

THE APPLICATION OF STATIONS IN THE WORK WITH YOUNGER STUDENTS

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ABSTRAKT

During the first term of the academic 2012 / 2012 year, a survey was conducted on a sample of 45 students in the fourth grade of a primary school. The aim was to determine possible differences in motor abilities deriving from the use of stations and the line arrangement in the realization of physical education programme. Basing our conclusions on the values of the univariate analysis of variance, we can deduce that there is a statistically significant difference in seven out of nine researched variables in motor abilities. Statistically significant differences are in favour of the experimental group, in which physical education programme was realized by the application of stations.

Key words: *motor abilities, stations, younger students*

INTRODUCTION

Methodical and organizational forms of work that are used in the first section of a main part of a lesson are: the beginning, pair work, group work (in groups of three), group work (in groups of four), parallel group work, parallel alternating work, alternating group work, work implying additional exercises, polygon, station work, cyclic form of work and track work (Milošević, 2005:239).

‘Start’ or ‘the line arrangement’ has been introduced from a gymnastic practice based on a ‘sokolski’ system. ‘Start’ or ‘the line arrangement’ is a methodical and organizational form of work in the main phase of lesson which can be described as: „while one exerciser, with control and possible help of a group leader, practices on an apparatus, the other exercisers from the same group stand arranged next to each other (line arrangement) and follow the exercise performed by their fellow student. Once the exercise finishes, the student goes to the end of the line (Matić, 1978: 231).

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The advantages of this methodical and organizational form are the following: applicability with students of all ages, suitability for majority of programme demands, applicability in both indoor and outdoor sport facilities, good conditions for teacher monitoring, high level of success in sport and technical improvement of students, etc. (Zdanski, 1967: 67).

The term station used as a technical term in school physical education, signifies a reinforced part of a polygon, which can possibly be equipped with a certain apparatus or a prop, where one or several students perform a set motor exercise simultaneously or alternatively.

When stations are used, all exercises are homogenous i.e. equal in terms of importance for the whole lesson. The main aim of station application is achieving greater volume of activities by setting a higher number of stations, thus reducing passive time when students stand and wait.

On polygon, every student must perform his / her exercise as fast as possible, whereas on a station they must perform as correctly as they can. On polygon, the workload is defined according to the weakest student, whereas at the stations it could be defined at several levels because organization work groups are formed.

Students' age has conditioned all programmes to be planned in a way that all workload in exercises is based on the gravity, student's own body, repulse of partner with similar abilities and props that are adjusted to students' age.

Due to the fact that the number of physical education classes per week is low, physical education methodologists are faced with an everlasting problem is the quest for the most effective methodological and organizational form of work, which will primarily extend active time during a lesson, as well as frequency of motor exercising, which will all result in improvement of acquisition of new movement tasks (Marković, Višnjić, 2008a), more adequate development of anthropometric characteristics (Marković, Milanović, and Bogdanović, 2010), motor abilities of primary and secondary school students (Marković, Višnjić, 2008b and Martinović, Marković, Višnjić, 2009) and physical literacy (Marković, 2007).

The aim of this research was to determine possible differences in motor abilities deriving from the use of stations and the line arrangement in the realization of physical education programme.

METHODOLOGY OF RESEARCH

The research was conducted in a primary school „Jovan Jovanović Zmaj" in the first term of the academic 2011 / 2012 year. The sample of 45 examinees was divided into two specific subsamples in relation to the application of the organizational forms of work in the main part of lesson: experimental group 24 students, when stations were used, and control group of 21 students, when 'start' or 'line arrangement' was used.

Evaluation of motor abilities was conducted through the use of nine standardized movement activities - 'Eurofit' test battery.

Apart from descriptive statistical methods, in the analysis and data processing, univariate analysis of variance (Anova), multivariate analysis of variance (Manova), and discriminant analysis were used in order to test significance of variance for each group.

RESEARCH RESULTS

Minimum and maximum values of researched motor abilities are within the expected range for this age group.

We could note that the results of examinees in the experimental group improved in relation to all researched variables at the final assessment, compared to initial one. The biggest deviation from the mean, which standard deviation points to, was in case of tenacious run (EFIZ) with the value of 47.77 in the initial and 26.45 in the final assessment.

The values of scunis with a negative sign, indicate an extremely positive asymmetric curve. Kurtosis values when hand-tapping is concerned (EFTA) at initial and final assessment, is higher than three, which indicated the existence of heterogeneity of obtained results and plati-curtic curve. Kurtosis is lower than three in other variables, which indicates that the results are homogeneous and that the curve is leptocurtic.

Table 1 Central and dispersive parameters and asymmetry and flatness measurements of motor abilities of the experimental group of examinees on intial- final measures

Varijable	M	SD	Min	Mah	CV	Interv. Pov.		Skew	Kur	Ks-p
EFTA - i	18.86	5.06	14.0	35.0	26.85	16.55	21.16	1.82	3.20	.260
EFFL - i	22.09	5.18	15.0	30.0	23.43	19.74	24.45	.22	-1.34	.605
EFPS - i	18.33	4.89	8.0	27.0	26.68	16.11	20.56	-.38	-.31	.998
EFSK - i	125.29	18.10	92.0	165.0	14.45	117.04	133.53	-.21	-.13	.939
EFLS - i	17.76	3.58	11.0	24.0	20.14	16.13	19.39	-.08	-1.07	.950
EFZG - i	16.33	13.99	1.0	56.0	85.63	9.97	22.70	1.36	1.21	.267
EFAG - i	24.95	1.47	22.0	28.0	5.87	24.28	25.62	.08	-.32	.704
EFDR - i	19.33	4.14	11.0	27.0	21.41	17.45	21.22	-.21	-.55	.992
EFIZ - i	246.57	47.77	190.0	350.0	19.37	224.82	268.32	1.08	.29	.507
EFTA - f	14.86	5.36	10.0	33.0	36.08	12.42	17.30	1.89	4.19	.510
EFFL - f	13.86	5.80	3.0	26.0	41.85	11.22	16.50	.16	-.56	.869
EFPS - f	21.09	4.97	11.0	29.0	23.56	18.83	23.36	-.59	-.46	.998
EFSK - f	144.52	17.82	116.0	185.0	12.33	136.41	152.64	.13	-.22	.946
EFLS - f	22.29	3.69	17.0	29.0	16.56	20.61	23.97	-.01	-1.24	.650
EFZG - f	31.81	25.83	10.0	100.0	81.19	20.05	43.57	1.51	1.09	.071
EFAG - f	22.05	1.36	20.0	26.0	6.16	21.43	22.67	1.01	1.66	.224
EFDR - f	22.57	4.24	14.0	29.0	18.77	20.64	24.50	-.48	-.56	.999
EFIZ - f	202.62	26.45	170.0	259.0	13.06	190.57	214.66	.69	-.68	.659

The values of Kolmogorov-Smirnov test indicate that the distribution of values for the researched variables at initial and final assessment, is placed within the range of normal distribution (Table 1)

Table 2 Central and dispersive parameters and asymmetry and flatness measurements of motor abilities of the control group of examinees on initial- final measures

Varijable	M	SD	Min	Mah	CV	Interv. Pov.		Skew	Kur	Ks-p
EFTA - i	19.33	3.63	14.0	29.0	18.78	17.80	20.87	.86	.90	.438
EFFL - i	24.13	5.48	15.0	30.0	22.71	21.81	26.44	-.42	-1.29	.720
EFPS - i	15.50	5.81	4.0	25.0	37.47	13.05	17.95	-.43	-.41	.847
EFSK - i	121.25	22.42	54.0	154.0	18.49	111.78	130.72	-1.04	1.72	.988
EFLS - i	15.38	4.23	3.0	22.0	27.51	13.59	17.16	-.81	1.26	.888
EFZG - i	19.88	16.81	2.0	77.0	84.59	12.77	26.98	1.72	3.52	.605
EFAG - i	25.50	3.50	14.0	31.0	13.73	24.02	26.98	-1.24	3.02	.842
EFDR - i	19.42	4.10	9.0	26.0	21.09	17.69	21.15	-.45	.01	.772
EFIZ - i	238.75	52.41	168.0	370.0	21.95	216.62	260.89	1.36	1.16	.120
EFTA - f	18.00	3.85	12.0	27.0	21.36	16.38	19.62	.66	.04	.358
EFFL - f	19.63	5.78	10.0	30.0	29.44	17.18	22.07	-.03	-.98	.909
EFPS - f	16.54	6.07	4.0	27.0	36.66	13.98	19.10	-.33	-.38	.999
EFSK - f	127.42	22.03	58.0	160.0	17.29	118.11	136.72	-1.26	2.39	.993
EFLS - f	17.00	4.35	3.0	25.0	25.61	15.16	18.84	-1.14	2.76	.877
EFZG - f	23.75	17.71	3.0	80.0	74.57	16.27	31.23	1.44	2.29	.460
EFAG - f	24.46	3.23	15.0	30.0	13.21	23.09	25.82	-.60	1.53	.941
EFDR - f	20.67	4.34	10.0	27.0	21.00	18.83	22.50	-.51	-.06	.943
EFIZ - f	231.33	52.54	167.0	365.0	22.71	209.14	253.52	1.38	1.10	.172

Studying Table 2, we can note that the results of examinees in the control group improved in every researched variable at final assessment, compared to the initial, except in dynamometric values of the dominant hand (EFDR). The biggest deviation from the mean, which standard deviation points to, is holding pull-ups (EFZG) with values being 52.14 at initial and 52.54 at final assessment.

Minimum and maximum values of researched motor abilities are within the expected range for this age group.

The values of scunis with a negative sign, indicate an extremely positive asymmetric curve. Kurtosis values of all researched variables at both assessments is lower than three, except when vis u zgibu (EFZG) and shuttle run 10x5 m (EFAG) are concerned.

The values of Kolmogorov-Smirnov test indicate that the distribution of values for the researched variables at initial and final assessment, is placed within the range of normal distribution (Table 2)

Table 3 The significance of differences between experimental and control group of examinees on initial and final measure in relation to motor abilities

Analysis	N	F	p
Manova	9	3.021	.009
Discriminant	9	2.893	.012

Basing our deductions on the values of multivariate analysis of variance - $p = .009$ and discriminant analysis - $p = .012$, we could conclude that there is a statistically significant difference and clearly defined border between experimental and control group of examinees at final assessment.

Statistically significant difference is in favour of the experimental group of examinees.

Table 4 The significance of differences between experimental and control group of examinees on final measure in relation to motor abilities

Variable	F	p
Taping - EFTA (sec)	5.201	.027
Flamingo - EFFL (no. of reps.)	11.125	.002
Sit and reach - EFPS (cm)	7.454	.009
Standing long jump - EFSK (cm)	8.046	.007
Sit-ups f30 s - EFLS (no. of reps.)	18.997	.000
Holding pull-ups - EFZG (sec)	1.522	.224
Shuttle run 10h5 m - EFAG (1/10 sec)	10.107	.003
Dynamometrics of the dominant hand - EFDR (kg)	2.205	.145
Endurance run 600 m - EFIZ (sec)	5.125	.044

Judging by the values of the univariate analysis of variance, we can deduce that there is a statistically significant difference in seven out of nine researched variables in motor abilities. Statistically significant difference is not present when holding pull-ups (EFZG) with the level of statistical significance $p=.224$ and dynamometrics of the dominant hand (EFDR) with the level of statistical significance $p=.145$ are concerned.

Table 5 Discrimination coefficients of experimental and control group of examinees at final assessment according to variables

Variable	Discrimination coefficients
Taping - EFTA (sec)	.025
Flamingo - EFFL (no. of reps.)	.123
Sit and reach - EFPS (cm)	.093
Standing long jump - EFSK (cm)	.047
Sit-ups 30 s - EFLS (no. of reps.)	.250
Holding pull-ups - EFZG (sec)	.000
Shuttle run 10h5 m - EFAG (1/10 sec)	.047
Dynamometrics of the dominant hand - EFDR (kg)	.010
Endurance run 600 m - EFIZ (sec)	.044

Discrimination coefficients indicate that the biggest differences between experimental and control group of examinees at the final assessment in relation to motor abilities at the variables: down - sit up for 30 s (EFLS) with value of .250, while the smallest is when holding pull-ups (EFZG) is concerned, with value of .000.

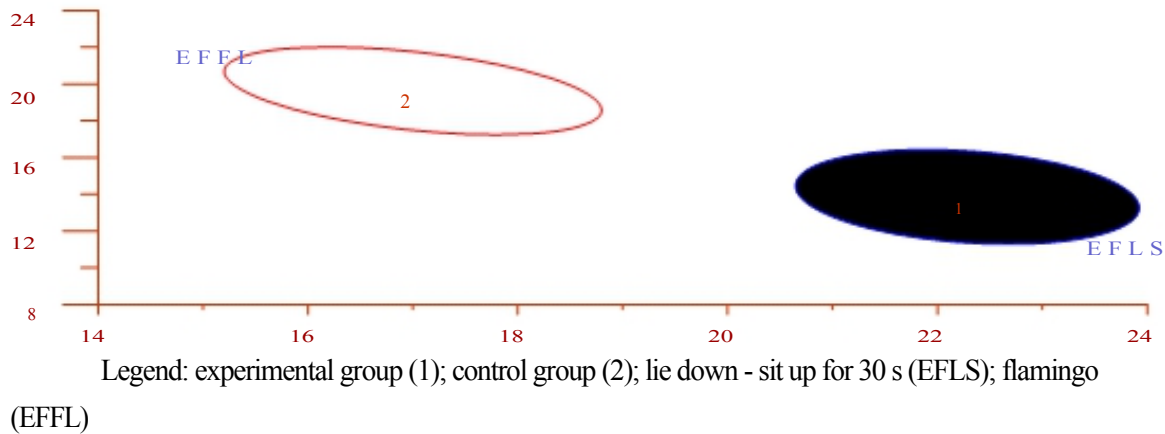
Table 6 Homogeneity of experimental and control group of examinees at final assessment

Group	n/m	%
Experimental	16/21	76.20
Control	20/24	83.30

Basing our conclusions on the above mentioned, we could deduce that at the final assessment of 21 examinees, 16 of them have characteristics typical for their group, with homogeneity of 76.20% (higher), which also means that five examinees have different characteristics, which are not typical for their group. In the control group, 20 examinees out of 24 have characteristics typical for their group, with homogeneity of 83.30% (higher), while four examinees have different characteristics.

Studying the graphical representations of ellipses (interval of trust), we could deduce the mutual positions and characteristics of the experimental and control group in relation to three most discriminative conditions of motor abilities: lie down - sit up for 30 s (EFLS), flamingo (EFFL) and sit and reach (EEPS).

Graph 1 Ellipses (interval of trust) of experimental and control group of examinees in relation to two most discriminative conditions: lie down - sit up for 30 s (EFLS) and flamingo (EFFL)

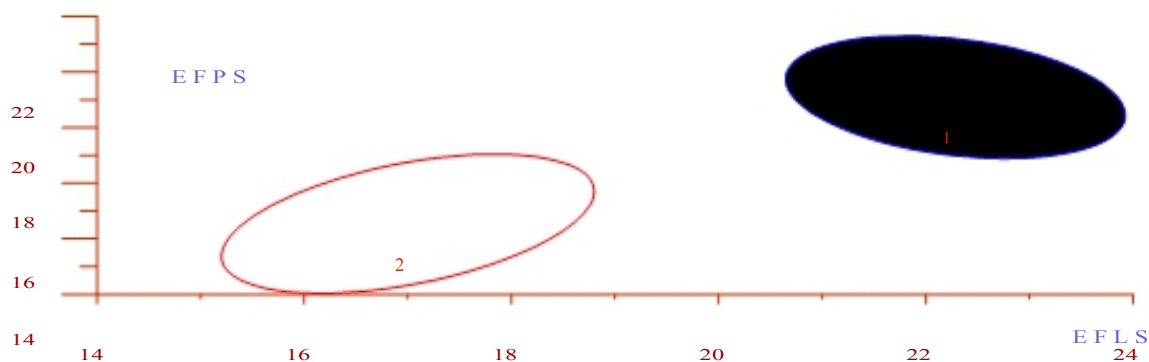


On Graph 1, the apcis (horisontal axis) represents lie down - sit up for 30 s (EFLS), and ordinate (vertical axis) is flamingo (EFFL).

It could be noted that in relation to lie down - sit up for 30 s, control group (2) has the lowest value, whereas experimental group (1) has the highest value. In relation to flamingo, experimental group has the lowest and control group has the highest value.

Graph 2

Ellipses (interval of trust) of experimental and control group of examinees in relation to two most discriminative conditions: lie down - sit up for 30 s (EFLS) and sit and reach (EFPS)



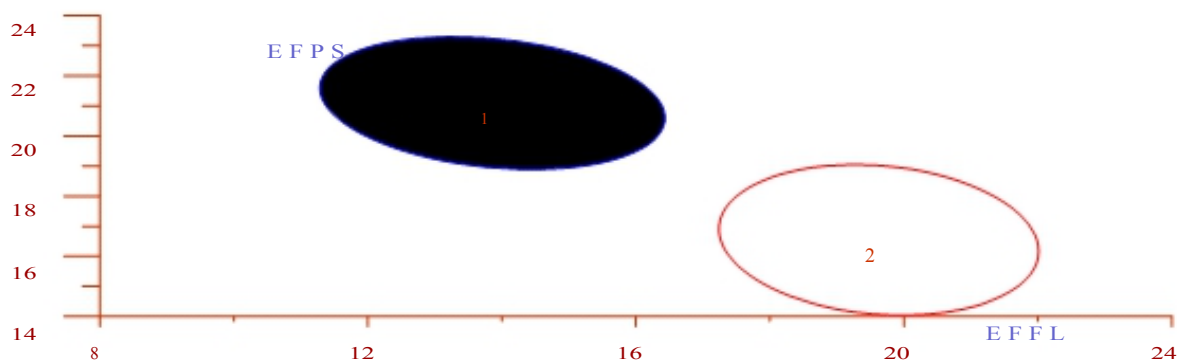
Legend:

experimental group (1); control group (2); lie down - sit up for 30 s (EFLS); sit and reach (EFPS)

On Graph 2, the apcis (horizontal axis) represents lie down - sit up for 30 s (EFLS), and ordinate (vertical axis) is sit and reach (EFPS).

It could be noted that in relation to the variable lie down - sit up for 30 s, control group of examinees has the lowest value of motor abilities, whereas experimental group has the highest value. In relation to sit and reach control group has the lowest and experimental group has the highest value.

Graph 3 Ellipses (interval of trust) of experimental and control group of examinees in relation to two most discriminative conditions: flamingo (EFFL) and sit and reach (EFPS)



Legend: experimental group (1); control group (2); flamingo (EFFL); sit and reach (EFPS)

On Graph 3, the apcis (horizontal axis) represents flamingo (EFFL), and ordinate (vertical axis) is sit and reach (EFPS).

It could be noted that in relation to the variable flamingo, experimental group of examinees has the lowest value of motor abilities, whereas control group has the highest value.