

THE RELATIONS OF COORDINATION AND ARTISTIC GYMNASTICS COMPULSORIES IN PHYSICAL EDUCATION

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Abstract: *The subject of research is motor abilities of coordination. Coordination, as the basic motor ability, is very complex, as the levels of the movement regulation can change. In addition, the regulation includes energetic mechanisms as well as mechanisms of simple structuring of movement. The appropriate level of coordination is necessary during each motor activity. Size and character of coordination depend mostly on a kind of activity and on forms of the specific ability demonstration, when specific branch or discipline is concerned. The research included the deliberate and specially selected sample of examinees, who are defined as physical education female students. The sample included the two complete generations of third year female students ($n = 34$) at the Faculty of Physical Education, the University of Pristine. For all the variables, which are the subject of the research, the basic, descriptive, statistical parameters were established. The multi-variant procedures were used in the research.*

Keywords: *coordination, motor abilities, motor and theoretical knowledge, physical activities of PE and Sport students, anthropological status*

1 Introduction

In all the sciences, whose goal is the study of man, there is the tendency, not only to notice his characteristics and abilities, but also to define and connect them into some bigger wholes. In order to get the system, which is defined by certain dimensions, it is necessary to make the appropriate classification first. By using this classification, we can get the approximate image of the anthropological status of an individual. The influence of certain body activities depends on complexity degree of their structural elements, mutual correlation of these elements, as well as on the degree of involvement of certain systems and subsystems of an organism during these activities. Body activities, which are at the higher level of hierarchy, will not be always and adequately valued, according to its influence, when the behavioural-educational practice is concerned. In order to deal with the status of motor abilities as with the primary thing, the valorisation of evaluation of

motor abilities, during the classes, is necessary. The main reason for it is that the estimation of motor abilities does not make sense unless the results of motor tests are estimated and graded. Three aspects are estimated, when every individual student is concerned, according to the concept of evaluation. These aspects are: motor abilities, motor and theoretical knowledge. This way we get the complete information about how much a female student can do (motor abilities) and how much she knows (motor and theoretical knowledge). The plans and programs of the study, at all the Faculties of Physical Education, are made in order to educate future physical education teachers, who will perform the teaching of physical education at schools. Generations of individuals (female students) have finished this kind of studies and left, as the evaluation of results during the studies, the grades of certain physical education teachers, when some areas are concerned. Success during the studies is connected to a number of different circumstances, which can be of great significance. This research wants to determine the expected relations that can exist between the success during the studies of physical education and motor abilities of female students.

Experts and scientists were very interested in coordination, which is the basic motor ability. However, this motor ability is not completely researched, as the research results are not sufficient and do not give enough information. Coordination can be defined as the appropriate and controlled, energetic, temporal and spacious organization of movements into the whole. Coordination, as the basic motor ability, is very complex, as the levels of the movement regulations can change. In addition, the regulation includes energetic mechanisms, as well as mechanisms of simple structuring of movement.

Considering the whole complexity of coordination, Hošek-Momirovic (1981) defined coordination as the ability of regulative exploitation of the energetic, tonal, programmatic, analytical potential, in order to realize the complex, mobile structures. The appropriate level of coordination is necessary in every kind of motor activity. Size and character of coordination depend mostly on a kind of activity and on forms of the specific ability demonstration, when specific branch or discipline is concerned. Considering all this, coordination can be divided into general and specific. The specific coordination is divided into one-sided coordination (we can see it when sportsmen go in for one sport discipline) and into many-sided coordination (when sportsmen, considering the form of movements, go in for complex sports disciplines).

2 Method

2.1 The sample of examinees

The research included the deliberate and specially selected sample of examinees, which are defined as physical education female students (that have, as we expected, the above average level of motor abilities). The sample of the physical education female students is chosen from the overall number of physical education female students at the University of Pristine.

The sample of the examinees from Pristine includes the two complete generations of third year female students. During the period of the research of the basic motor abilities (in 1997/98 and 1998/99 academic years), the students were 21 years old, some of them were six months older or younger. The number of examinees is 34, and it was completed after graduation at the Faculty of Physical Education, the University of Pristine.

2.2 The sample of variables

The battery for the estimation of coordination consists of the following tests:

2.2.1 Contraction and stretch (MGRO)

The Instruments: a mat and a stopwatch.

The task: an examinee is supposed to lie on a mat on her back; she performs a contraction in a hip joint and knees; she lifts her legs towards the chest, and put her arms around the knees. At the signal `now` she stretches and rotates around the vertical axis to the right for 360° , and after that she rotates in the opposite direction for 360° . She is supposed to perform four rotations, and to return to the original position, with her back on a mat.

Evaluation: The time necessary for the completion of the whole task is measured in 1/10 sec. (2-3).

2.2.2 Joined legs bounce with air rotation to the left and to the right (MOTD) and (MOTL).

The instruments: firm surface, a chalk, a school compass. A circle, whose diameter is 1.5 m, is drawn on the floor, and it is divided into segments of 15° .

The task: an examinee is supposed to stand straight on the floor, with her arms on the waist. She stands in the centre of the already made circle, with her face towards the zero

position. With a joined legs bounce she performs a maximal rotation to the left and to the right around the vertical axis, and returns, with stability, to the original position.

Evaluation: the task is performed three times, and the best trial represents the result, which is encircled on 5° to the closest value.

The grade at the final exam was used in order to estimate the successful study of the artistic gymnastics curriculum.

2.2.3 The results processing

Milan Dolga, the graduate mathematician from Novi Sad, suggested and made the choice and the order of the use of mathematical and statistical procedures and methods, as well as data processing. The results of the research were processed at the Multi-Variety-Analysis –Soft agency in Novi Sad. The data analysis was realized with the help of SPSS, which is the statistical package for data processing.

The basic descriptive, statistical parameters were established for all the variables, which are the subject of the research. According to the following measures, the normal distribution of the variables was researched:

- The twist coefficient (Skewness)
- The round coefficient (Kurtosis).

The multi-variant procedures were used in this research and those were: the multi-variant analysis of the variable (MANOVA) and the discriminative analysis. Also, the mono-variant procedures were used and those were: the mono-variant analysis of the variable (ANOVA), Student's t-test and the interval of entrust. The procedures were applied to the difference of the corrected environments. According to the mentioned procedures, we can only draw a conclusion whether the examined groups are similar or not. The application of the procedures, which are used in order to calculate the measure, gives the new dimension to this research. By finding the discrimination coefficient, the characteristics, which determine the specific group, and the characteristics, which should be excluded from the further processing, are separated. It is necessary to reduce the examined area. In order to research the examined phenomenon in the best possible way, the unity within the groups and the distance between them are presented.

According to the mentioned distance, the differences between the groups are classified. Furthermore, the cluster analyses differences are classified on the distance matrix. The next thing to do is to present the mentioned classification by charts.

Therefore, it is easy to notice, according to the mentioned characteristics, which groups are similar and which are not.

3 Results

The chart 1 shows the grade percentage at the final, artistic gymnastics exam, when the whole sample of examinees is concerned.

Chart 1. *The grades at the artistic gymnastics exam*

	6	7	8
n	24	6	4.
%	70.59	17.65	11.76

The results from the chart 1 determined the way of the further analysis of the received results, when the whole sample of thirty-four physical education female students is concerned. It can be concluded that the female students did not achieve high grades (9 or 10), at the final artistic gymnastics exam. That is how the female examinees were divided into two groups:

- Group I - female students whose grade was 6 at the artistic gymnastics exam (n=24)
- Group II - other female students who achieved better grades (7 and 8) at the artistic gymnastics exam (n=10).

3.1 The analysis of the examinees` coordination movements

According to results from the chart 2, it is possible to conclude that the values of all the characteristics, of the first group of the examinees, are within relatively possible limits.

Chart 2. *The central and the dispersive parameters of the female examinees, considering their coordination movements- I group (n=24).*

	mean	SD	min	max	coefficient	interv	.pov.
MGIO	3.91	.72	2.97	5.23	18.39	3.61	4.21
MOPL	396.88	37.53	360.00	480.00	9.46	381.02	412.73
MOPD	379.38	44.78	315.00	480.00	11.80	360.46	398.29

Chart 3. *The central and the dispersive parameters of the female examinees, considering their coordination movements-II group (n=10).*

	mean	SD	min	max	coefficient	interval	.pov.
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MGIO	3.77	.75	2.81	5.05	20.01	3.23	4.31
MOPL	418.60	47.85	360.00	496.00	11.43	384.36	452.84
MOPD	435.50	62.87	360.00	540.00	14.44	390.51	480.49

In spite of the fact that the results of this group of the examinees are within relatively possible limits, the biggest deviation from the average value, according to the variation coefficient and the standard deviation, is when the trait MGIO (20.01) is concerned.

Chart 4. *The parameters that deviate from the normal distribution of coordination movements of the examinees (I group).*

	median	Skewness	Kurtosis
MGIO	4.07	.46	-.81
MOPL	405.00	.57	-.76
MOPD	360.00	1.06	.30

According to Skewness's enlarged values, the asymmetrical distribution is mostly positive. It means that the curve of the results distribution goes towards the better results, when MOPD traits are concerned.

Chart 5. *The parameters that deviate from the normal distribution of coordination movements of the examinees (II group).*

	median	Skewness	Kurtosis
MGIO	3.76	.19	-1.20
MOPL	427.50	-.02	-1.23
MOPD	450.00	.08	-1.13

Kurtosis's negative values (the curve is smashed) can be seen when all the researched traits are concerned.

Chart 6. *The test of the normal distribution (Kolmogorov-Smirnov) of one group of the examinees (I group).*

n = 24	max D	lambda	p
MGIO	.120	.587	.881
MOPL	.184	.904	.388
MOPD	.216	1.056	.215

When coordination movements are concerned, the traits distribution, of the first group of the examinees, is mainly within the limits of the normal distribution.

Chart 7. *The test of the normal distribution (Kolmogorov-Smirnov) of one group*

of the examinees (II group).

n = 10	max D	lambda	p
MGIO	.086	.272	1.000
MOPL	.176	.557	.916
MOPD	.145	.458	.985

When coordination movements are concerned, the traits distribution, of the second group of the examinees, is mainly within the limits of normal distribution.

3.2 The differences among coordination movements in the examined groups

In this part of the research, it will be determined if there are any significant differences among coordination movements of the examinees of both groups, or not.

Chart 8. *The importance of the difference among the examinees, when their coordination movements are concerned.*

	n	F	p
MANOVA	3	3.121	.041

According to the fact that $p=.041$ of the MANOVA analysis, it is obvious that there is the significant difference between the two groups of the examinees, concerning the three traits of coordination movements.

Chart 9. *The importance of the difference among the coordination movements of the examinees*

ANOVA	F	p
MGIO	.262	.612
MOPL	2.012	.166
MOPD	8.710	.006

By analysing the ANOVA chart, it is obvious that there is the statistically important difference, which is evident between the two groups of the examinees, when the trait (MOPD) of coordination movements is concerned (as $p=.006$).

Chart 10. *The importance of the difference between the certain groups of the examinees for MOPD test*

t-test	g1	g2	mean	value	t	p
MOPD	Group I	Group I	379.375	435.500	2.951	.006

According to the received results, it is obvious that there is the significant difference between the two groups of the examinees for (MOPD) trait, as $p=.006$. The average value for the first group (379.375) is lower than the average value of the second group (435.50).

Chart 11. *Importance of difference among the coordination movements of the examinees*

	n	F	p
Discriminative NA	3	3.121	.041

According to the fact that $p=.041$ for the three synthesized traits of the examinees` coordination movements, when the discriminative analysis is concerned, we can conclude that there is the significant difference and clearly defined limit among at least some examinees.

Chart 12. *The discrimination coefficient among the examinees, when their coordination movements are concerned*

	<i>discrimination coefficient</i>
MGIO	.028
MOPL	.019
MOPD	.244

By analysing the discrimination coefficient, it is obvious that the biggest contribution to the discrimination, among different examinees (when the difference is the biggest), is for the traits: (MOPD) (.244), (MGIO) (.028), (MOPL) (.019).

4 Discussion

According to the researches made so far, we can logically conclude about the characteristics of each group. The researches included the sample of thirty-four examinees, as well as the applied methods such as: the MANOVA method, the discriminative method, the ANOVA method and t-test. The research also included the comparison of the discrimination coefficient and the average values, when coordination movements are concerned. Considering the fact that $p<.1$, the MANOVA analysis (.041)

and the discriminative analysis (.041), for some or for all the three traits, we can say that there is the difference between the groups. It means that there is the significant difference, when coordination movements are concerned, between the groups of the examinees (I and II group). Therefore, the clearly defined limit is established between them, and according to it we can formulate reliable prognoses.

By analysing the ANOVA charts and the discrimination coefficient charts, it is obvious that the researched area is not reduced. It is necessary to mention that the area of the coordination movements of the latent (hidden) characteristics, or better to say variables, which contribute, together with other characteristics, to the construction and creation of differences among certain levels. But, when those variables are concerned, the difference among them is not so distinct (MGIO, .612,), (MOPL, .166) (Chart 9.).

Chart 13. *The uniformity of the examinees*

	m/n	%
Group I	19/24	79.17
Group II	6/10	60.00

19 out of 24 examinees possess the characteristic of the examinees of the first group. That characteristic is defined by the earlier analyses. The uniformity is high (79.167%). Only 5 examinees of this group possess the characteristic of the second group. 6 out of 10 examinees possess the characteristic of the examinees of the second group. That characteristic is defined by the earlier analyses. The uniformity is high (60.000%). Only 4 examinees of this group possess the characteristic of the other group.

Chart 14. *Mahalanobis`'s distance among the examinees*

Group I	.00	1.19
Group II	1.19	.00

By calculating Mahalanobis`'s distance among the examinees, when their coordination movements are concerned, we can only present one more indicator of similarities or differences between the groups. The distances of different analyses can be

compared, if we apply them to the groups of the examinees. According to the results on the chart 14, it is obvious that the distance between the centres of the first and the second group is bigger.

5 Conclusion

According to the received results, we can conclude the following things: There are the statistically important differences, when the ability to surmount the movements is concerned. The examinees of the second group showed the greater ability for it.

As the examinees of the second group achieved the better result at the final artistic gymnastics exam, we can conclude that students with better coordination have greater success in learning the artistic gymnastics curriculum.

6 References

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