitative effect.

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EFEKTI PROGRAMIRANOG TRETMANA NA KVANTITATIVNE TRANSFORMACIJE MOTORIČKIH DIMENZIJA U SPORTSKIM IGRAMA

Sažetak

S uzorkom od 152 ispitanika (muška učenika) Katoličkog Školskog Centra (Gimnazija) u Sarajevu proveden je program u trajanju od jedne školske godine, sa nastavnim sadržajima košarke, odbojke, rukometa i nogometa. Za procjenu bazičnih motoričkih sposobnosti primjenjeno je 12 testova situacijske motorike (po 3 za svaku sportsku igru). Izvršena su dva mjerenja (inicijalno u rujnu i finalno u svibnju). Svrha ovog istraživanja je bila utvrđivanje kvantitativnih promjena situacijske motorike nakon provedenog tretmana, naime kako bi se utvrdile značajke transformacijskog procesa. Za procjenu kvantitativnih promjena korištena je Ssdif analiza, rotacija faktora razlika u promax kosokutnu poziciju, univarijantne razlike, analiza translacija i dilatacija kao i interna struktura diskriminativne funkcije razlika. Rezultati istraživanja su pokazali da je došlo do jedinstvene, sistematske i kontinualne rekonstrukcije općih motoričkih sposobnosti u tretmanu iako ne svih u jednakoj mjeri. Najslabiji efekti zabilježeni su u slučaju nogometa.

Key words: kvantitativne promjene, sportske igre, bazična i situacijska motorika

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