

# opción

Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía,  
Lingüística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

Año 35, 2019, Especial N°

# 21

Revista de Ciencias Humanas y Sociales  
ISSN 1012-1537/ ISSNe: 2477-9385  
Depósito Legal pp 198402ZU45



Universidad del Zulia  
Facultad Experimental de Ciencias  
Departamento de Ciencias Humanas  
Maracaibo - Venezuela



# **System of exercises for development of students' motor abilities**

**Aleksandr N. Legotkin<sup>1</sup>**

<sup>1</sup>Perm National Research Polytechnic University, Perm, Russia  
[legotkin.pstu@pstu.ru](mailto:legotkin.pstu@pstu.ru)

**Valery D. Panachev<sup>2\*</sup>**

<sup>2</sup>Perm National Research Polytechnic University, Perm, Russia  
[valery.panachev@pstu.ru](mailto:valery.panachev@pstu.ru)

**Leonid A. Zelenin<sup>3</sup>**

<sup>3</sup>Perm National Research Polytechnic University, Perm, Russia  
[zelenin\\_leonid@pstu.ru](mailto:zelenin_leonid@pstu.ru)

**Nikolay L. Ponomarev<sup>4</sup>**

<sup>4</sup>Perm National Research Polytechnic University, Perm, Russia  
[ponomarevn\\_perm@pstu.ru](mailto:ponomarevn_perm@pstu.ru)

**Anatoly A. Opletin<sup>5</sup>**

<sup>5</sup>Perm National Research Polytechnic University, Perm, Russia  
[opletinanatoly@pstu.ru](mailto:opletinanatoly@pstu.ru)

## **Abstract**

The article presents empirical research analysis and provides recommendations on the development of students' coordination abilities in physical education classes aimed at solving innovative problems all the generations face in the new millennium. The results of the ascertaining experiment prove the identity of physical fitness and coordination abilities of students in the control and experimental groups. In conclusion, Coordination of movements with closed eyes, CAc and CApc, confirmed a high level of improvement in the development of sensory (sensitive) and precise motor functions in students of the experimental group.

**Keywords:** Coordination, Abilities, Students, Mass Work.

# Sistema de ejercicios para el desarrollo de las habilidades motoras de los alumnos

## Resumen

El artículo presenta un análisis de investigación empírica y proporciona recomendaciones sobre el desarrollo de las habilidades de coordinación de los estudiantes en las clases de educación física destinadas a resolver problemas innovadores que todas las generaciones enfrentan en el nuevo milenio. Los resultados del experimento de comprobación demuestran la identidad de la aptitud física y las habilidades de coordinación de los estudiantes en los grupos de control y experimentales. En conclusión, la coordinación de movimientos con los ojos cerrados, CAc y CApc, confirmó un alto nivel de mejora en el desarrollo de las funciones sensoriales (sensibles) y motrices precisas en los estudiantes del grupo experimental.

**Palabras clave:** Coordinación, Habilidades, Estudiantes, Trabajo en Masa.

## 1. INTRODUCTION

At the current stage of the civil society development, the quality of education is a major problem caused by the acceleration of socio-economic progress, which honed the problem of students' functional readiness in relation to their health. Taken for 100% at the beginning of university training, the students' health deteriorates by 75% by the time of graduation from university (Kazin, 2014). In the vision for the Russian Federation development till 2020, there is a purpose of population physical development, the achievement of which requires better quality of physical education at university and the population

health improvement. But up to now, these problems have not been completely solved.

The main methodological drawback of higher education content is an underestimation of the role of graduates' motor activity, which is particularly important in professional activity. The research conducted was based on the results obtained by foreign scientists investigating the development of motor activity both in education and sports, empirical data such as observations, questioning, interviewing, testing, individual and group talks on the technique of movement control in the future profession and everyday life, students' personal interests in sports, results of research assignments and completion of exercises during the educational and experimental process and assessment of their qualitative achievements in formation of motor functions and in individual work based on the feedback (teacher-student).

The model developed identifies and determines which support leg is comfortable to stand on and on which side, which is facilitated by the simulators used. The tasks of the balance training system are based on its components and are associated with great muscle tension, which requires the development of held balance endurance on legs in different initial positions. Holding balance on the left and then on the right leg and then in the pose are unusual conditions for performing motor coordination tasks by students, which causes significant tremor of all muscle groups of the legs and makes it much more difficult to control movements. Working with this system of exercises, students acquire a richer and more diverse motor experience, learn to

extrapolate movements under complicated conditions and overcome themselves easier, have higher mobility of the nervous system in case of risky coordination actions (Aronson, 2013).

As a result of research, the system of preparatory exercises for taking qualifying standards of physical culture and methods of training sessions were developed. The system and the methods of training sessions promoted the effective form of physical fitness and coordination abilities in the pedagogical process of students' physical education. Preparatory exercises performed with opened and closed eyes provided a high level of physical and coordination abilities formed in the physical education classes. Pedagogical opportunities of the preparatory exercises enabling students to take the qualifying standards of physical culture and aimed at the formation of coordination abilities of the student were determined.

In the training process, a regular feature was revealed, the i.e. positive influence of preparatory exercises forming the ability to meet qualifying standards of physical culture on the formation of students' coordination abilities in the pedagogical experiment. These exercises laid the foundation of students' coordination abilities formation in the physical education process. To solve the problem, classes of applied physical culture, sports modules, have been introduced into modern educational curricula. Students can choose sports sections or systems of physical exercises for the development of their professional coordination abilities and competencies (Bezrykhih, 2014).

## **2. METHODS**

Overview. The research was based on a clearly developed plan of monitoring, which included interviewing and questioning students and then the development of the model of students' motor activity. The monitoring was conducted in 11 universities and 2 military institutes in the period of 2015-2018. The questionnaire developed on the basis of the interviews with students and aimed at finding out their attitude to a healthy lifestyle and sports activities laid the foundation for the development of the model which included exercises both in statics and dynamics (Hugo, 1899; Krüger, 2013). Sample. This sociological study developed at the departments of Physical Culture, Sociology and Political Science consisted of two parts, interviewing and respondents' answers to the questionnaire, and involved 1860 students of 11 different universities and cadets of 2 military institutions.

Restrictions and ethical issues. The survey involved only students selected into the main group on medical grounds, the questionnaires were anonymous. In later surveys, students with health restraints were involved, their wishes about the organization of physical therapy classes were taken into account. Based on the results of interviewing and survey, the model of students' motor activities was developed and tested. At the initial stage of the experiment, the system of exercises included preparatory and lead-up exercises, done with the eyes opened on the floor and elevation in statics and dynamics. Later

the students suggested accomplishing the exercises with eyes closed, which became a good motivation to perform the exercises.

To develop static balance (on the legs) at the initial stage of training, long-term static exercises were deliberately used. These exercises associated with numerous and various tasks were aimed at development of held balance endurance. Our long-term pedagogical experience has shown that to master the technique and the skill of holding balance, it is highly important to train long-term held balance on legs in different initial positions, as well as in standing position, i.e. to develop held balance endurance (Apanasenko, 2014; Hirtz, 2014).

### **3. RESULTS AND DISCUSSION**

The sociological analysis showed that in the period of 2015-2018 the University students and cadets of military institutions under study had mainly a healthy lifestyle, were engaged in sports activities, had enough time for rest and made efficient use of their time off (Bondin, 2014). According to the results, more than 60% of students of the Faculty of Humanities were enrolled in the main group of physical culture (Aghajanian, 2014). The rest of the students had health restrains and joined a special group, which included mostly students from the departments of Economy and Finance, Political Science, Linguistics, etc. As the survey showed, 85% of the students had been actively engaged in various sports activities before entering the University and had a desire to do modern sports activities, 35 % of



them wanted to go in for aerobics, tourism, sports games. Everyday life and professional situations hold university graduates to high standards of physical fitness and coordination of movements.

In the modern practice of students' physical education, there are no scientifically grounded approaches to the use of preparatory exercises enabling students to take the qualifying standards of physical culture and auxiliary exercises effectively forming coordination abilities of a number of motor qualities, physical fitness in general, especially in the educational process. In this research, the most efficient and affordable way to form physical fitness and coordination of movements in physical education classes was determined and justified with the help of preparatory exercises enabling students to take the qualifying standards. To determine the identity of coordination abilities and physical fitness of the groups of students under study, and also to reveal the efficiency of the techniques, an ascertaining experiment was conducted, the results of which are presented in Table 1.

Table 1: Indicators of motor functions reflecting students' coordination abilities and physical qualities

<b>Indicators</b>	<b>Control Group (CG)(n = 50)</b>	<b>Experimental Group (EG) (n=50)</b>	<b>P</b>
CAi (KCi)( integrated indicator), mm	24,83±0,73	26,20±0,97	>0,05
Cao with eyes open, mm	14,76±0,98	17,90±1,18	<0,05
CAC with eyes closed, mm	33,56±1,66	30,69±1,85	>0,05
Capo after the	19,74±1,28	19,60±1,17	>0,05

standard load with eyes open, mm			
Capafter the standard load with eyes closed, mm	29,98±1,49	33,11±1,86	>0,05
Static coordination (SC),sec (Romberg's test)	84,36±0,30	83,74±0,35	>0,05
sensitivity of vestibular analyzer (SVA)	82,08±2,32	76,60±3,11	>0,05
Reflexometry, cm	18,40±0,42	19,30±0,49	>0,05
Height of jump, cm	52,38±0,87	52,7±1,19	>0,05
Length of jump, cm	197,98±3,25	211,14±2,21	<0,05

As can be seen, the results of spatial and static coordination, the sensitivity of the vestibular analyzer, reflexometry and jump height, obtained by students of the control group (CG) and experimental group (EG) did not differ ( $P>0.05$ ) (Geppert, 2012; Loosch, 2010). The difference was significant only in the results of the long jump and in Cao (coordination abilities with opened eyes) at  $p < 0.05$  (Table 2). Taking into account the results of the ascertaining experiment, two equivalent groups were formed: control (CG) and experimental one (EG), the functional model and the main pedagogical conditions for developing experimental methods aimed at formation of physical fitness and coordination abilities (CA) of students were designed (Karnath, 2014).

The results of the main experiment (Table 2) confirmed the effectiveness of the preparatory exercises enabling students to take the qualifying standards to accomplish the aims of forming coordination abilities and physical qualities in the physical culture classes (Blume, 2013). First of all, the EG revealed a significant ( $P < 0.001$ ) improvement



CAi (integrated), mm	26,20±0,97	18,84 ± 0,7	28,09	<0,001	24,83 ± 0,73	24,91 ± 0,66	00,32	>0,05	6,16	<0,001
CAo with eyes opened, mm	17,90±1,18	14,68 ± 0,85	17,98	<0,001	14,76 ± 0,98	13,86 ± 1,08	77,45	<0,05	0,84	>0,05
CAC with eyes closed, mm	30,69±1,85	22,75 ± 1,38	25,87	<0,001	33,56 ± 1,66	33,02 ± 1,72	11,60	>0,05	4,43	<0,001
CApo after standard load with eyes opened, mm	19,60±1,17	15,46 ± 0,75	21,12	<0,001	19,74 ± 1,28	19,88 ± 0,85	00,20	>0,05	33,82	<0,001
CApc after standard load with eyes closed, mm	33,11 ± 1,86	23,73 ± 1,26	28,32	<0,001	29,98 ± 1,49	30,75 ± 1,71	22,56	>0,05	3,27	<0,001
Static Coordination, sec	83,74 ± 2,46	89,14 ± 0,85	66,44	<0,005	84,36 ± 2,09	83,08 ± 2,46	11,51	>0,05	2,30	<0,005
sensitivity of the vestibular analyzer, sec	76,60 ± 3,11	86,78 ± 1,4	13,28	<0,001	82,08 ± 2,32	86,60 ± 1,53	55,50	<0,05	0,09	>0,05
Reflex ometry, cm	19,30 ± 0,49	16,24 ± 0,43	15,85	<0,001	18,40 ± 0,42	18,54 ± 0,43	00,76	>0,05	3,45	<0,001
Height of jump, cm	52,7 ± 1,19	57,78 ± 1,03	9,63	<0,001	52,38 ± 0,87	52,02 ± 0,84	00,68	>0,05	4,29	<0,001
Length	211,1	219,1	33	<0,	197,9	197,6	0,	>0,	6,4	<0,

of jump, cm	4±2,2 1	0±2,0 6	,7 7	00 1	8±3,2 5	±2,53	19	,0 5	9	00 1
-------------------	------------	------------	---------	---------	------------	-------	----	---------	---	---------

Indicators of students' coordination abilities and physical qualities at the final stage of the forming experiment were (X1-x2 in%, EG=50 students; X3-X4 in%, CG=50 students.). Symbols: 1-CAi-integrated indicator, mm; 2-CAo-with eyes opened, mm; 3- CAc -with eyes closed, mm; 4- CApo - after the standard load with eyes opened, mm; 5- CApc -after the standard load with eyes closed, mm; 6-SC-statical coordination, C; 7-CVA - sensitivity of the vestibular analyzer, C; 8-reflexometry, cm; 9-jump height, cm; 10-jump length, cm [19, 38]. The final analysis of the coordination abilities results obtained by students of the experimental and control groups revealed a high degree of development in EG at t 6,16 (p< 0,001). The most difficult conditions of movement coordination with eyes closed, CAc and CApc, after the standard load at t 4,43 (p < 0,001); t 3,82 (p < 0,001) and 3,27 (p < 0,01) confirmed a high level of improvement in the development of sensory (sensitive) and precise motor functions in students of the experimental group.

The results of the ascertaining experiment prove the identity of physical fitness and coordination abilities of students in the control and experimental groups. But the parameters obtained with open eyes and the sensitivity of the vestibular analyzer make the difference. This became the foundation for the development of experimental methods that determined the structure and content of preparatory exercises

enabling students to take the qualifying standards of physical culture in physical education and the developing specific coordination abilities.

#### **4. CONCLUSIONS**

To fulfill the purpose, it was necessary to accomplish the objectives as follows:

1) Determine the nature, structure and content of the preparatory exercises for taking the standards of physical culture and development of students' coordination abilities in the classes of physical culture;

2) Study pedagogical opportunities of the preparatory exercises in the classes of physical culture enabling students to take the standards of physical culture, based on comparison of students' motor readiness and functional state in the control and experimental groups;

3) Justify experimental methods for the implementation of the educational possibilities of preparatory exercises for taking the standards of physical culture in the process of students' coordination abilities formation in the classes of physical culture;

4) Determine the effectiveness of preparatory exercises for taking standards of physical culture in formation of the students' coordination abilities.

The system of preparatory exercises for taking qualifying standards of physical culture and methods of training, promoting the development of fitness, coordination abilities and physical qualities in the classes of physical education were developed. The functional model of development and assessment of the students' coordination abilities was created, which provided the result-oriented formation of motor and functional potential, as well as motor activity. Coordination of movements with closed eyes, CAc and CApc, after the standard load at  $t\ 4,43$  ( $p < 0,001$ );  $t\ 3,82$  ( $p < 0,001$ ) and  $3,27$  ( $p < 0,01$ ) confirmed a high level of improvement in the development of sensory (sensitive) and precise motor functions in students of the experimental group.

## **REFERENCES**

- AGHAJANIAN, N. 2014. **Health of students**. Moscow: IzdRund. Russia.
- APANASENKO, G. 2014. **Valueology: First Results and Future Prospects**. Theory and Practice of Physical Culture. Vol. 6. Russia.
- ARONSON, L. 2013. **Conduction of labyrinthine impulses to the cortex**. J. nerv. Ment. dis. Vol. 78, pp. 250-259. USA.
- BEZRYKHIH, N. 2014. **Formation of setting students on a healthy lifestyle in the educational process of professional schools**. Saratov. Russia.
- BLUME, D. 2013. **Kennzeichnung Koordinativer Fechtigkeiten und Möglichkeiten ihrer Herausbildung im Trainingsports**. Wissenschaftliche Leitschrift der DH/K. Vol. 3, pp. 17-41. Germany.

- BONDIN, V. 2014. **School health teacher in higher education.** Theory and Practice of Physical Culture. P. 10. Russia.
- DUBROVSKY, V. 2014. **Valeologiy, ZOZH/ predislov. V.N. Mainov. M.** Ritorika: Flinta. P. 360. Russia.
- GEPPERT, A. 2012. **Imagining Outer Space: European Astroculture in the Twentieth Century.** Basingstoke: Palgrave Macmillan. P. 393. UK.
- HIRTZ, P. 2014. **Struktur und Entwicklung koordinateverLeistungsvorausser Zungen bei Schulkindern.** Theory and practice of body culture. Vol. 7, pp. 503-510. Germany.
- HUGO, V. 1899. **The Memoirs of Victor Hugo.** Part 5 out of 6. [URL: http://www.fullbooks.com/The-Memoirs-of-Victor-Hugo5.html](http://www.fullbooks.com/The-Memoirs-of-Victor-Hugo5.html) (accessed 28 November 2018). Germany.
- KARNATH, H. 2014. **Spatial neglect – a vestibular disorder?** / H, Karnath, M. Dieterich // Brain. Vol. 229, pp. 293-305. UK.
- KAZIN, T. 2014. **Scientific-methodical and organizational approaches to the creation of a regional program of education and health.** Valeology. Vol. 4. UK.
- KRÜGER, H. 2013. **Koordinative Fahigkeitsentwicklung und Technischulung bei jungen Sportler.** Theory and practice of body culture. Vol. 11, pp. 852-854. Germany.
- LOOSCH, E. 2010. **Ganzheitsprinzip und Variabilitgt in der Motorik.** Psychomotorik in Forshung und Lehre, Kassel. P. 315. Germany.
- MALINA, R., BEUNEN, G., CLAESSENS, A., LEFEVRE, J., VANDENEUNDE, B., RENSON, R., VANREUSEL, B.,



**SIMON, G. 2011. Fatness and physical fitness of girls 7 to 17 years.** Obesity Research. Vol. 3, pp. 221-231. Netherlands.





**UNIVERSIDAD  
DEL ZULIA**

---

# **opción**

Revista de Ciencias Humanas y Sociales  
Año 35, Especial N° 21, (2019)

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.  
Maracaibo - Venezuela

[www.luz.edu.ve](http://www.luz.edu.ve)

[www.serbi.luz.edu.ve](http://www.serbi.luz.edu.ve)

[produccioncientifica.luz.edu.ve](http://produccioncientifica.luz.edu.ve)