

Studying The Efficiency of a Differentiated Instruction in the Development of Physical Qualities of Students of Non-Sports Faculty

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Annotation: The article presents the results of research on changes in body mass index indicators when applying the differentiated approach developed by the authors. This approach is based on a comprehensive individualization and considers the individual characteristics, interests, and motivations for engaging in systematic physical education activities among students with different constitutional types, determined by the R.N. Dorokhov algorithm, from non-sporting faculties of a pedagogical university during their education. The results obtained confirmed the effectiveness of using an individually differentiated approach, with exercises organized around circuit training to improve physical qualities in physical education for students at a pedagogical university. As a result of applying the innovative method developed by the authors, which provides a practical and health-oriented focus on improving the physical development and overall physical fitness of participants, the average relative increase in the results of the arithmetic means of all six physical fitness indicators for the control group of retarded-type students in the pedagogical experiment was 5.58%. In the experimental group of the same development type, this indicator was 9.66%. For students of the normal-type development in both the control and experimental groups, these values were 6.33% and 11.15%, respectively. For students of the accelerated-type development, the average relative increase in the results of the arithmetic means of all six physical fitness indicators in the pedagogical experiment was 7.20% for the control group, while in the experimental group, this value was 13.38%. The overall average increase in physical fitness indicators across three different constitutional types of students during the pedagogical experiment for all studied indicators was 6.37% for the control group and 11.40% for the experimental group.

Keywords: differentiated instruction, accelerant, retardant, statistical reliability, type of development, physical qualities.

Introduction. Many years of practical work and the results of scientific research [3] showed that a certain part of the students registered an insufficient degree of physical education and physical fitness during their studies at the university. This can lead to a decrease in their health and professional abilities. Therefore, the need to develop innovative methods that provide practical and health-improving orientation to increase the degree of physical development and general physical fitness of those involved increases to a large extent - the methodology of physical education of students of a pedagogical university.

The following methods were used : theoretical analysis and generalization of materials from special scientific and methodological periodicals; control pedagogical tests; pedagogical observation; pedagogical experiment; methods of mathematical statistics. To determine whether each student belongs to the certain constitutional type, the algorithm of R.N. Dorokhov [5] tested under different conditions by different authors were used. Means of physical education for each group (type) are selected taking into account the degree of development of physical characteristics.

The studies were carried out at the Chirchik State University in 2020-2022, in which students of 1-3 courses took part, in total - 56 people (in each type of development).

The results obtained confirmed the effectiveness of the application of an individually differentiated instruction, taking into account the organization of classes based on circular training to influence the physical qualities of students of a pedagogical university.

Results and discussion. As a result of the forming (at the beginning) experiment, unreliable ($p>0.05$) changes in the height-weight indicators of students in the control (CG) and experimental (EG) groups of retardant, normal and accelerating types of development were determined.

The dynamics of changes in the indicators of physical qualities of students from the CG and the EG of all three types of development during the pedagogical experiment are given in tables 1, 2 and 3.

Table 1. Dynamics of changes in indicators of physical qualities of students of the control (CG, n=28) and experimental (EG, n=28) groups of the retardant type of development during the experiment

№ test	Group	Beginning of the experiment			End of the experiment			t_{st}	p
		\bar{X}	σ	V, %	\bar{X}	σ	V, %		
1	CG	1353.46	156.43	11.56	1439.58	160.64	11.16	2.03	<0.05
	EG	1314.26	157.61	11.99	1456.69	162.13	11.13	3.33	<0.01
2	CG	11.39	1.21	10.62	10.86	1.1	10.13	1.72	>0.05
	EG	11.53	1.26	10.93	10.64	1.08	10.15	2.84	<0.01
3	CG	4.38	0.55	12.56	4.63	0.56	12.10	1.69	>0.05
	EG	4.41	0.57	12.93	4.84	0.59	12.19	2.77	<0.01
4	CG	165.73	19.16	11.56	174.56	19.45	11.14	1.71	>0.05
	EG	162.38	19.35	11.92	177.82	19.76	11.11	2.95	<0.01
5	CG	17.59	1.86	10.57	16.62	1.69	10.17	2.04	<0.05
	EG	17.74	1.95	10.99	15.98	1.62	10.14	3.67	<0.001
6	CG	16.48	2.07	12.56	17.45	2.11	12.09	1.74	>0.05
	EG	16.26	2.1	12.92	17.92	2.17	12.11	2.91	<0.01

Note : for convenience, in the text, tables and diagrams, control tests are indicated in the following order: 1-six-minute run (m); 2-time shuttle run for 4x9 m (s.); 3- bending forward from a standing position with straightened legs (measured from the under the legs, sm); 4- long jump from a place (sm); 5- run time for 100 m (s.); 6- push-ups, bending and straightening arms in a prone position on the floor (number, times).

The smallest relative increase in the course of the experiment of students of the retardant type of development in the CG is observed in the test "Shuttle run time for 4x9 m." (4.65%), and the largest - in the "Six-minute run" (6.36%), and the arithmetic mean of the relative increase in the group was 5.58%. In the EG these indicators

were equal to 9.51%, 10.84% and 9.66%, respectively. As can be seen from all these indicators, the superiority of EG is obvious; the ratio fluctuates between 1.659 and 1.799 times, and by groups 1.732 times in favor of the EG (Diagram 1).

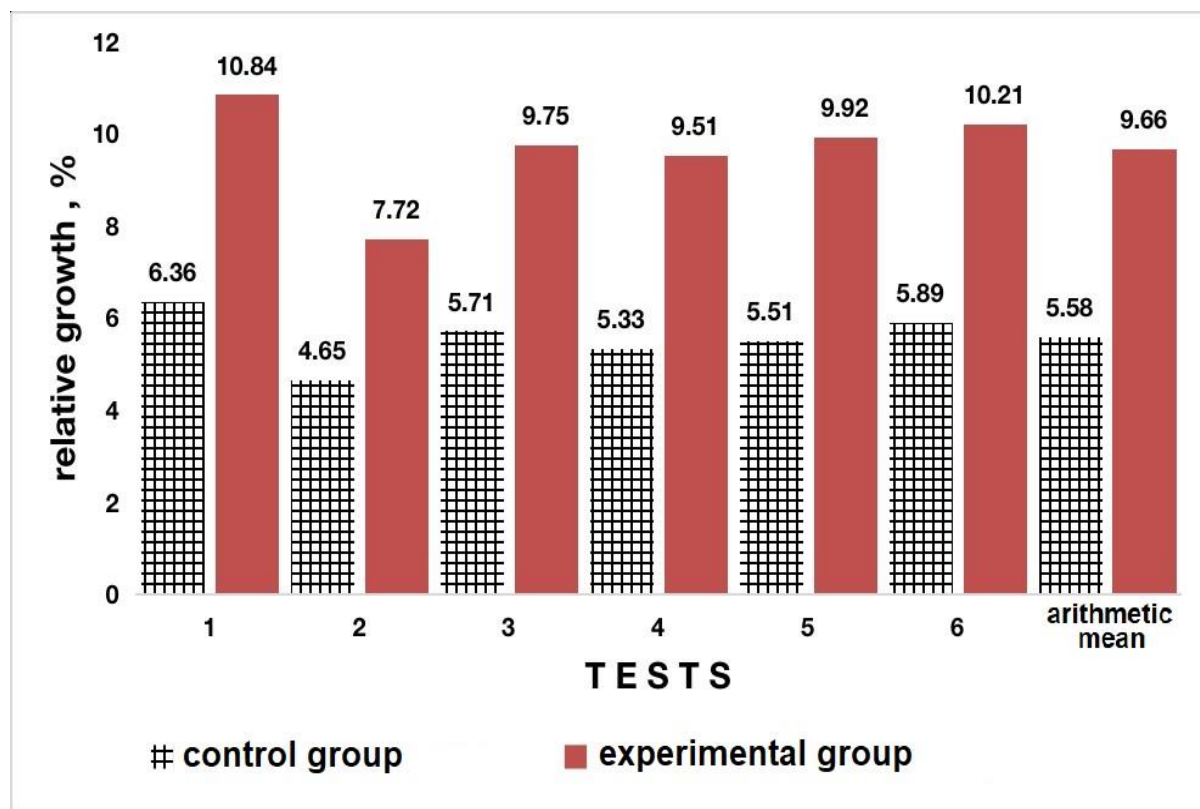


Diagram 1. Dynamics of change in the relative increase in the arithmetic mean values of indicators of physical qualities of students from the CG and EG of retardant type of development during the experiment (in percent)

Table 2. Dynamics of changes in indicators of physical qualities of students from the CG and the EG of normal development during the experiment

№ test	Group	Beginning of the experiment			End of the experiment			t _{st}	p
		\bar{X}	σ	V, %	\bar{X}	σ	V, %		
1	CG	1527.73	176.37	11.54	1636.27	181.93	11.12	2.27	<0.05
	EG	1493.17	178.19	11.93	1693.44	188.94	11.16		
2	CG	11.28	1.19	10.55	10.69	1.08	10.10	1.94	>0.05
	EG	11.43	1.25	10.94	10.42	1.06	10.17		
3	CG	4.78	0.6	12.55	5.1	0.62	12.16	1.96	>0.05
	EG	4.72	0.61	12.92	5.26	0.64	12.17		
4	CG	171.62	19.8	11.54	182.26	20.31	11.14	1.98	>0.05
	EG	169.22	20.23	11.95	186.97	20.79	11.12		
5	CG	17.38	1.82	10.47	16.31	1.65	10.12	2.30	<0.05
	EG	17.49	1.91	10.92	15.57	1.58	10.15		

6	CG	16.87	2.12	12.57	17.98	2.18	12.12	1.93	>0.05
	EG	16.64	2.15	12.92	18.59	2.25	12.10	3.32	<0.01

In students of normal type of development, the smallest relative increase in the course of the experiment in the EG is also observed, as in the CG, in the test “ Shuttle run time for 4x9 m.” (5.23%), and the largest - in the "Six-minute run" (7.10%), and the arithmetic mean of the relative increase in the group was 6.33%. In the EG these indicators were equal to 8.84%, 13.14% and 11.15%, respectively. As can be seen from all these indicators, the superiority of EG is obvious; the ratio fluctuates between 1.692 and 1.887 times, and by groups 1.762 times in favor of the EG (Diagram 2).

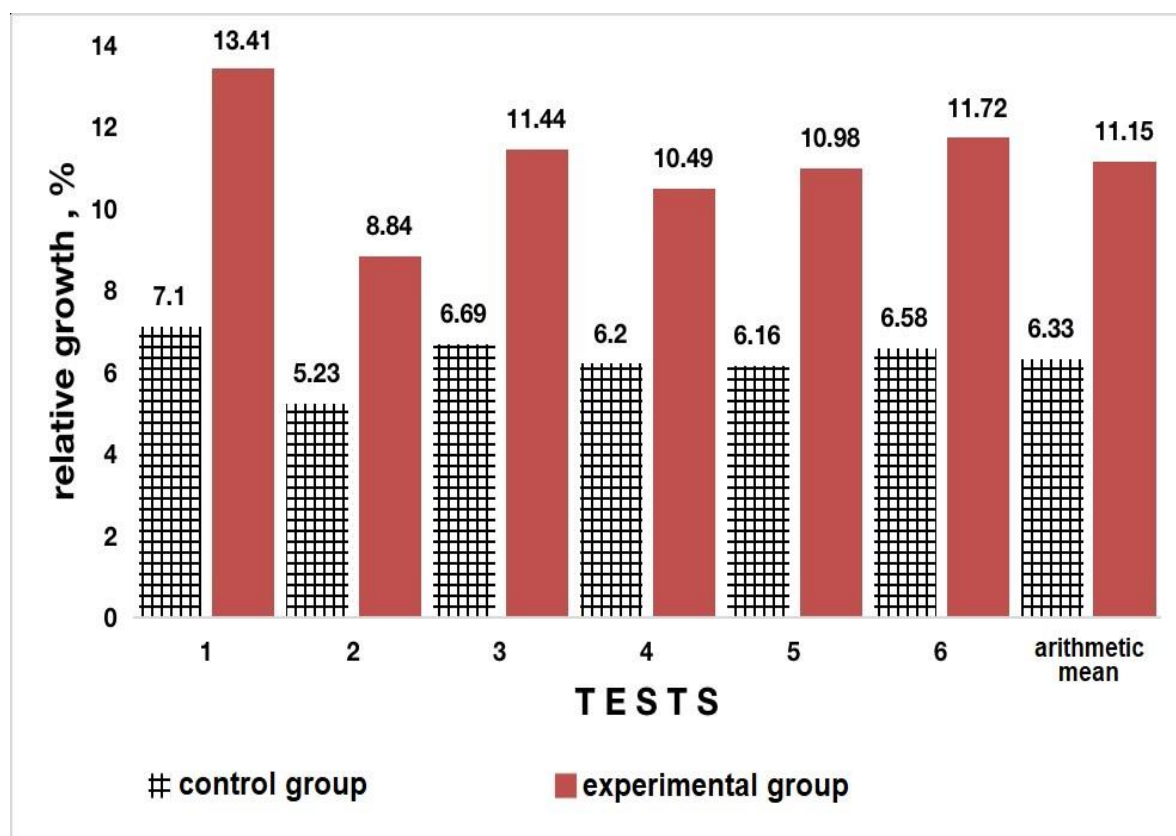


Diagram 2. Dynamics of change in the relative increase in the arithmetic mean values of the indicators of physical qualities of students from the CG and the EG of normal development type during the experiment (in percent)

Table 3. Dynamics of changes in indicators of physical qualities of students from the CG and the EG of the accelerant type of development during the experiment

№ test	Group	Beginning of the experiment			End of the experiment			t _{st}	p
		\bar{X}	σ	V, %	\bar{X}	σ	V, %		
1	CG	1549.48	178.57	11.52	1676.48	186.72	11.14	2.60	<0.05
	EG	1518.37	180.73	11.90	1733.93	193.26	11.15	4.31	<0.001
2	CG	11.12	1.17	10.52	10.46	1.06	10.13	2.21	<0.05
	EG	11.28	1.23	10.90	10.03	1.02	10.17	4.14	<0.001

3	CG	4.95	0.62	12.53	5.32	0.65	12.22	2.18	<0.05
	EG	5.04	0.65	12.90	5.79	0.71	12.26	4.12	<0.001
4	CG	178.12	20.52	11.52	190.63	21.24	11.14	2.24	<0.05
	EG	181.43	21.61	11.91	205.93	22.96	11.15	4.11	<0.001
5	CG	17.12	1.79	10.46	15.94	1.62	10.16	2.59	<0.05
	EG	16.91	1.84	10.88	14.96	1.52	10.16	4.32	<0.001
6	CG	17.06	2.14	12.54	18.37	2.23	12.14	2.24	>0.05
	EG	17.34	2.23	12.86	19.96	2.43	12.17	4.20	<0.001

In students of the accelerant type of development, the smallest relative increase during the experiment in the EG is observed in the same way as in the CG and in other types of development, in the test "Shuttle run time for 4x9 m." (5.94%), and the largest - in the "Six-minute run" (8.20%), and the arithmetic mean of the relative increase in the group was 7.20%. In the EG, these indicators were equal to 11.08%, 14.88% and 13.38%, respectively. As can be seen from all these indicators, the superiority of EG is obvious; the ratio varies between 1.6 73 and 1.991 times, and by groups 1.859 times in favor of the EG (diagram 3).

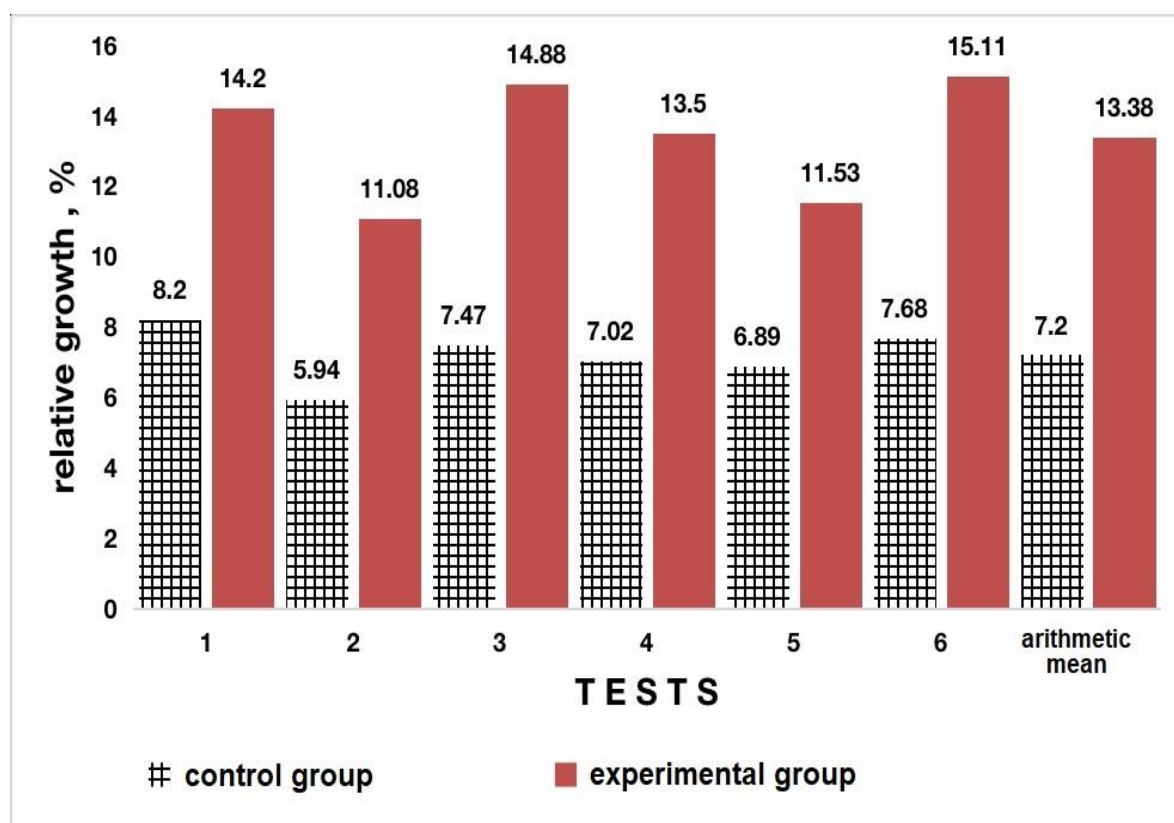


Diagram 3. Dynamics of change in the relative increase in the arithmetic mean values of the indicators of physical qualities of students from the CG and the EG of the accelerant type of development during the experiment (in percent)

Diagram 4 shows a comparison of the arithmetic mean values of the relative increase in the physical qualities of students from the CG and the EG of three types of development during the experiment, which also shows significant differences in the relative increase in the results of students from the EG compared to the CG,

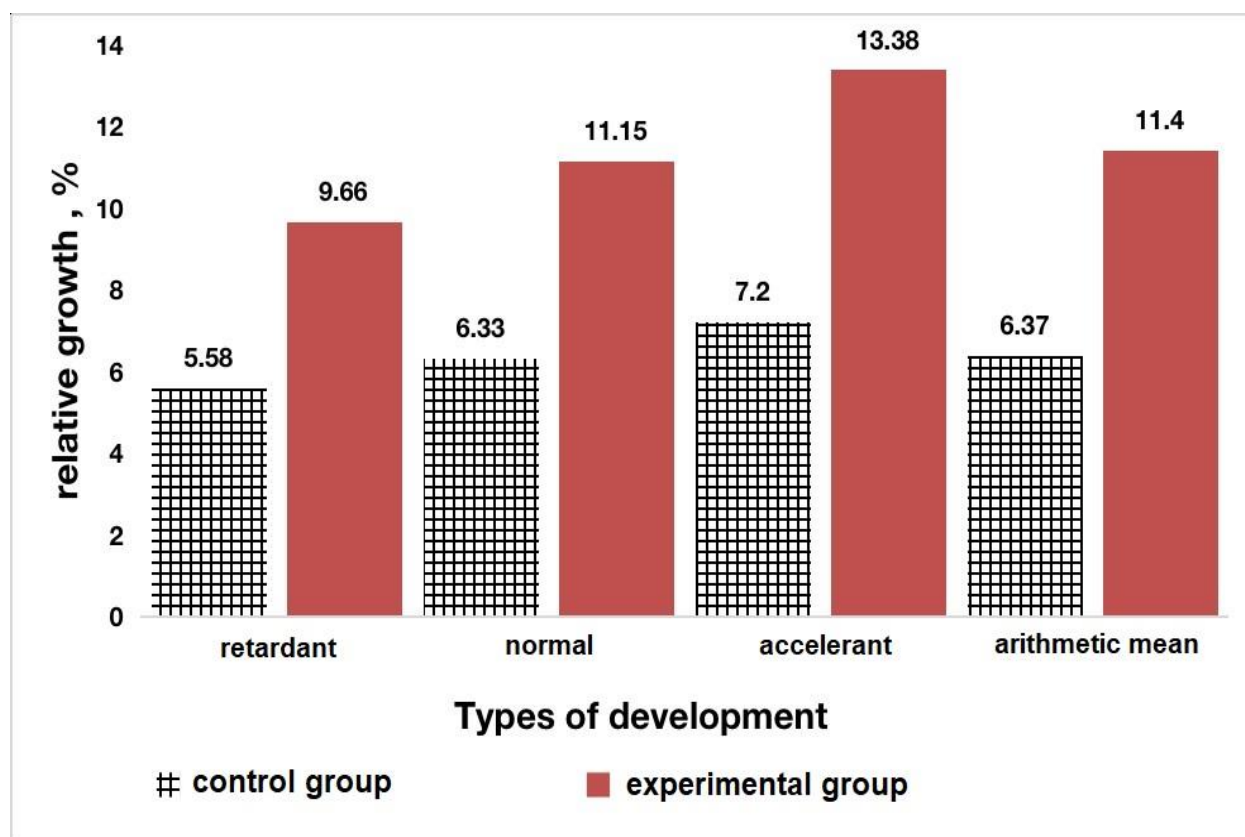


Diagram 4. Comparison of the arithmetic mean values of the relative increase in the indicators of physical qualities of students from the CG and the EG of three types of development during the experiment (in percent)

Conclusions. The results of the research showed that as we move from one stage to the next, there is a tendency for a gradual change in the level of indicators of the physical qualities of students. The results obtained confirmed the effectiveness of the application of an individually differentiated instruction, taking into account the organization of classes based on circular training to influence the physical qualities in the physical education of students of a pedagogical university. During the pedagogical experiment, the average increase in the studied indicators of the control group was 6.37%, and the experimental group - 11.40%.

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