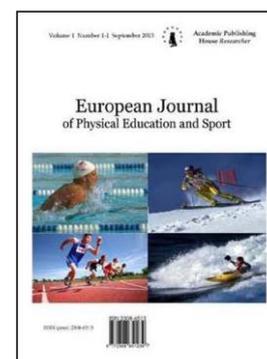


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Published in the Slovak Republic
European Journal of Physical Education and Sport
Has been issued since 2013.
E-ISSN: 2409-1952
2019, 7(1): 18-27

DOI: 10.13187/ejpe.2019.1.18
www.ejournal7.com



The Efficiency of the Professionally Applied Physical Preparation of Students with Diseases of the Nervous System

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Abstract

Purpose: the effectiveness of the developed program of professionally applied physical preparation of students of special medical groups with diseases of the nervous system in technical university based on control psycho-physiological functions to experimentally establish. **Material:** in the investigated was attended by students of special medical groups of the National University «Lviv Polytechnic»: 40 boys and 40 girls with diseases in the functional state of the nervous system in a state of remission. **Results:** that the integrative assessment of psycho-physiological functions in the students of the sample under study is very low, according to the results of the ascertaining experiment it was established. That under the influence of the developed professionally applied physical preparation, a significant improvement in all the studied parameters of psycho-physiological functions in students of experimental groups was revealed it is shown. **Conclusions:** the application of the proposed professionally applied physical preparation program during the course of physical education achieved the much better results in solving tasks than the traditional organization and content of physical education, which are used in the control group.

Keywords: student, physical education, special medical group, professionally applied physical preparation, authoring program, psycho-physiological functions.

1. Introduction

The main task of the national high school is to prepare students for effective professional activities. The success of its decision largely determines the development of the country and its place in the world community. Ukraine has actively embraced world trends in improving the health of the population through education. Currently, the quality of higher education is identified with the quality of training of skilled professionals (Blavt, 2016). What is an actual problem of pedagogical theory and practice.

One of the leading places in the formation of readiness for work belongs to professional-applied physical training (further PFP) students in higher education institutions. PFP provides realization of the potential of formation of personal and professional qualities of future specialists (Lyudovyk, 2014). So effective solution of production tasks is provided by an appropriate level of their psychophysical condition. From this angle, attention is paid to the permanent positive dynamics of students with diseases of various somatic etiologies. Accordingly, the number of students targeted at specialist medical groups (SMG) in institutions of higher education is constantly increasing (Koryahin et al., 2013).

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The problem is exacerbated by the fact that SMG students with a higher incidence of diseases than the students of the main medical groups are characterized by reduced capacity for work (Anikieiev, 2015). Thus, the training of students with a disability in health to highly productive work necessitates the search for a specific management. The above defines the importance of the PFP as an organized didactic process for the formation of a specialist (Viktorov et al., 2018). Given the tendency to deteriorate health of carriers of intellectual potential of the country, the issue of the effectiveness of such training is relevant.

2. Reviews of related literature

The content of PFP students, ways of improving its effectiveness are based on a broad source base. The scientific and theoretical foundations of PFP students of higher technical educational institutions are considered (Olkhovskaya, 2017). It was emphasized on the necessity of increasing the efficiency of students' professional training in accordance with the requirements of production. Focusing on the optimization of PFP students in the field of technical education, taking into account globalization and rapid technological development (Golovchenko et al., 2001). The problems of PFP students of higher education institutions of technical profile (Lyudovyk, 2014) were investigated. The content of control in the process of PFP (Koryahin, et al., 2013) is proposed. The PFP is considered in the light of a particular specialty (Viktorov et al., 2018). The methodical provision of PFP students in SMG (Olkhovskaya, 2017) is substantiated.

It was determined (Golovchenko et al., 2001) that "professional training" is directly dependent on the level of physical fitness and the state of psychophysiological functions. In the interpretation (Ohromy, 2005), the latter are to some extent correlated with this process. Thus, the observation of psycho-physiological functions is used in the field of employment, professional selection, in forecasting the quality of the labor process, etc. (Lyudovyk, 2014; Ilyin, 2003).

At the same time it was found out (Korobeynikov, 2002) the dependence of physical efficiency on the state of psychophysiological functions. The conditionality of their development is empirically determined from the level of motor activity of students (Alyrkaiev, 2014). The influence of health on the development of physiological functions was confirmed (Ribot, 2017). It is proved that the character and the localization of diseases to one degree or another also correlates their state (Koryahin et al., 2018). Therefore, it is a factor that needs to be taken into account in the process of PFP formation for students with disabilities in their health.

The theoretical analysis of scientific literature found that existing searches are concentrated mainly on problems with students of basic medical groups. PFP students in SMG was not the subject of scientific analysis and the subject of extensive research. At the same time, we find in the literature (Ayers, 2004) the conviction that the students should be constructed on the basis of peculiarities of the psychophysical state. There is evidence (Koryahin et al., 2013) that the current PFP program in higher education institutions is practically not adapted to the contingent of students with disabilities in health. There are no studies on correction of the students' psychophysical state in the process of their PFP. Programs of PFP taking into account the nature of the diseases of students, in particular violations in the state of the nervous system (further NA), not found. The literature does not solve the scientific and practical problem of increasing the efficiency of students with diseases of the National Polyclinic in the process of PFP. At the same time, we find information (Korobeynikov, 2002) that such diseases are factors influencing the physical and psycho-physiological development of students. There is evidence that the proper development of attenuation abilities ensures the success of professional activity (Ayers, 2004). It has been established that their development, and, in addition, the development of power abilities and strength endurance correlates with the lability and force of the nervous system (Ohromy, 2005). The latter are a factor in violations of cognitive function. That has a certain impact on the success of learning and the development of cognitive activity (Koryahin et al., 2018).

However, it has been established that the existing PFP programs do not take into account all of the above-mentioned factors. At present, there are no studies on the correction of psychophysiological functions in the course of PFP of students with diseases of the nervous system.

The hypothesis of the study is based on the assumption that the implementation of PFP in the SMG, taking into account the peculiarities of students' illness, will increase its effectiveness. The question of optimal organization of classes for ensuring the proper level of psychophysical readiness of students is relevant for solving the problems of their preparation for productive

activities. On the other hand, the results of the control of psycho-physiological functions are a significant factor in the correlation of pedagogical influences in the process of PFPF.

Purpose: to experimentally determine the effectiveness of the developed program of PFPF students with diseases of nervous system in the physical education of higher education institutions technical profile on the basis of control of psycho-physiological functions.

3. Methods and organization of the research

Participants: students of the National University "Lviv Polytechnic" of the first year of study were selected for research. They were directed at SMG in the state of health. Of the 40 boys and 40 girls, two control (CG) and experimental (EG) groups were formed. The study sample was formed from students with diseases in the functional state of the nervous system in remission. The requirements for the adequacy of its volume at the level $p < 0,05$ are met. Participants received written permission to participate in the experiment.

Procedure. The methodology for monitoring the effectiveness of the program is based on research psychophysiology of labor (Blavt, 2016). As well as the study of psycho-physiological features of specialists in the technical industry (Lyudovyk, 2014). The control of psycho-physiological functions was carried out on the basis of the assessment of mental endurance, working capacity, cognitive functions and attentional abilities. Used: "Tepping test" (Korobeynikov, 2002), "Technique Munsterberg" (Munsterberg, 1915), Benjamin B. Bourdon test, E. Krepelin test (Andreassi, 2000).

"Tepping test" (Korobeynikov, 2002) is used to evaluate the properties of the National Assembly. The test is based on measuring the time of maximum pace of movement of the brush. The test material contains a piece of paper with six squares drawn. On the signal it is necessary to put stereotyped movements of the brush fast in each square for 5 seconds, as many points as possible with a pencil. Without interrupting the work, the clock moves to the next square. The result processing involves counting the number of points in each square. The results determine the properties of nervous system: the indicator of dynamic endurance (DDP – ability to maintain the pace of work); lability of the motor apparatus (LRA – speed of switching from one type of activity to another); coefficient of mobility of the of nervous system (CRNS – motor mobility coefficient). Interpretation of the results is carried out according to test scales.

"Technique Munsterberg" (Munsterberg, 1915) is aimed at determining the selectivity of attention. The material of the technique consists of a letter test letter with words. It is necessary to find and emphasize these words. Estimated number of selected words and the number of errors (missed and wrongly selected words). Processing results: TM indicator is calculated from time estimate (T) corrected for errors (C – each missed word is estimated at 1 point). The calculation formula has the form: $A = T - C$. Assessment of the test according to the scale of the table.

Bourdon Correctional Sample (Benjamin B. Burdon) (Andreassi, 2000) is used to evaluate the parameters of attention. Sample material contains a standard test form. The letterhead is randomly printed in 2000 letters. The task of the subject is to find the letters "d" and "p" and strike them for 10 minutes with a signaling interval per minute. The results of the test are estimated by the number of missed unsigned characters, the time of execution and the number of revised characters. This is expressed by the number of processed lines and the number of errors allowed for each minute interval of testing.

Processing results: the concentration of attention (C) is calculated by the formula: $K = C2/P$, where C – the number of revised tables in the table, P – the number of errors. The mistake is to skip letters that need to be strikethrough, as well as incorrect strikethrough. Stability of attention (K_u) is estimated for every 60 seconds by the formula: $K_u = S/t$, where S is the number of letters in the revised part of the corrective table, t is the execution time. The efficiency indicator (Pr) is calculated by the formula: $C = (So/S) * 100 \%$, where So is the number of erroneously processed lines, S is the total number of rows in the processed part of the table. The obtained results are compared with normative indicators.

E. Krepelin's test (Andreassi, 2000) was used to evaluate mental performance. The test material contains a standard test form. On the blank, one pairs of single digits are printed. Task of the subject – determine the result of adding a pair of digits in each line to the signal. Go to the next line every 20 seconds. The Mental Capacity Ratio (RPC) is calculated as the ratio of the sum of correctly executed additions of the last four rows (S_2) to the sum of correctly executed additions of

the first four rows (S1): $K = S2/S1$. If the ratio is closer to 1, then this means that fatigue is practically non-existent.

Testing is implemented at the beginning of the classes and at the end of the course. The criteria for the effectiveness of the study were the dynamics of the investigated parameters. In the process of implementing the experiment, there are no laboratory artificial conditions for conducting it.

Statistical analysis. To characterize the results, indicators of descriptive and inductive statistics are used (Vincent, 2005). The difference between the average group was considered to be valid at values $p < 0.05$ for a given number of degrees of freedom.

4. Results

In order to ensure the objectivity of the expert conclusions regarding the conducted research, a statistical analysis of the characteristics obtained at the beginning of the experiment was carried out (Table 1). It was established that at the beginning of the study, the significance of the indices in the students of the experimental groups among themselves was not significantly different. The homogeneity of the sample ensured the representativeness of the data obtained, the objectivity of the conclusions and the veracity of the interpretation of the results. The test results were processed in accordance with the requirements of the techniques used.

According to the results of the stage of experiment start, others the tacit assessment of psycho-physiological functions in students with nervous system disease was at a very low level. In order to establish the dynamics of the working capacity of the nervous system, as an indicator of the functional state of the body of students, "Tepping test" was used. The decrease in the number of points from square to square during the test, which was observed in the vast majority of students, has shown a low level of functional stability of the motor sphere and nervous system. There was a decrease in qualitative controlled indicators in terms of the effect of mental stress during the tasks. In the results of dynamic endurance and lability of the motor vehicle, there were no significant differences. Their digital values are evidenced by the low level of this indicator among students in the sample.

Table 1. Parameters of the psycho-physiological state of students at the beginning of the experiment ($p > 0,05$)

| Investigated parameters | | EG (n=20) | | | | | CG (n=20) | | | | |
|-------------------------|---|-----------|-------|------|-------|------|-----------|-------|------|-------|------|
| | | X | S | As | Me | V | X | S | As | Me | V |
| DDP, RU | m | 6,06 | 0,44 | 0,23 | 6,00 | 36,8 | 6,26 | 0,37 | 0,36 | 6,11 | 43,4 |
| | f | 7,01 | 0,91 | 0,39 | 6,99 | 37,5 | 7,14 | 0,29 | 0,58 | 6,44 | 39,1 |
| LRA, RU | m | 2,38 | 0,61 | 0,83 | 2,22 | 37,4 | 2,47 | 0,42 | 0,70 | 2,13 | 33,5 |
| | f | 2,26 | 0,68 | 0,37 | 2,11 | 36,2 | 2,30 | 0,31 | 0,46 | 2,13 | 26,7 |
| CRNS, % | m | 0,53 | 0,10 | 0,55 | 0,45 | 34,7 | 0,52 | 0,08 | 0,53 | 0,43 | 33,4 |
| | f | 0,51 | 0,09 | 0,32 | 0,34 | 34,5 | 0,50 | 0,05 | 0,54 | 0,32 | 30,1 |
| "TT" evaluation, points | m | 6,14 | 0,84 | 0,52 | 6,09 | 39,0 | 6,05 | 0,48 | 0,34 | 6,00 | 28,4 |
| | f | 5,01 | 0,66 | 0,68 | 4,98 | 40,4 | 4,99 | 0,65 | 0,22 | 4,78 | 44,1 |
| A, points | m | 5,99 | 0,52 | 0,54 | 5,88 | 38,9 | 5,91 | 0,42 | 0,62 | 5,66 | 32,1 |
| | f | 6,51 | 0,61 | 0,30 | 6,43 | 31,7 | 6,97 | 0,73 | 0,52 | 6,66 | 28,7 |
| T, % | m | 70,23 | 2,11 | 0,47 | 69,3 | 35,1 | 71,57 | 3,15 | 0,20 | 69,9 | 33 |
| | f | 74,15 | 3,09 | 0,60 | 73,2 | 29,7 | 72,73 | 4,11 | 0,79 | 73,1 | 37,6 |
| I, signs | m | 1301 | 102,3 | 0,45 | 1300 | 43,4 | 1299 | 111,5 | 0,38 | 1270 | 45,5 |
| | f | 1403 | 155,7 | 0,56 | 1401 | 39,1 | 1431 | 123,1 | 0,41 | 1421 | 28,6 |
| C, % | m | 38,48 | 5,2 | 0,35 | 38,32 | 33,5 | 37,62 | 6,1 | 0,51 | 36,32 | 25,4 |
| | f | 41,63 | 4,6 | 0,52 | 40,92 | 26,7 | 40,88 | 5,8 | 0,50 | 40,11 | 35,7 |
| Pr, % | m | 43,51 | 4,7 | 0,38 | 42,43 | 33,4 | 42,79 | 5,1 | 0,54 | 42,04 | 42,2 |
| | f | 41,22 | 3,8 | 0,67 | 40,11 | 30,1 | 42,12 | 4,8 | 0,14 | 40,11 | 34,5 |

| | | | | | | | | | | | |
|---------------------|---|-------|------|------|-------|------|-------|------|------|-------|------|
| K _u , RU | m | 51,45 | 5,2 | 0,80 | 50,33 | 28,4 | 53,6 | 6,1 | 0,44 | 52,34 | 43,5 |
| | f | 60,68 | 4,6 | 0,72 | 59,4 | 23,9 | 59,5 | 5,8 | 0,34 | 59,2 | 26,7 |
| t, s | b | 240,1 | 37,3 | 0,88 | 237,9 | 29,8 | 238,5 | 22,3 | 0,36 | 235,9 | 36,4 |
| | g | 223,2 | 25,2 | 0,02 | 221,4 | 37,2 | 225,4 | 18,3 | 0,58 | 224,4 | 37,5 |
| MPR, RU | m | 0,59 | 0,09 | 0,39 | 0,58 | 31,2 | 0,60 | 0,07 | 0,70 | 0,57 | 37,4 |
| | f | 0,53 | 0,11 | 0,83 | 0,51 | 33,4 | 0,55 | 0,09 | 0,46 | 0,54 | 36,2 |

Legend: DDP – ability to maintain the pace of work; LRA – speed of switching from one type of activity to another, CRNS – motor mobility coefficient; "TT" – "Tepping-test"; A – switching attention; T – accuracy of attention; I – mental indicator of productivity; C – concentration of attention; K_u – stability of attention; Pr – performance efficiency; t – attention selectivity; MPR – mental capacity ratio; RU – relative unit; EG – experimental groups, CG – control groups, m – male students; f – female students

At the beginning of the study, the parameters of attention of students in experimental groups are below the mean and average values. There are trends in reducing the mental capacity for work.

At the end of the experiment, we observe a significant positive dynamics of the studied indicators (Table 2).

According to a qualitative criterion, the results obtained at the beginning of the experimental study of the motor mobility coefficient (CRNS), which is an indicator of its dynamic working capacity, 4.7 % of students had the first level, all the others –the second. Persons with a high grade among students of research groups have not been identified. At the end of the experiment, 78.2 % of the people who had registered the positive dynamics of the mobility coefficient of the nervous system were enrolled in the EG. In digital terms, it has reached the middle level.

Investigation of the parameters of attention has shown the following. The slowness of switching attention (A) was observed in the students of the experimental groups at the beginning of the classes as a factor in reducing the quality of work. Before the beginning of the experiment, the level of switching attention among the students of the EG was within the low range. At the end of classes we see a significant increase in switching attention to the average functional level.

By the end of the experiment, the qualitative values of the accuracy of attention (T) in the students of EG achieve a positive dynamics in the range up to 30 % ($p < 0,05$). The quantitative values of the productivity index (E) have improved significantly in terms of the results obtained in the first year ($p < 0,001$). This testifies to increased stability of the level of active attention in the students of EG.

Table 2. Parameters of the psycho-physiological state of students at the after of the experiment

| Investigated parameters | | EG (n=20) | | | | CG (n=20) | | | |
|-------------------------|---|-----------|------|-------|--------|-----------|------|-------|-------|
| | | X | S | + (%) | p | X | S | + (%) | p |
| DDP, RU | m | 4,76 | 0,61 | 21,4 | <0,001 | 6,22 | 0,44 | 0,6 | >0,05 |
| | f | 5,72 | 0,77 | 18,4 | <0,05 | 7,12 | 0,38 | 0,2 | >0,05 |
| LRA, RU | m | 3,09 | 0,72 | 29,8 | <0,01 | 2,45 | 0,48 | 0 | >0,05 |
| | f | 2,90 | 0,78 | 28,3 | <0,01 | 2,36 | 0,61 | 0,21 | >0,05 |
| CRNS, % | m | 0,66 | 0,09 | 24,5 | <0,01 | 0,52 | 0,04 | 0 | >0,05 |
| | f | 0,63 | 0,11 | 23,5 | <0,01 | 0,51 | 0,03 | 2,0 | >0,05 |
| "TT" evaluation, points | m | 7,36 | 0,63 | 19,8 | <0,05 | 6,11 | 0,71 | 1,2 | >0,05 |
| | f | 6,01 | 0,81 | 19,6 | <0,05 | 5,05 | 0,88 | 1,1 | >0,05 |
| A, points | m | 8,42 | 1,01 | 33,5 | <0,001 | 5,76 | 0,63 | 0 | >0,05 |
| | f | 9,08 | 1,14 | 36,1 | <0,001 | 7,08 | 0,54 | 0,2 | >0,05 |

| | | | | | | | | | |
|---------------------|---|-------|------|------|--------|-----------|-------|------|-------|
| T, % | m | 85,1 | 2,88 | 20,8 | <0,05 | 73,63 | 2,28 | 2,7 | >0,05 |
| | f | 90,5 | 2,16 | 21,6 | <0,05 | 75,31 | 3,01 | 4,1 | >0,05 |
| I, signs | m | 1770 | 88,4 | 36,2 | <0,001 | 1315 | 99,9 | 1,2 | >0,05 |
| | f | 1865 | 92,3 | 32,1 | <0,01 | 1501 | 103,8 | 4,8 | <0,05 |
| C, % | m | 48,7 | 4,4 | 25,6 | <0,01 | 38,63 | 5,1 | 1,7 | >0,05 |
| | f | 54,1 | 5,3 | 33,3 | <0,001 | 42,46 | 4,9 | 2,4 | <0,05 |
| Pr, % | m | 56,2 | 4,2 | 29,2 | <0,05 | 43,3 0 | 3,2 | 1,4 | >0,05 |
| | f | 55,2 | 3,3 | 33,1 | <0,05 | 42,32 | 4,5 | 0,04 | >0,05 |
| K _u , RU | m | 68,7 | 6,4 | 32,6 | <0,05 | 55,8 | 5,1 | 3,7 | >0,05 |
| | f | 76,1 | 7,1 | 26,3 | <0,05 | 61,5 | 4,9 | 3,1 | >0,05 |
| t, s | m | 156,6 | 22,1 | 30,1 | <0,0 | 213,4 | 15,4 | 9,1 | <0,05 |
| | f | 133,4 | 18,7 | 40,2 | <0,001 | 200, 8 | 7,2 | 11,1 | <0,05 |
| MPR, RU | m | 0,75 | 0,08 | 27,1 | <0,05 | 0,65 | 0,03 | 8,2 | <0,05 |
| | f | 0,64 | 0,04 | 26,9 | <0,05 | 0,58 | 0,06 | 4,7 | >0,05 |

At the beginning of the study, 100 % of the students of the study sample had a low concentration of attention (C), which was marked by rigor. At the end of the study, we see an increase in this parameter to a good level in the students of the EG.

The integrative index of attenuation abilities according to the results of the trial during the experiment increased in the students of the EG by an average of 33.3 % ($p < 0.05$). Numerical values of concentration, stability, switching and selectivity of attention reached average and good level. In general, this is a major factor in ensuring a high level of mental performance and working efficiency.

According to the provisions of system psychophysiology, the level of mental performance is ensured by the development of cognitive functions and attentional abilities (Korobeynikov, 2002). The state of the mental capacity ratio for students of EG after the completion of classes is characterized by positive dynamics. As a result, in numerical values, it approaches one.

The research of psycho-physiological functions has established that the change of experimental parameters in the students of CG in the course of classes is characterized by the absence of a marked positive tendency. The status of certain parameters has improved, but at the end of their numerical values do not significantly differ ($p > 0.05$) compared with the beginning of the study.

5. Discussion

In conducting empirical exploration, we were guided by the fact that the training of specialists in higher education institutions is a multidisciplinary specially organized process (Ayers, 2004). An important place in its course is occupied by PFP. It is considered as a means of general, special, physical and psycho-physiological training of students for professional activity (Koryahin, et al., 2013).

The proposed PFP for students with illnesses in the state of emergency in higher education institutions technical profile. Its distinction from the current one is organizational and methodological provision. The peculiarities of the introduced PFP for students with illnesses of the nervous system are based on the specifics of their psychophysical condition. The latter is due to the complexity of pathological changes in the nervous system. The problem is exacerbated by the fact that it is in the departments of the nervous system that the regulation of all manifestations of the organism is centralized (Ilyin, 2003). On the other hand, the PFP should ensure the formation and improvement of qualities important for technical specialists (Lyudovyyk, 2014).

The obtained results showed that the implementation of the envisaged content of the PFP in the EG provides an effective solution to the tasks of the experimental program. The effectiveness of its influence on the state of psycho-physiological functions and mental efficiency is proved. Thus, the hypothesis of the study is confirmed.

As in the works of other authors (Koryahin, et al., 2013; Lyudovyyk, 2014), it was found that modern requirements for training specialists predetermine the necessity of substantially updating

the methods of PFP. The scientific research carried out was aimed at supplementing the scientific understanding of the necessity of introducing the principles of individualization in this process. The unity of the position of researchers is the need to take into account the individual characteristics of the organism, adjusting the capacity for work. According to the reports (Korobeynikov, 2002), they are in a state of health, levels of physical development and physical fitness, and the effectiveness of psychophysiological functions.

The conducted scientific research is substantiated from the standpoint of the necessity of controlling psychophysiological functions within the functional study of SMG students in order to control the process of their PFP. In particular, information support of the medical and pedagogical aspects of decision making in relation to its correction of this process. In the course of the study, we were convinced that the management of PFP is provided by timely monitoring measures in the physical education of the SMG. This position supplements the existing literature data (Anikieiev, 2015; Viktorov, et al., 2018).

Guided by reports on the state of psychophysiological functions, as a potential for ensuring the professional preparedness of students (Olkhovskaya, 2017), it is interesting to notice the role of nervous system violations in this process (Ayers, 2004). Our studies are consistent with the information (Koryahin, et al., 2018) that the level of development of psychophysiological functions most adequately reproduces the functional state of the organism of students, its ability to implement the author's program. It is determined that deviations in the state of emergency affect the efficiency of mental activity to a certain extent (Korobeynikov, 2002). This is due to its leading purpose in the body and the management function in relation to other systems (Munsterberg, 1915). Diseases of the nervous system and the properties of the nervous processes (strength, mobility, balance) are a factor of deterioration of attention concentration, growth of nervous tension, a significant increase in the time of solving problems, rapid fatigue, etc. A correlation of the functional state of the state of emergency and the state of psychophysiological functions was established (Ilyin, 2003). In particular, the intellectual activity depends on the conditions of blood supply to the brain. It is proved (Andreassi, 2000) that even minor violations of blood circulation in the brain are a prerequisite for negative reactions from the intellectual capacity. In mental work, functional shifts occur primarily in the nervous system (Korobeynikov, 2002). The efficiency of the nervous system is the physiological basis of labor productivity (Andreassi, 2000).

At the beginning of the study, the parameters of attention of students in experimental groups are the result of pathological inertia of the processes of excitation and inhibition in the nervous system. Accordingly, the regulation of psycho-physiological functions creates the basis for improving the functional state of the nervous system (Ohromy, 2005). And, consequently, it is a factor in the effectiveness of the PFP. That, accordingly, and the available information (Olkhovskaya, 2017; Viktorov, et al., 2018).

It is proved that attention, as a cognitive function and process in the state of emergency, depends on the individual physiological characteristics of the nervous system and the general state of the organism (Ribot, 2017). In particular, it is believed that the factors of weakness of attention are the mediocrity of the nervous processes. Attention is being considered (Ilyin, 2003) as a function that can be raised and improved as a result of targeted influence. In terms of the physiology of this process (Munsterberg, 1915), it is provided by inhibition of optimal excitation in some areas of the cerebral cortex of the cerebrum and its occurrence in others. The state of the parameters of attention after classes in the students of EG, probably, is a consequence of improving the state of emergency.

Indicator of accuracy of attention (T) depends on the functional state of emergency, the degree of stability and fatigue of attention. As a result, it determines the quality of the work (Andreassi, 2000). Probably, its improvement is due to the activation of the reticular system under the influence of occupations.

Indicator of productivity (I) characterizes the speed of processes of perception and thinking and depends on the mobility of nerve processes (Korobeynikov, 2002). The achievement of the limits of optimal excitation in the state of emergency by the influence of occupations has created favorable conditions for increasing the productivity of attention from the students of the EG.

The concentration of attention (C), as an important condition for the implementation of complex practical actions, is ensured by the mobility of nerve processes (Ribot, 2017). Its low level at the beginning of the study in the students of the sample is due to the presence of functional

deviations in the state of emergency (in particular, the presence of neurotic conditions, etc.). The influence of individual-typological peculiarities of students of research groups is not excluded. The results of testing concentration of attention from the students of the EG confirm data (Overton, et al., 2016; Koryahin, et al., 2018), regarding the possibility of its development. This became possible due to an increase in the general level of activation of the brain under the influence of occupations.

Improvement of the stability of attention (Ku) in EG students is a factor in improving the state of emergency, namely, the processes of excitation and inhibition in the cerebral cortex (Ribot, 2017). In addition, the probability of maintaining the necessary intensity of attention for a long time was also influenced by the fitness in the process of implementing the PFPF.

Growth of the integrative index of attentional abilities in the students of EG was a factor in ensuring a high level of mental performance and work efficiency. According to the provisions of system psychophysiology, the state of mental functioning is ensured by the development of cognitive functions and attention abilities (Andreassi, 2000). The main mechanism of its reduction at the beginning of classes is defined functional changes in the state of the central nervous system and the resulting destructive states of the body.

Understanding of psycho-physiological functions as a dynamic system, their consideration from the standpoint of physical development allows us to analyze not only the result but also the process of their correction. The latter is consistent with the reports (Ilyin, 2003) that the level of mental performance as its maximum psycho-physiological potential positively correlates with the state of health. The results of empirical intelligence are confirmed by data (Ohromy, 2005; Koryahin, et al., 2018) concerning the relationship between the potential of mental activity and the physiological state of the organism. Find information (Andreassi, 2000) on the psycho-physiological support of optimal mental working capacity, which is essentially due to the general state of the organism. Our results are coordinated with regard to the "coherence of mental activity". This is reflected in the coordinated functioning of psycho-physiological functions in the relationship, which is ensured in their addition (Korobeynikov, 2002; Ribot, 2017).

The results of the study are grounds to support the position (Ohromy, 2005; Koryahin et al., 2018) regarding the possibility of improving mental performance by eliminating violations of the functional state of the organism or normalization (correction) of the state of emergency. The reduced level of mental performance among students based on the results of the qualifying phase is due to violations in the state of emergency. It is not excluded and the influence of mental fatigue, as a holistic process, which covers all levels of the motor apparatus with a limiting cortical link. This also turns out to be reduced in efficiency (Olkhovskaya, 2017; Overton et al., 2016). This condition is conditioned by the effect of a significant training load at the beginning of education in higher education institutions.

In conclusion, the belief that the level of performance is formed against the background of a particular functional state of the organism (Adyrkhaiev, 2014; Andreassi, 2000). The obtained results, apparently due to pathological inertia of the nervous processes. That, it is quite probable, is a consequence of functional disorders of the experimental groups that are localized in the nervous system. This complements the doctrine (Ilyin, 2003; Overton et al., 2016) regarding this issue.

At the same time, we agree on the results obtained regarding the possibility of restoring mental performance of students under the influence of correctional and pedagogical measures (Ohromy, 2005; Anikieiev, 2015; Koryahin et al., 2018).

It is proved (Korobeynikov, 2002) that understatement of the level or disturbance of the development of properties of attention leads to a decrease in mental activity and disability. In the same line of doctrine (Ilyin, 2003; Ribot, 2017) in relation to the purposeful development of attentional abilities. The latter are considered as a factor in ensuring the success of professional activity and the efficiency of mental performance. Improvement of mental working capacity by means of physical education is substantiated (Overton et al., 2016) in terms of physiological mechanisms for its provision. It is quite logical that the obtained data serve as confirmation of the conclusions (Olkhovskaya, 2017; Ohromy, 2005) concerning the influence of physical activity on the possibility of ensuring the efficiency of labor.

Summarizing the results of the intelligence, the own achievements (Blavt, 2016; Koryahin et al., 2018) were complemented in the framework of the implementation of the experimental program of physical education of SMG students. The expected effect of the experiment conducted is

the efficacy of the introduced PFP. Thus, the scientific data (Adyrkhaiev, 2014; Anikieiev, 2015; Overton et al., 2016) concerning the influence of motor activity on the functional state of the central nervous system was confirmed. An indication of this is the positive dynamics of the studied parameters. Conducting a molding experiment confirmed (Blavt, 2016; Ohromy, 2005; Viktorov et al., 2018) the expediency of differentiation of PFP in SMG, taking into account the specificity of disorders in the state of health of students. This made a contribution to solving the problem of professionally oriented physical training of SMG students, enriching the theory and method of physical education. At the same time, the data obtained contradict studies (Ayers, 2004), which indirectly support the inalienability of differentiating the educational process in the SMG on the basis of the nature of the diseases.

The scientific data (Adyrkhaiev, 2014; Blavt, 2016; Koryahin et al., 2018) on the low effectiveness of the current system of physical education in SMG at higher educational establishments has been confirmed. The change in the experimental parameters of the students of the KH indicates a weakening of the energy and regulatory processes in the central nervous system, which objectively manifests itself in the state of parameters of psycho-physiological functions.

6. Conclusion

The formation of high-level professionals with a high level of efficiency is an urgent problem of pedagogical theory and practice. PFP is organically integrated into the physical education of students with a comprehensive pedagogical impact on the personality of a future specialist in the process of developing his professional training.

The basis of the construction of individual trajectories PFP during the pedagogical activity was the establishment on the one hand deviations in the state of emergency, on the other – the specifics of the specialists of the technical industry. The effectiveness of work in such a field is that it has protection against the working capacity and functional state of the organism.

The PFP program has been developed and proposed, which will ensure better improvement of the number of indicators of the traditional organization and strengthen this process in higher educational institutions. The management team completed the development of programs for the students of SMG with nervous system in the educational process, which ensured the effectiveness of equal values of the studied parameters of the students of experimental groups in comparison with the control group. Attachment of control over existing changes in stationary parameters. Summarizing the results of tests of psycho-physiological functions ensure positive changes in their parameters in the students of the EG in the range up to 30 %. At the same time, these differences have a significant significance with students of CG ($p < 0.01$). In the latter, the indicators of psycho-physiological functions improve only individual and lower rates, from the rest – remains at the level reached. Development of psycho-physiological functions in the process of PFP, as a systematic introduction of the components of psychophysical readiness of students to perform their professional duties, the purchase of useful programs. The statistical significance established in the parameters of the studied parameters of the students of the experimental groups of the final experiments confirmed the effectiveness of the proposed PFP.

Thus, the analysis of data obtained during the pedagogical experiment is subject to the practice of forming the professional psycho-physiological functions of future workers in the technical field. The conducted study allowed to provide higher education, which allows effective formation of professional readiness of students of educational institutions. Thus, it is provided with effective management of the process of recruiting psychophysical readiness of students from health care students to professional activities.

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