**УДК 37.014 (045)**

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# PEDAGOGICAL DIAGNOSIS OF LEVELS OF FUTURE PHYSICAL TRAINING TEACHERS' READINESS FOR ORGANIZING SPORTS-AND-HEALTH ACTIVITIES OF YOUTH

***Анотація.*** *The actuality of the study is to analyze and justify scientifically the diagnostic system which should be an objective indicator of the appropriate levels' formation of a higher educational establishment graduate's readiness for organizing sports-and-health activities of youth.*

*Objective: the selection of optimal diagnostic methods of research; collecting information with the help of diagnostic methods; quantitative and qualitative processing of the obtained results.*

*It is proved and well-founded that the formation of corresponding levels of a graduate's readiness will be effective on the condition of sports-and-health direction of content, forms and methods of future physical training teachers' professional training; working out and implementation of the model of training of physical training teachers aimed at formation of readiness for sports-and-health activities; approval of sports-and-health values as the basis of an outlook of a specialist in pedagogical field.*

***Ключові слова:*** *diagnosis; methods; criteria; levels of readiness; analysis; pedagogue; physical education; sports-and-health activity.*

**Articulation of the issue.** In order to establish the state of corresponding levels of future physical training pedagogues' readiness for organizing sports-and-health activities of youth, we have implemented the set of special diagnostic methods, on the basis of which specific magnitude and levels of integral pedagogical activity are determined.

**Analysis of the latest researches and releases.** Concurrently it is necessary to state that analysis of works, where methods are suggested, which related to the actual problem (resumes, self-report and rating methods, tests), has determined, that they are generally dedicated to the consideration of certain aspects of pedagogue's readiness: ethical, preventive, aesthetic etc. Some aspects of future physical training pedagogues' readiness for organizing sports-and-health activity of youth come out in diagnostic programs of studying pedagogical culture and methodological preparation of a high school teacher: social attitude and social interests, communicative skills related to the setting of socio-pedagogical aims morally-willed self-regulation etc. [1, с. 47–48].

The scientific literature investigates the problems of pedagogical readiness in terms of diagnosing the development of separate qualities of teacher's and student's personality,

which are developed in the context of psychological science: communication, managerial skills, inclinations, interests, business and moral qualities, etc. [2, p. 3]. Consequently, the reviewed scientific works have become a valuable, meaningful source of scientific and methodological information on certain aspects of future physical training pedagogues' readiness for organizing sports-and-health activities of youth. At the same time, it should be noted that in pedagogical science and practice (based on the content of publications), the complex of methods, that would allow to measuring the level of students' physical culture and health development and the readiness of the future teacher to implement such activities has not been developed yet [3, p. 15]. Therefore, it is necessary to lay the foundation of a diagnostic system that would act as an objective indicator of the formation of the appropriate levels of physical training teachers' readiness for organizing sports-and-health activities.

In this regard, we used data from direct and indirect pedagogical observations of subjects of the learning process, students' characteristics and their self-characteristics, monographic descriptions, as well as special techniques.

**Goal and Tasks Setting** – the study of future physical training teachers' readiness for organizing sports-and-health activities of youth. Assignment: the selection of optimal diagnostic methods of research; collecting of information using diagnostic techniques; quantitative and qualitative processing of the received results.

It needs to be clarified that the final data measurement at the nascent stage of the experiment was also conducted using the techniques and questionnaires, which were used at the ascertaining stage of the experiment. In order to ensure the reliability of the results at each stage of the final measurements, the methods of statistical processing were used.

**The main research material description.** Therefore, the purpose of the first diagnostic cut was to determine the initial level of future physical education teachers' readiness for the organizing of sports-and-health activities of youth.

Evaluation of readiness indicators

| Level | critical | | sufficient | | optimum | | tactical | |
|---|---|---|---|---|---|---|---|---|
| Scores | 0 – 28 | | 30 – 54 | | 56 – 80 | | 82 – 108 | |
| | 0 – 14 | 16 – 28 | 30 – 46 | 48 – 54 | 56 – 68 | 70 – 80 | 82 – 94 | 96–108 |
| | 8 | 22 | 36 | 50 | 64 | 78 | 92 | 106 |
| | 15 | | 43 | | 71 | | 99 | |

The results are presented in Table 1:

*Table 1.*

**Summary results of the first diagnostic cut**
(input control, empirical distribution)

| Levels | | critical | | sufficient | | optimum | | tactical | |
|---|---|---|---|---|---|---|---|---|---|
| Scores | | 0–14 | 16–28 | 30 – 46 | 48–54 | 56–68 | 70–80 | 82–94 | 96–108 |
| | | 8 | 22 | 36 | 50 | 64 | 78 | 92 | 106 |
| Number of participants | CG ($X$) $n_1 = 169$ | 42 | 70 | 39 | 11 | 7 | – | – | – |
| | EG ($Y$) $n_2 = 186$ | 47 | 74 | 42 | 13 | 10 | – | – | – |
| | | 89 | 144 | 81 | 24 | 17 | – | – | – |
| | | 89 | 233 | 314 | 338 | 355 | | | |

I. Uniformity of samples (entrance control, Wilcoxon criterion) [2, p. 249].

$n_1 = 169$, $n_2 = 186$

1) total variation range:

1 … 89 90 … 233 234 … 314 315 … 338 339 … 355;

2) observed criterion value

$$w_{\text{ñïîñò.}} = \frac{1+89}{2}\cdot 42 + \frac{90+233}{2}\cdot 70 + \frac{234+314}{2}\cdot 39 + \frac{315+338}{2}\cdot 11 + \frac{339+355}{2}\cdot 7 = 29901.$$

3) lower critical point

$$w_{\text{íèæ.êð.}} = \left[\frac{(n_1+n_2+1)n_1 - 1}{2} - z_{\text{êð.}}\sqrt{\frac{n_1 n_2 (n_1+n_2+1)}{12}}\right]$$

4) upper critical point

$w_{\text{âåðõ.êð.}} = (n_1+n_2+1)n_1 - w_{\text{íèæ.êð.}} = 31976$;

1) $w_{\text{íèæ.êð.}} < w_{\text{ñïîñò.}} < w_{\text{âåðõ.êð.}}$.

2) Samples are uniform.

II. Verification of the hypothesis of normality of distribution (Pearson's criterion [2, p. 251])

Control group (X):

$n_1 = 169$; $\bar{x} = 24{,}0$; $\sigma_x = 13{,}79$; $h = 14$ (êðîê); $N_1 = \frac{n_1 h}{\sigma_x} = \frac{169\cdot 14}{13{,}79} = 171{,}6$;

$u = \frac{x - \bar{x}}{\sigma_x}$; $\varphi(u)$ - find according to the tables; $n' = N_1\varphi(u) = 171{,}6\cdot\varphi(u)$.

Calculation table

| $x$ | 8 | 22 | 36 | 50 | 64 |
|---|---|---|---|---|---|
| $n$ | 42 | 70 | 39 | 11 | 7 |
| $u$ | -1,16 | -0,14 | 0,87 | 1,88 | 2,90 |
| $\varphi(u)$ | 0,2036 | 3951 | 2732 | 0681 | 0260 |
| $n'$ | 35 | 68 | 47 | 12 | 4 |

$$\chi^2_{\text{ñïîñò}} = \sum\frac{(n'-n)^2}{n'} = 5{,}2;$$

$\chi^2_{\text{êð}}(0{,}05;5-3) = \chi^2_{\text{êð}}(0{,}05;2) = 6{,}0$.

$\chi^2_{\text{ñïîñò}} < \chi^2_{\text{êð}}$.

The hypothesis of a normal distribution is not rejected.

*Experimental group (Y):*

$n_2 = 186$; $\bar{y} = 24{,}3$; $\sigma_y = 15{,}58$; $h = 14$; $N_2 = \frac{n_2 h}{\sigma_y} = \frac{186\cdot 14}{15{,}58} = 167{,}2$;

$u = \frac{y - \bar{y}}{\sigma_y}$; $\varphi(u)$ - find according to the tables; $n' = N_2\varphi(u) = 167{,}2\cdot\varphi(u)$.

Calculation table

| $y$ | 8 | 22 | 36 | 50 | 64 |
|---|---|---|---|---|---|
| $n$ | 47 | 74 | 42 | 13 | 10 |
| $u$ | -1,04 | -0,14 | 0,75 | 1,65 | 2,54 |
| $\varphi(u)$ | 0,2323 | 3951 | 3011 | 1023 | 0458 |
| $n'$ | 39 | 66 | 50 | 17 | 8 |

$$\chi^2_{ñîáñò} = \sum \frac{(n'-n)^2}{n'} = 5{,}3;$$

$$\chi^2_{êð}(0{,}05;2) = 6{,}0.$$

$\chi^2_{ñîáñò} < \chi^2_{êð}$. The hypothesis about the normality of the distribution of the general population is not rejected. The empirical and theoretical frequencies differ slightly (by chance).

Consequently, at the beginning of the molding experiment, the principle of uniformity of quantitative and qualitative indicators of the control and experimental groups was observed.

As it is evidenced by the results of the initial stage of the molding experiment, 66.3% of the students in the control group and 65.1% of the students in the experimental group were diagnosed with a critical level of readiness for organizing sports-and-health activities of youth. The sufficient level was observed in 29.6% of the control group of students and 29.5% of the students in the experimental group.

The optimal level of' readiness for organizing sports-and-health activities of youth was revealed only in 4.1% of students in control and 5.4% of students in experimental groups. At the tactful level of the formation of the future physical training teachers' readiness for organizing sports-and-health activities of youth, no student was found in either the EG or the KG.

After the classes, these indicators began to change in every studied group. The second diagnostic section (intermediate) was conducted to determine the dynamics of changes in the formation of readiness levels of future physical training teachers for organizing sports-and-health activities of the youth of each group. It was conducted at the end of 20 weeks of lectures, seminars and pedagogical practices – based on questionnaires, testing and pedagogical observation.

The data of the second diagnostic cut were analyzed not only through the prism of quantitative but also qualitative analysis. Therefore, the following distribution of students' levels of readiness for the organizing of sports-and-health activity is given in table 2:

*Table 2.*

**Summary results of the second diagnostic cut**

(empirical distribution)

| Levels | | critical | sufficient | optimum | tactical |
|---|---|---|---|---|---|
| Scores | | 0–28 | 30–54 | 56–80 | 82–108 |
| | | 14 | 42 | 70 | 98 |
| Number of participants | KG ($X$) $n_1 = 169$ | 88 52% | 62 36,7% | 19 11,3% | – |
| | EG ($Y$) $n_2 = 186$ | 70 37,6% | 77 41,4% | 39 21,% | – |
| | | 158 | 139 | 58 | |
| | | 158 | 297 | 355 | |

I. Investigation of uniformity of samples (Wilcoxon criterion) [2, p. 249].

1) total variation range:

1 … 158 159 … 297 298 … 355;

2) the observed value of the Wilcoxon criterion:

$$w_{ñîáñ.} = \frac{1+158}{2} \cdot 88 + \frac{159+297}{2} \cdot 62 + \frac{298+355}{2} \cdot 19 = 27355;$$

3) $w_{íèæ.êð.} = 28188$; $w_{âåðõ.êð.} = 31976$;

As far as $w_{\text{ñïîñò.}} < w_{\text{ïèê. êð.}}$, then the samples are non-uniform and belong to different generic sets.

Here are the basic numerical characteristics of these samples (they are similar to the previous one):

$$\bar{x} = 30{,}6;\ D_x = 365{,}69;\ \sigma_x = 19{,}12;\ S_x^2 = 367{,}75;\ S_x = 19{,}18;$$

$$\bar{y} = 37{,}3;\ D_y = 437{,}66;\ \sigma_y = 20{,}92;\ S_y^2 = 440{,}02;\ S_y = 20{,}98;$$

$\delta_x = 2{,}9$; $\delta_y = 2{,}8$; confidence intervals:

$$(\bar{x} - \delta_x;\ \bar{x} + \delta_x) = (27{,}7;\ 33{,}5);\ (\bar{y} - \delta_y;\ \bar{y} + \delta_y) = (34{,}8;\ 39{,}8).$$

Confidence intervals are not overlapped, indicating that results are significantly higher in the experimental group at the stage of the second cut-off control.

According to the diagnostic data, from the table 3.2 in the experimental group, the optimal level of readiness for organizing sports-and-health activities of youth was typical for 21% of students, sufficient – for 41.4% and critical – for 37.6% of students. The diagnostic results were lower in the control group: 11.3% of the subjects were diagnosed with the optimal level of readiness; 36.7% – sufficient and 52% – at the critical level of readiness for organizing sports-and-health activities of youth.

The third, final diagnostic cut was carried out at the end of the fifth year of study, after the course completion of pedagogical disciplines, and after passing the students' pedagogical practice.

Evaluation of the manifestation of readiness components was performed in the following order: theoretical recitation on unique (specially-developed) tasks of the educational material of the special course; analysis of pedagogical situations, presentation and scientific substantiation of the developed programs for organizing sports-and-health events with schoolchildren; detailed analysis of the conducted lessons and sports-and-health events. Results of the third diagnostic section are given in Table 3:

*Table 3.*

**Summary results of the third diagnostic cut**

(output control, empirical distribution)

| Levels | | critical | | sufficient | | optimum | | tactical | |
|---|---|---|---|---|---|---|---|---|---|
| Scores | | 0–14<br>8 | 16–28<br>22 | 30–42<br>36 | 44–54<br>50 | 56–68<br>64 | 70–80<br>78 | 82–94<br>92 | 96–108<br>106 |
| Number of participants | KG ($X$)<br>$n_1 = 169$ | 17 | 27 | 35 | 29 | 21 | 15 | 15 | 10 |
| | EG ($Y$)<br>$n_2 = 186$ | 10 | 16 | 28 | 35 | 30 | 24 | 23 | 20 |
| | | 27 | 43 | 63 | 64 | 51 | 39 | 38 | 30 |
| | | 27 | 70 | 133 | 197 | 248 | 287 | 325 | 355 |

I. Uniformity samples (Wilcoxon criterion) [2, p. 249].

1) total variation range:

1 … 27 28 … 70 71 … 133 134 … 197 198 … 248 249 … 287 288 … 325 326 … 355;

2) observed criterion value:

$$w_{\text{ñïîñò.}} = \frac{1+27}{2}\cdot 17 + \frac{28+70}{2}\cdot 27 + \frac{71+133}{2}\cdot 35 + \frac{134+197}{2}\cdot 29 + \frac{198+248}{2}\cdot 21 + \frac{249+287}{2}\cdot 15 +$$

$$+ \frac{288+325}{2}\cdot 15 + \frac{326+355}{2}\cdot 10 = 26592;$$

3) $w_{iàæ\ .êð.} = 28188$; $w_{âåðõêð.} = 31976$;

4) $w_{ñòîð.} < w_{iàæ\ .êð.}$. Samples are non-uniform.

II. Basic numerical characteristics of the samples

*1) control group (CG - X):*

$n_1 = 169$; $\bar{x} = 49{,}2$; $D_x = 808{,}24$; $\sigma_x = 28{,}43$; $S_x^2 = 813{,}10$; $S_x = 28{,}51$; $\delta_x = 4{,}3$;

confidence interval: $(\bar{x} - \delta_x;\ \bar{x} + \delta_x) = (44{,}9;\ 53{,}5)$;

*2) experimental group (EG-Y):*

$n_2 = 186$; $\bar{y} = 60{,}3$; $D_y = 772{,}24$; $\sigma_y = 27{,}79$; $S_y^2 = 776{,}46$; $S_y = 27{,}87$; $\delta_y = 3{,}3$;

confidence interval: $(\bar{y} - \delta_y;\ \bar{y} + \delta_y) = (57{,}0;\ 63{,}6)$.

Calculation table

| $x$ | 8 | 22 | 36 | 50 | 64 | 78 | 92 | 106 |
|---|---|---|---|---|---|---|---|---|
| $n$ | 17 | 27 | 35 | 29 | 21 | 15 | 15 | 10 |
| $u$ | -1,45 | -0,95 | -0,46 | 0,03 | 0,52 | 1,01 | 1,50 | 1,99 |
| $\varphi(u)$ | 0,1394 | 2541 | 3589 | 3988 | 3485 | 2396 | 1295 | 0551 |
| $n'$ | 13 | 22 | 31 | 34 | 30 | 19 | 12 | 8 |

$$\chi^2_{ñîáñò} = \sum \frac{(n_i' - n_i)^2}{n_i'} = 9{,}84;\ \chi^2_{êð}(0{,}05;5) = 11{,}1.$$

As far as $\chi^2_{ñîáñò} < \chi^2_{êð}$, then, the empirical and theoretical frequencies differ slightly (by chance). There is no reason to reject the hypothesis about the normality of the distribution of the general population.

*3) experimental group (EG-Y):*

$$n_2 = 186;\ \bar{y} = 60{,}3;\ \sigma_y = 27{,}79;\ h = 14;\ N_2 = \frac{n_2 h}{\sigma_y} = 93{,}7;\ n' = N_2 \varphi(u)$$

**Calculation table**

| $y$ | 8 | 22 | 36 | 50 | 64 | 78 | 92 | 106 |
|---|---|---|---|---|---|---|---|---|
| $n$ | 10 | 16 | 28 | 35 | 30 | 24 | 23 | 20 |
| $u$ | -1,88 | -1,37 | -0,87 | -0,37 | 0,13 | 0,63 | 1,14 | 1,64 |
| $\varphi(u)$ | 0,0681 | 1561 | 2732 | 3726 | 3956 | 3271 | 2083 | 1040 |
| $n'$ | 8 | 15 | 26 | 35 | 37 | 30 | 20 | 15 |

$$\chi^2_{ñîáñò} = \sum \frac{(n_i' - n_i)^2}{n_i'} = 5{,}36;\ \chi^2_{êð}(0{,}05;5) = 11{,}1.$$

As far as $\chi^2_{ñîáñò} < \chi^2_{êð}$, then there is no reason to reject the hypothesis about the normality of the distribution of the general population. The empirical and theoretical frequencies differ slightly (by chance).

IV. Comparison of dispersions (Fischer-Snedekor's criterion) [2, p. 207].

$n_1 = 169$; $S_X^2 = 813{,}10$; $n_2 = 186$; $S_Y^2 = 776{,}46$;

the numbers of degrees of freedom: $k_1 = 169 - 1 = 168$; $k_2 = 186 - 1 = 185$.

1) observed criterion value:

$$F_{ñîáñò} = \frac{S_A^2}{S_M^2} = \frac{813{,}10}{776{,}46} = 1{,}05;$$

2) critical criterion value:

$$F_{êð}(\alpha;\ k_1;\ k_2) = F_{êð}(0{,}05;\ 168,\ 185) = 1{,}90.$$

As far as $|T_{ñïîñò.}| > T_{êð.}$, then the sample average is significant (not accidentally), which confirms the effectiveness of the author's technique.

The obtained data showed that the quantitative indicators of the levels of formation of readiness for the organizing of sports-and-health activities were distributed as follows: in the control group, the tactical level of readiness was 14.7% of students, the best – 21.3%, sufficient – 38% and critical – 26% of students.

In the experimental group, 23.1% of students had a tactical level, 29% had an optimal level, 33.9% had a sufficient level and 14% had a critical level of readiness for the organizing of sports-and-health activities of youth. Positive changes occurred both in the experimental and in the control groups, but the students of the experimental group, the level of readiness for the organizing of sports-and-health activities of schoolchildren achieved significantly higher results compared with the students of the control group.

To analyze the consolidated results of the three diagnostic sections in the control and experimental groups, a comparative table was drawn in which the dynamics of changes in readiness levels for the organizing sports-and-health activities of schoolchildren was observed (see Table 3).

**Conclusions.** According to the data presented in the comparative table 3.4, there was a significant dynamics of changes in the future physical training teachers' readiness levels. Thus, in the experimental group CHNU, readiness rates have increased compared to the first diagnostic cut – the tactical level of 23.1%, the optimal level – by 23.6% and at the same time they decreased by a critical level by 51%:

*Table 4.*

**Comparative table of summary results of three diagnostic sections**

| № s/n | Groups | Levels of readiness, % | | | |
|---|---|---|---|---|---|
| | | critical | sufficient | optimum | tactical |
| 1. | Experimental group of ChNU | | | | |
| | 1 cut | 65 | 29,6 | 5,4 | – |
| | 2 cut | 37,6 | 41,4 | 21 | – |
| | 3 cut | 14 | 33,9 | 29 | 23,1 |
| | Зміни (+, –) | –51 | +4,3 | +23,6 | +23,1 |
| 2. | Control group: | | | | |
| | 1 cut | 66,3 | 29,6 | 4,1 | – |
| | 2 cut | 52,0 | 36,7 | 11,3 | – |
| | 3 cut | 26,0 | 38,0 | 21,3 | 14,7 |
| | Changes (+, –) | –40,3 | +8,4 | +17,2 | +14,7 |

In the control group, the levels of readiness increased compared to the first diagnostic cut – the tactical level of 14,7%, the optimal level – by 17,2%, sufficient – by 8,4%, while the level of readiness at the critical level decreased by 40,3%.

On the basis of the comparative analysis it can be argued that the replenishment and updating of the knowledge of psychological and pedagogical disciplines regarding the regularities and special aspects of the psychological and physiological development of schoolchildren, forms and methods of organizing work with pupils allowed us to master the skills of conducting sports-and-health activities more fully, confirming the data we have received the dynamics of readiness development according to the criteria developed by us.

**Prospects for further studies** in this direction require a question about the role of certain educational disciplines and their intersubject relations, pedagogical practice, the role

of self-education in the readiness of future physical training teachers for the organizing of sports-and-health activities of youth.

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***Abstract. Usatova I. A., Tkachenko V. V., Vedmediuk A. D. Pedagogical diagnosis of levels of future physical training teachers' readiness for organizing sports-and-health activities of youth.***

***Introduction.*** *The actuality of the study is to analyze and justify scientifically the diagnostic system which should be an objective indicator of the appropriate levels' formation of a higher educational establishment graduate's readiness for organizing sports-and-health activities of youth.*

***Results.*** *Objective: the selection of optimal diagnostic methods of research; collecting information with the help of diagnostic methods; quantitative and qualitative processing of the obtained results. It is proved and well-founded that the formation of corresponding levels of a graduate's readiness will be effective on the condition of sports-and-health direction of content, forms and methods of future physical training teachers' professional training; working out and implementation of the model of training of physical training teachers aimed at formation of readiness for sports-and-health activities; approval of sports-and-health values as the basis of an outlook of a specialist in pedagogical field.*

*According to the consolidated results of research-and-experimental work, the dynamics of changes in the levels of readiness according to the developed criteria has been determined. It is proved that it is necessary to assess the formation of future physical training teachers' research skills in a strict sequence which in a certain system creates the algorithm of their measurement. It is determined that the number of students with high and medium levels of readiness increased, while the number of students with low levels of readiness decreased. It is determined that the experimental group increased significantly in quality and its quantitative indexes are significantly higher than the corresponding figures before the experiment. It is found out that the significant educational achievements of the experimental group are explained by the implementation of the proposed experimental methods in the educational process which proves their effectiveness. This fact confirms the working out and implementation in the educational process of higher educational establishments of the necessity to create and realize an integrated scientific-and-methodological support of the content of future physical training teacher's professional training aimed at formation of sports-and-health values of modern youth as the basis of an outlook of a pedagogical field specialist, preparation for the organizing of sports-and-health activities of youth.*

***Conclusions.*** *On the basis of the comparative analysis it can be argued that the replenishment and updating of the knowledge of psychological and pedagogical disciplines regarding the regularities and special aspects of the psychological and physiological development of schoolchildren, forms and methods of organizing work with pupils allowed us to master the skills of conducting sports-and-health activities more fully, confirming the data we have received the dynamics of readiness development according to the criteria developed by us.*

***Key words****: diagnosis; methods; criteria; levels of readiness; analysis; pedagogue; physical education; sports-and-health activity.*

*Одержано редакцією 04.05.2017*
*Прийнято до публікації 12.05.2017*