THE APPLICATION OF THE ALGORITHM OF THE INDIVIDUALIZATION OF STUDENTS' PHYSICAL EDUCATION PROCESS

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Annotation. *Purpose:* theoretically and experimentally justify the use of the algorithm of physical education process individualization in universities taking into account the psychophysiological features of students. *Material:* the study involved 413 students. It was defined indicators of the level of physical fitness and functional status, psycho-physiological features. *Results:* it was worked out the algorithm of individualization of students' physical education process. It was defined the structure of the complex preparedness and it was developed models of characteristics of students – representatives of different sports specializations. It was established that for the successful construction of the training process, it is necessary to combine the parameters of physical, functional training and physiological indicators into a single integral evaluation of the individual characteristics of students. It was shown that at the students of the experimental group was improved indicators of functional, psychophysiological capabilities and physical preparedness. *Conclusions:* the application of the algorithm of the individualization of process of physical education enhances the functionality of the students.
Keywords: students, preparedness, individualization, algorithm, specialization, psychophysiology.

Introduction

Nowadays HEE has become nearly the only opportunity for girls and boys' physical perfection. That is why correct choice of sport specialty by a student is very important not only for his perfection as specialist in certain kind of activity but also influences on his physical fitness, functional state and health. In this connection, at present individualization of physical education at higher educational establishments has been becoming still more important [2, 3, 6, 9, 15, 21, 22].

Many authors [2, 4, 5, 16, 17, 18, 23] stress that it is necessary to organize physical education process at HEE in compliance with sport specialties, because sport-oriented form of trainings is the most demanded form of educational process.

However, with it there often appears a problem of student's choice of sport specialty, which would be the most suitable for him in compliance with his motion and psycho-physiological characteristics. Individually suitable trainings are one of main factors of health strengthening. But not every student can quickly determine his own motion preferences. Central nervous system is responsible for individual organization of psycho-motor functions. That is why individualization of students' physical education envisages consideration of both physical fitness indicators and psycho-physiological indicators, because they are one of aspects of organism's functional state [1, 8, 10, 11, 19, 20]. In this connection it has become urgent to develop algorithm for physical education's individualization at higher educational establishments.

The researches were fulfilled in compliance with combined plan of scientific – research works for 2011-2015, topic 2.4 "theoretical-methodic principles of individualization in physical education and sports" (state registration number 0112U002001) as scientific work, which is financed by Ministry of education and science for 2013-2014 "Theoretical-methodic principles of application of information, pedagogic and medical-biological technologies for formation of healthy life style "(state registration № 0113U002003).

Purpose, tasks of the work, material and methods

The purpose of the research is to give theoretical and experimental foundation for application of individualization algorithm in physical education process at higher educational establishments, considering students' psycho-physiological characteristics.

The methods of the research are: theoretical analysis and generalization of literature sources, anthropometric and physiological methods, pedagogic testing, psycho-physiological methods of examination, mathematical statistic. Determination of physical fitness and functional state was carried out by results of boys' chin-ups and girls' pressing ups; rising torso from lying position in sitting one for 1 minute; shuttle run 4 x 9 meters; forward torso bent in sitting position; long jump from the spot. Functional state was determined by indicators of ortho-test, Stange's test, Genci's test, Letunov's test. Psycho-physiological indicators were measured in tapping test, Gorbov's test (red and black tables), Shulte's test (5 tables), Burdon's test by computer programs, developed under guidance of Ashanin [1]. Besides, for determination of short term memory volume, characteristics of nervous system and latent period of responses in different modes we worked out computer programs "Perception-1", "Perception-2", "Psycho-diagnostic" with application of traditional diagnostic's methodic [1, 4, 8, 10, 11].

In our research 413 students of Kharkov national university of radio-electronics (KNURE) took part. At final experimental stage – they were 209 students of 2-5 years, who trained different sport specialties of main health group (among them: 122 students: 27 – football specialty; 19 – "sambo"; 27 – "volleyball"; 28- "basketball"; 21 – "boxing";

doi:10.15561/20755279.2014.0601

also there were 87 girl students: 23 – "aerobics" specialty; 21 – "power kinds of ports, martial arts"; 22 – "volleyball"; 21 – "basketball"). At stage of forming experiment 204 1st year students participated, who were divided in control group (48 girls and 56 boys) and experimental group (42 girls and 58 boys).

Results of the research

Practical physical education classes in KNURE as well as in other HEE, where physical education classes are specialized, are based on choice of certain kind of sports; that is why students of one department are trained not as academic groups but they attend different circles according to their sport specialty and are trained by instructors – specialists in this kinds of sports.

In final experiment, which was conducted for determination of the most important indicators of every sport specialty we practiced expanded testing, which included both tests for physical fitness and tests for psycho-physiological potentials. For foundation of effectiveness of the worked out individualization algorithm, in forming experiment we carried out the most significant tests, determined with factorial analysis in final experiment.

As a result of theoretical-analytical work we worked out algorithm of physical education's individualization for higher educational establishments, which was pointed, on the one hand to help student in choice of sport specialization, and, on the other hand, to using of individual approach in every sport circle. This algorithm is based on principles of theoretical conception of Zh.L. Kozina. [6, 7] about importance of determination of complex fitness for determination of trainees' individual characteristics.

Algorithm of individualization consists of the following stages:

Stage 1 – factorial analysis of indicators of 2-5 years students' complex testing (students, who already chose their sport specialty and started self-realization in it). Testing includes determination of both physical and functional fitness as well as psycho-physiological potentials. There determined students' individual characteristics and the most significant indicators for representatives of different sport specialties.

Stage 2 – working out of sigmal scales of evaluation by the most significant indicators of testing, resulted from factorial analysis for every sport specialization.

Stage 3 – determination of sport specialization for 1st year students, who is to be conducted in two directions: the first – with the help of students' independent choice of sport specialization; the second – students, for whom it is difficult to choose and for students, who did not practiced sports beforehand we offered tests for physical, psycho-physiological and functional fitness by indicators, which were selected and scaled at first and second stages.

Stage 4 – application of methodic of physical education's individualization at higher educational establishment, which consists of two parts:

1 – distribution of students by sport specializations; 2 – individualization of training process in every sport circle, where, at initial stage students are divided by level of fitness and at later stages – by game roles, styles of duel, modes of loads. Physical education classes in control and experimental groups of every sport specialization were conducted 1 time a week, in compliance with curriculum and, additionally 1-2 times a week as optional trainings [2].

Here we provide results of application of the worked out algorithm of educational process's individualization.. Students – representatives of different sport specializations- show different individual expressiveness of factors in structure of fitness. For example, basketball and volleyball players have such expressed factors as "speed of run at short and middle distances, jumping", "cognitive abilities (short term memory)", "Bent to think about actions". Football players, martial arts representatives have the following mostly expressed factors as: "Power potentials", "Concentration of attention", "Psychic stability". Besides, sambo wrestlers and boxers show such factors as "sense of time" and "speed of nervous processes".

Girl students – representatives of different specializations – manifest the following expressiveness of factors in structure of fitness. Basketball players show "Short term memory", "Concentration and re-switching of attention", "Sense of time", "Power and endurance"; girls – representatives of martial arts – have such expressed factors as: "Power and endurance", "Psychic stability". Volleyball players manifest "Speed-power endurance, "Short term memory", "Psychic stability", "Flexibility". Aerobics' representatives have "Psychic adaptability", "Concentration and re-switching of attention", "Short term memory".

Such model characteristics of students – representatives of different sport specializations- were taken as the base, when working out of evaluation scales for main tests by results of factorial analysis. These scales were intended for make students' choice of sport specialty easier. Specialists in physical education and sports [13, 14, 16] are sure that progressing of motion abilities and improvement of trainees' health to large extent depend on diagnostic of their bents. On the base of the most significant physical and psycho-physiological parameters for different kinds of motion functioning, it is possible to prognosticate student's bents to certain physical activity. According to own choice and in compliance with worked out scales first year students were divided by sport specializations at the beginning of academic year.

In every specialization trainings were conducted, considering students' individual potentials. Such individual approach not only stimulated students' vivid interest to certain kind of sports, but also interest to development of own abilities, to own health and physical perfection.

As a result of individualization of physical education process we registered confident reduction of heart beats rate (HBR) in rest in experimental groups from 75.3 b.p.m.-1 to 65.3 b.p.m.-1 of volleyball players ($p<0.05$), from 74.5 b.p.m.-1 to 64.0 b.p.m.-1 of basketball players ($p<0.05$), from 832 b.p.m.-1 to 72.0 b.p.m.-1 of sambo wrestlers ($p<0.05$), from 78.8 b.p.m.-1 to 68.4 b.p.m.-1 of boxers ($p<0.05$), from 85.2 b.p.m.-1 to 80.4 b.p.m.-1 of representatives

of power kinds of sports ($p<0.05$), from 85.6 b.p.m.-1 to 74.8 b.p.m.-1 of football players ($p<0.05$).; increment of students' functional potentials by Shtange's test, which, in experimental group, confidently increased from 54.0 sec. to 59.7sec. ($p<0.05$) of basketball players; from 50.4 sec. to 57.8 sec. ($p<0.05$) of representatives of power kinds of sports; from 36.4 sec. to 47.6 sec. ($p<0.05$) of football players. In control groups such changes were not confident ($p>0,05$).

We registered statistically confident ($p<0.05$) reduction of HBR with fulfillment of Letunov's test after experiment in experimental groups, that witness about increasing of functional potentials and improvement of cardio-vascular and respiratory systems – main systems, which determine state of health. In control groups such changes were not confident.

We also observed confident improvement of psycho-physiological characteristics: increasing of quantity of correctly reproduced symbols by program "Perception-2" (test №1) in experimental groups of volleyball players from 5.18 to 7.21, of basketball players – from 5.84 to 6.98, of sambo wrestlers – from 4.34 to 5.83, of boxers – from 5.25 to 6.64, of representatives of power kinds of sports from 5.15 to 5,96 with $p<0.05$; and by program, "Perception-2" (test 2) in experimental groups of volleyball players – from 7.3 to 8.7, of basketball players – from 7.1 to 8.2, of sambo wrestlers – from 4.8 to 7.4, of boxers – from 6.4 to 7.6, of football players – from 6.5 to 8.3 with $p<0.05$.

In experimental group of girls - volleyball players increment of correctly reproduced symbols by program "Perceptio-1" (test №1) was registered in from 4.4 to 5.0, of basketball players – from 4.3 to 4.9, of aerobics – from 3.7 to 5.8; in experimental group of representatives of power kinds of sports – from 3.1 to 4.1 with $p<0.05$. We also found confident improvement of results in other psycho-physiological tests that witness about improvement of nervous system, which reflects health condition.

We also observed confident increase of physical fitness indicators: time of fulfillment of test "Shuttle run" confidently reduced in experimental groups of girls-basketball players – from 10.2 sec. to 9.6 sec., of volleyball players – from 9.9 sec. to 9.4 sec., of football players – from 9.8 sec. to 9.2 sec. with $p<0.05$. Similar data were received in groups of girl students. Changes in control boys and girls' groups were not confident. We also observed the trend to improvement of results in experimental groups in tests "pressing ups in lying positions", "Long jump from the spot", "Forward torso bending from sitting position".

Conclusions:

1. We have experimentally grounded application of algorithm of physical education's individualization, considering students' psycho-physiological potentials. We have shown that the worked out algorithm of students' physical education's individualization, based on determination of structure of psycho-physiological potentials and physical fitness, can be applied for students to make easier and more correct choice of sport activity that is of great importance for effectiveness of professional training, improvement of motion abilities, perfection of health.
2. We have determined the structure of students' complex fitness, (students, who are representatives of different sport specializations) and their psycho-physiological characteristics.
3. We have proved that as a result of experiment students of experimental groups demonstrated better indicators of functional potentials that is witnessed by reduction of HBR in rest, by improvement of Shtange's test and Letunov's test; the students also demonstrated improved indicators by programs "Perception-1" and "Perception-2" as well as physical fitness indicators.

The prospects of further researches imply perfection of individualization system for development of students' physical and functional potentials.

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Cite this article as: Barybina L.N., Kolomiec N.A., Komotskaja V.A. The application of the algorithm of the individualization of students' physical education process. *Physical education of students,* 2014, vol.6, pp. 3-7. doi:10.15561/20755279.2014.0601

The electronic version of this article is the complete one and can be found online at: http://www.sportpedu.org.ua/html/arhive-e.html

Received: 10.06.2014
Published: 30.06.2014