A COMPARATIVE ANALYSIS OF DIFFERENT MODELS FOR MANAGEMENT OF THE TEACHING PROCESS IN PHYSICAL EDUCATION

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Abstract

This research has been conducted with the aim of defining and analysing models for management of the teaching process in Physical Education. With this aim, an analysis was performed on 120 Physical Education lessons held by 55 female students and 65 male students. Data on the quality of the teaching process and the process of interpersonal communication were collected by the use of direct observation method of public lessons held by students, and by the application of the *Teaching process evaluation questionnaire UN1* and *Modalities of interpersonal communication evaluation questionnaire (UN1)*. In order to analyse modalities of managing the teaching process or stiles of interpersonal communication, both subsamples of subjects were classified according to values of the variables of the teaching process in three groups: subjects with below average results, subjects with average results and subjects with above average results. The obtained results confirmed statistically significant differences regarding stiles of management or communication modalities among subjects with different results for implementation of teaching. Based on the findings, a model was defined for successful management of the teaching process in Physical Education, based on communication and content clarity, clear and decisive expression of personal attitudes and a high degree of openness and cooperation with pupils.

Key words*: kinesiological education, communication stiles, quality of teaching*

Introduction

Quality of the teaching process is a result of complex teacher-pupil-content relationships within a wider social context. The area of kinesiological education additionally complicates things as Physical Education not only includes teaching skills and offering new knowledge, but also transforms pupil's overall anthropological status. As a consequence of the previously mentioned approach, the effects of Physical Education can be seen in both quantitative and qualitative changes in a wider spectre of morphological, motor, functional, as well as cognitive and conative characteristics of pupils (Babin, Bavčević & Vlahović, 2013; Babin, Vlahović & Bavčević, 2008; Bavčević, Babin & Vlahović, 2005; Bavčević, Vlahović & Katić, 2008; Bavčević, Zagorac & Katić, 2008; Vlahović, Bavčević & Katić, 2007; Zagorac, Retelj, Babić, Bavčević & Katić, 2008). Such comprehensive impact assumes professional management of the process aiming to optimise the effects of educational work. Therefore, an important question imposed on kinesiological didactics as a scientific discipline is defining the role of a teacher as a manager of the overall teaching process.

A great number of research indicate the significance of the teacher's role being a moderator of all aspects of the teaching process in Physical Education, from drawing subject plans and programmes, lesson plans, to implementation and control (Babin, Bavčević & Prskalo, 2010; D. Bavčević, Tonči Bavčević & Teo Bavčević, 2012; Teo Bavčević, Tonči Bavčević & D. Bavčević, 2012a, 2012b; Bavčević, Babin & Prskalo, 2006). According to the mentioned, an imposed imperative refers to defining optimal models for managing the teaching process, based on optimally structured communication process, which largely contributes to the quality of the teaching process. An effective teacher's operation, aiming to improve the teaching results as a whole, depends on defining optimal communication modalities, applying specific teaching situations and their successful implementation.

A great number of previous studies dealt with issues regarding the structure of communication in teaching. Young (1984), within the analysis of communication in teaching, states that the process of communication in teaching is mostly indoctrinating, cognitively asymmetric and oriented toward transmission of simple information without experiential background. He also emphasises that the majority of communication in teaching is based on a monologue. After analysing the teaching process Piccolo, Harbaugh, Carter, M.M. Capraro, and R.M. Capraro (2008) present similar findings. The authors indicate that the teaching communication dominantly consists of the teacher's communication, in which pupils are only included on the bases of the question-answer method. The stated led to the conclusion that there is an

insufficient involvement of pupils in the communication process, or we can say there is an expressed communication asymmetry.

Also, there is a question regarding defining communication modalities within the teaching process. Wells (2007) indicates two functions of communication, monologic and dialogic. The monologic communication is oriented toward transmission of information without expecting feedback, while the dialogic communication is a two-way process and it includes feedback. Elaborating further the mentioned statements, it is also mentioned that each of the two communication functions is in its genesis dialogic, and each statement is a link within the dialog chain. Therefore, when starting communication we necessarily continue or react to positions someone has already expressed, and our statements are also formed according to expectations of persons they are referred to. A somewhat more complex model is suggested by Ametller, Leach and Scott (2007) in their research. The authors define the teaching communication in two dimensions: authoritative / dialogic, and interactive / non-interactive. In the authoritative communication the teacher controls direction of the conversation in order to focus it on the set point of view, while in dialogic communication the discourse is open for different points of view and attitudes. Interactive communication includes more interlocutors, as opposed to non-interactive communication which includes only the teacher.

Another problem refers to modalities of communication of teachers as managers of the teaching process and pupils as its active participants. Forrest (2008) identifies three different modalities for designing communication by a teacher: 1) expressive message design logic is oriented toward research of attitudes in relation to the current situation of the teaching process without focusing on the real teaching problem with the aim of including pupils in work; 2) conventional message design logic is oriented toward forming a message adapted to a specific teaching problem with the aim of obtaining the desired answer and encouraging pupils to cooperate; 3) rhetorical message design logic is oriented toward strategic management of the teaching process through achieving a social consensus, and with the aim of meeting the previously set tasks. Depending on the logic used, individuals differently design and perceive messages. It is obvious that teachers generate communication messages in different ways. Also, it can be assumed that there are different modalities of communication formed by pupils as well. Arnot and Reay (2007) identified four types of pupil communication: 1) communication in the classroom is defined as communication related to the teaching and learning processes; 2) communication in a subject refers to communication related to contents of that subject; 3) identity communication refers to achieving social bonding, humour, friendly conversation and expressing one's belonging to a subsocial category; 4) code communication refers to rules for determining the teaching process and its interpretation by pupils.

It can be concluded that the teaching communication is characterised by the existence of a large number of communication modalities in both teachers and pupils. In order to explain scientifically such a complex phenomenon, and to give answers to questions or relations between the communication modalities and the quality of implementation of the teaching process, it is necessary to analyse structures of interpersonal communication as a whole, as well as to analyse manifestation of the communication dimensions.

The aim of this paper is to define management modalities, based on interpersonal communication in Physical Education, and their correlation to the quality of implementation of the teaching process.

Methods

Sample of subjects

The research included 120 subjects, 55 female students and 65 male students from the University of Split, Faculty of Kinesiology, in the ratio as follows:

- 3rd year of study – female students: 27 subjects
- 3rd year of study – male students: 33 subjects
- 4th year of study – female students: 28 subjects
- 4th year of study – male students: 32 subjects

Students on the project had passed, before the testing started, professional-pedagogical practice in the course Kinesiological Didactics for both primary and secondary school programmes in the duration of fifteen days. Subjects voluntarily participated in the project after learning the research subject and the testing procedure.

Methodology of data collection

Data on the quality of the teaching process and the process of interpersonal communication were collected by the method of direct observation of public lessons held by students and by the application of the *Teaching process evaluation questionnaire UN1* and *Modalities of interpersonal communication evaluation questionnaire (UN1)* (Bavčević, 2010). Evaluation of the mentioned dimensions was carried out by five evaluators, all holding a university degree in kinesiology. Evaluators learned all the parameters as well as the marking methodology before the testing started.

Described methodology resulted in five parameters for describing the quality of the teaching process: *1) Quality of introductory lesson part (NUDS), 2) Quality of preparatory lesson part (NPDS), 3) Quality of main A lesson part (NGADS), 4) Quality of main B lesson part (NGBDS), 5) Quality of closing*

lesson part (NZDS), and also in three variables for describing modalities of interpersonal communication: *1) Technical and tactical communication dimension (KTS), 2) Assertiveness and formality dimension (KAF), 3) Emphatic and closeness dimension (KEP)*.

Methods of data processing

Data processing included calculation of descriptive statistics parameters as follows: mean ($\bar{x}$), standard deviation (σ), skewness (α_3), kurtosis (α_4). Test for normality distribution of data was implemented by the use the Kolmogorov-Smirnov Test and calculating maximum deviation between the empiric and theoretical cumulative relative frequency (max d). Dividing subsamples based on the criterion of quality of the implementation of the teaching process in groups was implemented by the application of taxonomy following the K-means method. Significance of differences between modalities of interpersonal communication was tested by the application of discriminant analysis. Software Statistica version 7.0 was used for statistical data processing.

Results

Table 1 shows descriptive statistics parameters, and the Kolmogorov-Smirnov Test for normality distribution of data for the subsamples of female and male students.

By comparing the results of the means ($\bar{x}$) and the belonging standard deviations (σ) of both subsamples of subjects, it can be concluded that the average deviation of the result does not exceed one third of the value of the arithmetic mean for all variables. Values for the skewness (α_3) range within an interval from -1.31 to -0.10 for female students, and from -0.85 to 0.32 for male students, indicating a high degree of skewness for all variables. The values of the kurtosis (α_4) assume values within an interval from -1.04 to 1.01 for female students, and from -1.31 to 0.05 for male students, not indicating a more significant deviation from the referent values of the normal distribution for all variables.

Since results of the Kolmogorov-Smirnov Test show that maximum deviations between the empiric and theoretical cumulative relative frequencies (max d) do not exceed the critical value of the KS-Test of 0.180 for female students and 0.166 for male students for all variables, it can be concluded that there is no statistically significant deviation of empiric distribution from the normal distribution in any variable.

Table 1 Descriptive statistics parameters and the Kolmogorov-Smirnov Test for normality distribution of data

	Female students					Male students				
Variable	$\bar{x}$	**σ**	**α_3**	**α_4**	**max d**	$\bar{x}$	**σ**	**α_3**	**α_4**	**max d**
NUDS	3.94	0.65	-0.10	-1.04	0.101	3.61	0.90	-0.25	-1.31	0.137
NPDS	3.65	0.63	-0.61	-0.10	0.090	3.33	0.67	0.32	-0.56	0.074
NGADS	3.72	0.63	-0.22	-0.71	0.080	3.61	0.57	0.26	-0.75	0.092
NGBDS	3.60	0.87	-0.73	-0.05	0.115	3.51	0.81	-0.37	-0.56	0.083
NZDS	3.96	0.69	-0.93	0.69	0.128	3.79	0.73	-0.51	-0.65	0.095
NGOS	3.24	0.99	-0.58	-0.08	0.096	2.89	1.09	0.17	-0.83	0.115
KTS	3.87	0.65	-0.74	-0.38	0.142	3.65	0.54	-0.00	-0.47	0.064
KAF	3.52	0.50	-0.33	0.34	0.113	3.33	0.45	0.31	-0.34	0.072
KEP	3.48	0.49	-0.15	-0.77	0.066	3.34	0.53	-0.24	0.06	0.087

Threshold max d $(p<0.05)_{female}$ = 0,180; Threshold max d $(p<0.05)_{male}$ = 0.166

Note: $\bar{x}$ – arithmetic mean, σ – standard deviation, α_3 – skewness, α_4 – kurtosis, max d – maximum deviation between the empiric and theoretical cumulative relative frequency

By application of taxonomy following the K-means method both subsamples were divided according to the criterion of implementation quality of the teaching in three groups (*Table 2*):

- ***Group 1*** – average results of female students (N=27) / male students (N=16)
- ***Group 2*** – above average results of female students (N=21) / male students (N=22)
- ***Group 3*** – below average results of female students (N=7) / male students (N=27)

By comparing the arithmetic means and belonging standard deviations (σ) in all three groups and for both subsamples of subjects, it can be concluded that the average deviations of the results do not exceed one third of the mean value of each variable of the teaching process. Therefore, the mentioned average deviations may be considered statistically acceptable.

Variance analysis confirmed statistically significant quantitative differences between the three groups for all variables of the teaching process both in the subsample of female students F:[14.07, 69.90]; p:[0.00, 0.00]), and in the subsample of male students (F: [11.66, 81.65]; p:[0.00, 0.00]).

The values of the Euclidian distances (d) for both subsamples of subjects show that greatest distance in the area of variables of the teaching process were noticed between groups 2 and 3, that is between subjects with above average results and subjects with below average results (d_{female} = 1.60; d_{male} = 1.17). The next distance in its size was noticed between groups 1 and 3, that is between subjects

with average results and subjects with below average results (d_{female} = 0.89; d_{male} = 0.79), while the shortest distance was noticed between groups 1 and 2, that is between subjects with average results and subjects with above average results.

Table 2 Taxonomy following the K-means method

		Group 1 N = 27		Group 2 N = 21		Group 3 N = 7			
Female students	**Variable**	**x̄**	**σ**	**x̄**	**σ**	**x̄**	**σ**	**F**	**p**
	NUDS	3.75	0.58	4.39	0.48	3.31	0.44	14.07	0.00
	NPDS	3.57	0.42	4.07	0.47	2.69	0.56	24.82	0.00
	NGADS	3.45	0.41	4.32	0.30	2.96	0.48	46.29	0.00
	NGBDS	3.40	0.50	4.37	0.37	2.06	0.58	69.90	0.00
	NZDS	3.83	0.49	4.48	0.32	2.87	0.70	33.89	0.00
				d					
	Group 1	0							
	Group 2	0,75		0					
	Group 3	0,89		1,60		0			
		Group 1 N = 16		**Group 2** N = 22		**Group 3** N = 27			
Male students	**Variable**	**$\bar{x}$**	**σ**	**$\bar{x}$**	**σ**	**$\bar{x}$**	**σ**	**F**	**p**
	NUDS	4.33	0.32	4.19	0.57	2.71	0.47	81.65	0.00
	NPDS	3.07	0.45	4.00	0.48	2.94	0.48	33.12	0.00
	NGADS	3.44	0.41	4.21	0.34	3.23	0.38	44.25	0.00
	NGBDS	3.47	0.73	4.26	0.36	2.93	0.63	31.76	0.00
	NZDS	3.77	0.51	4.28	0.49	3.40	0.78	11.66	0.00
				d					
	Group 1	0							
	Group 2	0.69		0					
	Group 3	0.79		1.17		0			

Note: x̄ – arithmetic mean, σ – standard deviation, F – value of the F-test, p – level of significance, d – Euclidean distance

Table 3 shows descriptive statistics parameters of all three groups in the area of interpersonal communication for the subsamples of female and male students.

Analysis of the obtained results indicates that the values of arithmetic means of variables of the process of interpersonal communication (x̄) for both subsamples of subjects correspond to the taxonomy implemented based on the quality of implementation of the teaching process. Namely, group 1 for both subsamples of subjects, that is subjects with average results, achieve average results in all variables of interpersonal communication. Furthermore, both female and male students from group 2, that is subjects with above average results, achieve, from the point of view of quantity, the highest results in all variables of interpersonal communication, while group 3, that is subjects with below average results achieve the lowest results in the mentioned variables. Therefore, the values of variables *Technical and tactical communication dimension (KTS), Assertiveness and formality dimension (KAF),* and *Emphatic and closeness dimension (KEP)* reflect the logic of taxonomy defined according to the criterion of performance in teaching, and also confirm correlation between the quality of implementation of the teaching process and manifestation of communication modalities.

Analysis of the obtained values of the arithmetic means (x̄) and standard deviations (σ) of each variable indicate an acceptable level of average deviations of results from the values of the belonging arithmetic means for all three groups and for both subsamples of subjects.

Table 3 Descriptive statistics parameters of all three groups in the area of interpersonal communication

		Group 1		Group 2		Group 3	
	Variable	**x̄**	**σ**	**x̄**	**σ**	**x̄**	**σ**
Female students	**KTS**	3.74	0.54	4.33	0.38	3.00	0.61
	KAF	3.38	0.43	3.87	0.33	3.00	0.52
	KEP	3.39	0.44	3.77	0.42	2.94	0.27
Male students	**KTS**	3.60	0.35	4.15	0.36	3.27	0.43
	KAF	3.17	0.35	3.67	0.43	3.15	0.36
	KEP	3.27	0.29	3.81	0.35	2.99	0.47

Note: x̄ – arithmetic mean, σ – standard deviation

Table 4 shows results of discriminant analysis between the groups and for both subsamples of female and male students for the dimensions of interpersonal communication.

Conducted analysis on both subsamples of subjects resulted in isolation of one significant discriminant function. The belonging eigenvalues (λ_{female} = 1.140; λ_{male} = 1.214) indicate a statistically satisfactory level of separation strengths of the defined functions. A possibility of differentiating the groups of female and male students based on isolated discriminant functions is confirmed by the belonging coefficients of canonical discriminant (Rc_{female} = 0.730; Rc_{male} = 0.740). The values of Wilks' lambda (Wilks λ_{female} = 0.460; Wilks λ_{male} = 0.428) indicate a statistically significant differences between the groups of female and male students, and confirm the quality of the defined discriminant models. Statistical significance of the obtained discriminant functions was tested by the use of the Bartlett's χ^2-test. The obtained results (Female: χ^2 = 39.579; df = 6; p = 0.000; Male: χ^2 = 51.777; df = 6; p = 0.000) confirmed statistical significance of the discriminant models.

Table 4 Discriminant analysis between the groups for the variables of interpersonal communication modalities.

		λ	R_c	Wilks' λ	χ^2	df	p
Female students	**Df_1**	1.140	0.730	0.460	39.579	6	0.000
	Df_2	0.015	0.123	0.985	0.775	2	0.679
Male students	**Df_1**	1.214	0.740	0.428	51.777	6	0.000
	Df_2	0.056	0.229	0.947	3.300	2	0.192

Note: Df_1, Df_2 – discriminant functions, λ – eigenvalue, R_c – coefficient of canonical determinant, Wilks' λ – values of Wilks' lambda, χ^2 – values of the chi-square, df – number of the degrees of freedom, p – levels of significance

Table 5 shows the structure of discriminant functions between the groups for the dimensions of the interpersonal communication, as well as the centroids of the groups for both subsamples.

Matrix of the structure of the subsample of female students shows that variable *Technical and tactical communication dimension (KTS)* has the highest degree of correlation with the discriminant function (F_{KTS} = -0.84), and therefore has the highest relative contribution to the strength of the discrimination model. A significant correlation with the discriminant function is also found in variables *Assertiveness and formality dimension (KAF)* (F_{KAF} = -0.71) and *Emphatic and closeness dimension (KEP)* (F_{KEP} = -0.63).

In the subsample of male students the highest degree of correlation with discriminant function is noticed in variable *Technical and tactical communication dimension (KTS)* (F_{KTS} = 0.92) which means it achieve the greatest partial strength contribution of the discrimination model. The following variable, as far as the size is concerned, is *Emphatic and closeness dimension (KEP)*, which is also in high correlation with the discriminant function (F_{KEP} = 0.84). Significant correlation with the discriminant function is also noticed in variable *Assertiveness and formality dimension (KAF)* (F_{KAF} = 0.57).

Inspecting the position of centroids of the groups at the scale of significant discriminant functions (Df_1), it can be noticed that group 1, that is the group of subjects with average results, and group 3, that is the group of subjects with below average results, are positioned on the positive side of the function (Female: $c_{Group\ 1}$ = 0.40; $c_{Group\ 3}$ = 1.96; Male: $c_{Group\ 1}$ = -0.20; $c_{Group\ 3}$ = -1.05) for both subsamples of subjects. Both for female and male students from group 2, that is the group with subjects with above average results, they are positioned on the negative side of the function (Female: $c_{Group\ 2}$ = -1.16; Male: $c_{Group\ 2}$ = 1.43). Comparison of the previously mentioned results with the structure of the discriminant functions, it can be stated that group 2, that is the group of subjects with above average results, achieved the highest results for all variables of interpersonal communication. As far as the values of the results are concerned, the following is group 1, that is the group of subjects with average results, while group 3, that is the group of subjects with below average results, achieve on average lower values in the area of interpersonal communication variables. The obtained results refer to both subsamples of subjects. The mentioned statements are in conformity with the previously presented descriptive statistics results.

Table 5 Structure of discriminant functions and centroids of the groups.

		Female students		Male students	
	Variable	**Df_1**	**Df_2**	**Df_1**	**Df_2**
F	**KTS**	-0.84	-0.53	0.92	0.11
	KAF	-0.71	0.57	0.57	-0.79
	KEP	-0.63	-0.27	0.84	0.02
c	**Group 1**	0.40	-0.11	-0.20	0.40
	Group 2	-1.16	0.07	1.43	-0.10
	Group 3	1.96	0.22	-1.05	-0.16

Note: Df1, Df2 – discriminant functions, F – correlations between variables and discriminate functions, c – centroids of the groups.

Table 6 shows the classification matrix for the groups including both subsamples of female and male students, as well as the number and percentage of the correctly classified entities. The matrix was calculated by the use of discriminant function of differences between the groups for the dimensions of interpersonal communication.

For the subsample of female students the total percentage of the correctly classified entities by the use of the obtained discriminant function ($\%_{\Sigma}$ = 76.36) indicates a satisfactory degree of prediction for belonging to a group based on dimensions of the quality of interpersonal communication. Using the discriminant model, 25 female students were classified as entities from group 1, that is as subjects with average results. Furthermore, 23 female students were classified as entities from group 2, that is female subjects with above average results were, while 7 female students were classified as entities from group 3, that is female subjects with below average results.

Comparing the percentage of the correctly classified entities in group 1 ($\%_{Group\ 1}$ = 74.07) with the belonging a priori classification value ($p_{a(Group\ 1)}$ = 0.49), it is noticed that there is a significantly higher degree of a correct prediction while using the obtained discriminant function. The number of correctly classified entities ($f_{Group\ 1}$ = 20) from group 1 is significantly higher than the number of incorrectly classified entities ($f_{Group\ 2}$ = 5; $f_{Group\ 3}$ = 2).

The percentage of the correctly classified entities from group 2 ($\%_{Group\ 2}$ = 80.95), is also significantly higher than the belonging a priori probability of classification ($p_{a(Group\ 2)}$ = 0.38). The number of the correctly classified entities ($f_{Group\ 2}$ = 17) is significantly higher than the number of the incorrectly classified entities ($f_{Group\ 1}$ = 4; $f_{Group\ 3}$ = 0).

Using discriminant function enables a significantly better degree of classifying entities ($\%_{Grupa\ 3}$ = 71.43) than the a priori probability of classification ($p_{a(Grupa\ 3)}$ = 0.13) from group 3 as well. The number of correctly classified entities ($f_{Group\ 3}$ = 5) from group 3 is significantly higher than the number of the incorrectly classified entities $f_{Group\ 1}$ = 1; $f_{Group\ 2}$ = 1).

In the subsample of male students the total percentage of the correctly classified entities by the use of the obtained discriminant function ($\%_{\Sigma}$ = 70.77) indicates a satisfactory degree for prediction of belonging to a group based on dimensions of the quality of interpersonal communication. Using the discriminant model 12 male students were classified as entities from group 1, that is as subjects with average results. Furthermore, 23 male students were classified as entities from group 2, and 29 male students were classified as entities from group 3, that is male subjects with below average results.

Defined discriminant function provides a better degree of a correct classification of entities for group 1 ($\%_{Group\ 1}$ = 43.75) than the method of a priori classification. The number of incorrectly classified entities from group 1 ($f_{Group\ 2}$ = 2; $f_{Group\ 3}$ = 7) was higher than the number of the correctly classified entities ($f_{Group\ 1}$ = 7).

Comparing the percentage of the correctly classified entities from group 2 ($\%_{Group\ 2}$ = 81.82) with the belonging a priori value of classification, it is noticed that there is a significantly higher degree of a correct prediction while using the obtained discriminant function. The number of the correctly classified entities ($f_{Group\ 2}$ = 18) from group 2 is significantly higher than the number of the incorrectly classified entities ($f_{Group\ 1}$ = 3; $f_{Group\ 3}$ = 1).

The percentage of the correctly classified entities from group 3 ($\%_{Group\ 3}$ = 77.78) is also higher than the belonging a priori value of classification ($p_{a(Grupa\ 3)}$ = 0.42). The number of the correctly classified entities ($f_{Group\ 3}$ = 21) is significantly higher than the number of incorrectly classified entities ($f_{Group\ 1}$ = 3; $f_{Group\ 2}$ = 3).

Table 6 Classification matrix

		%	$f_{Group\ 1}$	$f_{Group\ 2}$	$f_{Group\ 3}$
Female students			p_a=0.49	p_a=0.38	p_a=0.13
	Group 1	74.07	20	5	2
	Group 2	80.95	4	17	0
	Group 3	71.43	1	1	5
	Σ	76.36	25	23	7
Male students			p_a=0.25	p_a=0.34	p_a=0.42
	Group 1	43.75	7	2	7
	Group 2	81.82	3	18	1
	Group	77.78	3	3	21
	Σ	70.77	13	23	29

Note: % – percentage of the correctly classified entities, $f_{Group\ 1}$ – number of the correctly classified entities for group 1, $f_{Group\ 2}$ – number of the correctly classified entities for group 2, $f_{Group\ 3}$ – number of the correctly classified entities for group 3, p_a – a priori probability of classification, Σ – total percentage or the number of the correctly classified entities.

Discussion and Conclusion

With the aim of analysing the models for managing the teaching process, or the stiles of interpersonal communication, both subsamples of subjects were classified according to the values of the variables of the teaching process in all three groups.

Female subjects from group one had average results according to the criterion of the quality of the teaching process. For female students from this

group there were 27 entities, or 49.09 % of the total subsample of female subjects, and for male students this group included 16 entities, or 24.61 % of the total subsample of male subjects. For both subsamples this group achieved average values for all variables of the teaching process, with the exception of variable *Quality of introductory lesson part (NUDS)* in which male students achieved best results of all three groups of subjects.

Female subjects from group two had above average results according to the criterion of the quality of the teaching process. Female subjects from this group included 21 entity, or 38.18 % of the total subsample of female subjects, and 22 entities for male students, or 33.85 % from the total subsample of male subjects. For both subsamples of subjects this group achieved above average results in all variables of the teaching process, except for variable *Quality of introductory lesson part (NUDS)* in which male students achieved somewhat lower values in comparison to group 1.

Female subjects from group three had below average results according to the criterion of the quality of the teaching process. Female subjects from this group included 27 entities, or 12.73 % of the total subsample of female subjects, and 27 entities for male students, or 41.54 % from the total subsample of male subjects. For both subsamples this group achieved below average results in all variables of the teaching process.
Variance analysis confirms statistically significant differences between defined groups in all variables of the teaching process.
In order to define modalities of interpersonal communication and to determine their structure considering the contribution of implementation of the teaching process, manifestations of communication dimensions were analysed in all three groups of subjects, and especially for the subsample of female and male students. The obtained results were similar for both subsamples of subjects.

Female and male subjects with average results from group 1 achieve moderately high values of results in all variables of interpersonal communication. This led to the conclusion that manifestations of dimensions of interpersonal communication are adequate to the level of results achieved in implementation of each lesson part. Female and male students who achieve moderate level of technical and tactical articulation within the communication process, and who have average manifestation of relative assertiveness and formality dimension, as well as emphatic and closeness dimension, also achieve average results in implementation of the teaching process.
Female and male subjects with above average results from group 2 achieve the highest values of results in all variables of interpersonal communication. It can be concluded that high manifestations of interpersonal communication dimensions are adequate to above average level of results achieved in implementation of each lesson part. Male students with above average results manifest communication with a high degree of clarity in expression, syntax and logic. As far as relationship is concerned their communication is marked with a high degree of authority and determination in expression of their own attitudes as well as increased degree of positional fixation or communication asymmetry. At the same time, female and male students with above average results achieve in their communication a high degree of openness and cooperation with pupils, and they generate positively and emotionally oriented communication climate.
Female and male subjects with below average results from group 3 achieve the lowest values of the results in all variables of the process of interpersonal communication. The obtained results led to the conclusion that low manifestations of the dimensions of interpersonal communication results in the above average quality of implementation of the lesson parts. A low degree of technical and tactical content articulation, as well as a low degree of assertiveness and formality, as well as emphatic and closeness, consequently have a low degree of quality of the teaching process realisation.

Significance of differences between the groups in manifestations of the dimension of interpersonal communication was tested by the use of discriminant analysis. The obtained results confirmed statistical significance of the registered differences in both subsamples of subjects ($\chi^2_{\text{female students}} = 39.579$; $df_{\text{female students}} = 6$; $p_{\text{female students}} = 0.000$; $\chi^2_{\text{male students}} = 51.777$; $df_{\text{male students}} = 6$; $p_{\text{male students}} = 0.000$). The isolated discriminant function is of satisfactory separation strength and it provides a valid differentiation of groups both in the subsample of female students ($\lambda = 1.140$; $R_c = 0.730$; Wilks' $\lambda = 0.460$) and in the subsample of male students ($\lambda = 1.214$; $R_c = 0.740$; Wilks' $\lambda = 0.428$). It can be concluded that the analysed groups, globally speaking, differ significantly in manifestation of the dimensions of interpersonal communication.

In order to determine a partial contribution of each dimension for differing the groups, analysis was carried out on correlation of the variables of interpersonal communication with the isolated discriminant function.
In the subsample of female students the highest partial contribution of each dimension for differing the groups is achieved by variable *Technical and tactical communication dimension (KTS)* ($F_{KTS} = -0.84$). The obtained results led to the conclusion that the difference between female subjects with the average, above average and below average results are reflected in the aspects of speech clarity and intelligibility, correct syntax and logic. The following in its size is variable *Assertiveness and formality dimension (KAF)* ($F_{KAF} = -0.71$). Female subjects with different results also show differences in manifestation of assertiveness, or authority and determination in expressing their own attitudes, as well as in communication formality, that is in positional fixation and the degree of communication

symmetry. A significant contribution of differing groups is achieved by variable *Emphatic and closeness dimension (KEP)* (F_{KEP} = -0.63). From the previously mentioned it can be concluded that the degree of openness, cooperation with pupils, mutual appreciation, and emotions and closeness in the process of communication, significantly differs female subjects categorised according to the results achieved for implementation of the teaching process.

In the subsample of male students a partial contribution is achieved, as in the subsample of female students, in variable *Technical and tactical communication dimension (KTS)* (F_{KTS} = 0.92). Obviously, male students with different results differ in the first place according to the degree of technical and tactical articulation of communication with pupils. The following in its size is variable *Emphatic and closeness dimension (KEP)* (F_{KEP} = 0.84). It can be concluded that the difference between male subjects with average, above average and below average results is seen in the degree of openness, cooperation with pupils, mutual appreciation, and emotions and closeness in the process of communication. Variable *Assertiveness and formality dimension (KAF)* (F_{KAF} = 0.57) also achieves a high contribution to differing the groups. The obtained results led to the conclusion that male subjects with different results also differ in manifestation of authority and determination of expressing their own attitudes, as well as in positional fixation or communication symmetry.

Many authors dealt in their research with the topic of defining optimal conditions of communication modalities as well as with analysis of their influence on the quality of the teaching process. Ballard (1987) emphasises the importance of communication in the process of education, stressing the importance of enabling mutual interaction between pupils as well as the importance of providing a two-way teacher-pupil communication. When analysing the teaching communication Westerhof-Shultz and Weisner (2004) indicated that the dominant communication model existing in schools is based on the Socratic teaching methods. Unlike the dominating one-way monologic form, which is demotivating for students, the authors suggest a dialogic form of communication, based on a two-way democratic discourse with the aim of having a positive motivational structure and optimal teaching process as a whole. Wilen (2004) emphasises the importance of dialogic form of communication, indicating positive effects of such instructing model to encouraging critical thinking in pupils, solving problems and decision making. Identical conclusions were brought by Wells and Arauz (2006). The authors identify two types of the teaching communication: monologic and dialogic, emphasising the value of the dialogic form for the quality of the learning process. Nurzali and Khairu'l (2009) also highlight the importance of dialogically oriented communication process, stressing out that the two-way communication is shown to be essential in providing an effective process of teaching and learning. It can be concluded that between the experts there is a consensus regarding the form of communication since optimum modality is clearly dialogue as a communication tool.

An important aspect in defining modalities of the teaching communication refers to the dimension of positive fixation or communication symmetry. Chin (2006) stresses as a positive modality of communication, guided or oriented communication, as opposed to the dominating one where the teacher controls entirely the discourse. Role of the teacher in managing the learning process is to provide pupils with communication for thinking. In order to achieve this, the teacher must take into account communication reciprocity and encourage pupils to think deeper. Optimal modality of the teaching communication is considered by Saenz-Ludlow (2006) to be asymmetric-symmetric communication. During this type of communication, according to the educational needs, the phases of asymmetric communication in the phase of structuring the teaching content, alternates with the symmetric communication in the phase of the teaching discourse and cognitive elaboration by pupils. Reese (2007) emphasises the importance of free and altruistic communication, free from form of commands and fixed position of the teacher in generating a productive teaching environment. Pedota (2007) stresses out the importance of positive communication environment as a significant factor for quality of the teaching process. The author indicates that classroom environment in which pupils feel welcome and not threatened has a positive influence on motivation and the learning ability. Kjellin and Stier (2008) emphasise that in the teaching communication process, which is to some degree vertical due to its institutional role, it is necessary for the teacher to provide pupils with horizontal communication or a dialogue at the same level. As an important element of the teaching communication, Brown (2005) emphasises the congruent communication, or coordination of communicated messages and manifest behaviour. In the process of communication, congruence is indicated as an important factor for improvement of pupils' motivation regarding active participation in lessons and keeping a positive teaching environment. Also, the author gives certain guidelines for achieving the expression of the congruent communication, such as using techniques of active listening, coordinating non-verbal and verbal messages, avoiding obstacles in communication, emphatic behaviour with other pupils, and using culturally adequate communication processes. Piccolo et al. (2008) indicate that there is a need for increasing pupils' competencies with the aim of increasing their participation in the communication process. The authors particularly emphasise the importance of inclusion of pupils in the communication process through conversation and articulation of their own understanding of presented teaching content.

Analysing the previous findings leads to isolating two communication modalities which stand out as

positive determinants of the quality of the teaching process. The first modality refers to dialogic communication, or a two-way exchange of information and attitudes on a teacher-pupil relation. While analysing the teaching communication process, Fottland and Matre (2005) stated that the dialogic communication consisted of activity for creating meaning, and that it was possible to observe it as an intermediary process between two or more persons. The second modality refers to symmetry of communication, or establishing such communication dynamics, which allows a pupil to participate actively in designing a communication process.

In order to get a wider perspective from observation of the structure of the communication modalities and their influence on the quality of the teaching process, it is necessary to compare previous scientific knowledge and findings. The mentioned methodology gives an insight into a very complex structure of the process of interpersonal communication, and indicates that there are complex and multiple correlations of the communication process with the teaching process as a whole. It can be concluded that successful modalities of the teaching communication lay on dialogic and symmetric communication, but at the same time on a high level of content articulation as well as on manifestation of assertiveness, formality, emphatic and closeness dimensions. In other words, clear and understandable, as well as appropriate and logic communication in combination with a clearly defined position of the teacher as a moderator of the teaching process in the context of positive communication environment, based on dialogue and freedom of expression, represents a significant factor of a successful teaching process. In conclusion, it can be stated that the quality of implementation of the teaching process is possible only within the context of previously established positive communication relationships, which are realised as a complex function of manifestation of all communication dimensions.

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KOMPARATIVNA ANALIZA RAZLIČITIH MODELA VOĐENJA NASTAVNOG PROCESA U TJELESNOJ I ZDRAVSTVENOJ KULTURI

Sažetak

Istraživanje je provedeno s ciljem definiranja i analize različitih modela vođenja nastavnog procesa u tjelesnoj i zdravstvenoj kulturi. S tim ciljem izvršena je analiza 120 sati tjelesne i zdravstvene kulture provedenih od strane 55 studentica i 65 studenata kineziologije. Podaci o kvaliteti nastavnog procesa i procesa interpersonalne komunikacije prikupljeni su metodom direktne opservacije javnih predavanja studenata te primjenom *Upitnika za procjenu kvalitete nastavnog procesa (UN1)* te *Upitnika za procjenu modaliteta interpersonalne komunikacije (UK1)*. Kako bi se analizirali modaliteti vođenja nastavnog procesa odnosno stilova interpersonalne komunikacije, oba subuzorka ispitanika klasificirana su sukladno vrijednostima varijabli nastavnog procesa u tri grupe; ispodprosječni, prosječni i iznadprosječni ispitanici. Dobiveni rezultati potvrdili su statistički značajne razlike u stilu vođenja odnosno komunikacijskim modalitetima između različito uspješnih ispitanika u provedbi nastave. Temeljem nalaza definiran je model uspješnog vođenja nastavnog procesa u tjelesnoj i zdravstvenoj kulturi bazirana na komunikacijskoj i sadržajnoj jasnoći, jasnom i odlučnom iznošenju vlastitih stavova te visokim stupnjem otvorenosti i suradnje s učenicima.

Ključne riječi: *kineziološka edukacija, komunikacijski stilovi, kvaliteta nastave*

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