

IMPROVEMENT METHODOLOGY OF PHYSICAL FITNESS AND FUNCTIONAL STATE OF JUNIOR SCHOOLCHILDREN WITH MENTAL RETARDATION THROUGH VESTIBULAR GYMNASTICS

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Abstract. The relevance of vestibular stability development in children with mental retardation is due to the fact that many specialists in correctional pedagogy associate the leading characteristics of their dysontogenesis with the pathology of the vestibular system [2]. The very important, basic coordination ability of a person in the process of motor actions controlling is vestibular stability. In modern practice of adaptive physical education (APE), it seems timely and urgent to research and experimentally substantiate innovative means and methods for optimizing physical fitness and functional state of junior schoolchildren with mental retardation. At present, there is no understanding of how to apply vestibular gymnastics, which is widely used in medicine, neuropsychology, speech therapy, etc., for classes with junior schoolchildren with mental retardation in APE. Therefore, the description of the technique will be essential and useful for specialists working with such children.

Keywords: junior schoolchildren with mental retardation, vestibular stability, vestibular gymnastics.

Introduction

In the scientific field of special pedagogy and adaptive physical education there is a large quantity of data, indicating a high corrective potential of coordination exercises. It has been proven by practitioners that by developing the coordination capacity of children with disabilities, it is possible to influence the correction of their deviations [3]. However, the development of vestibular stability in children, especially with mental retardation, has not yet been sufficiently

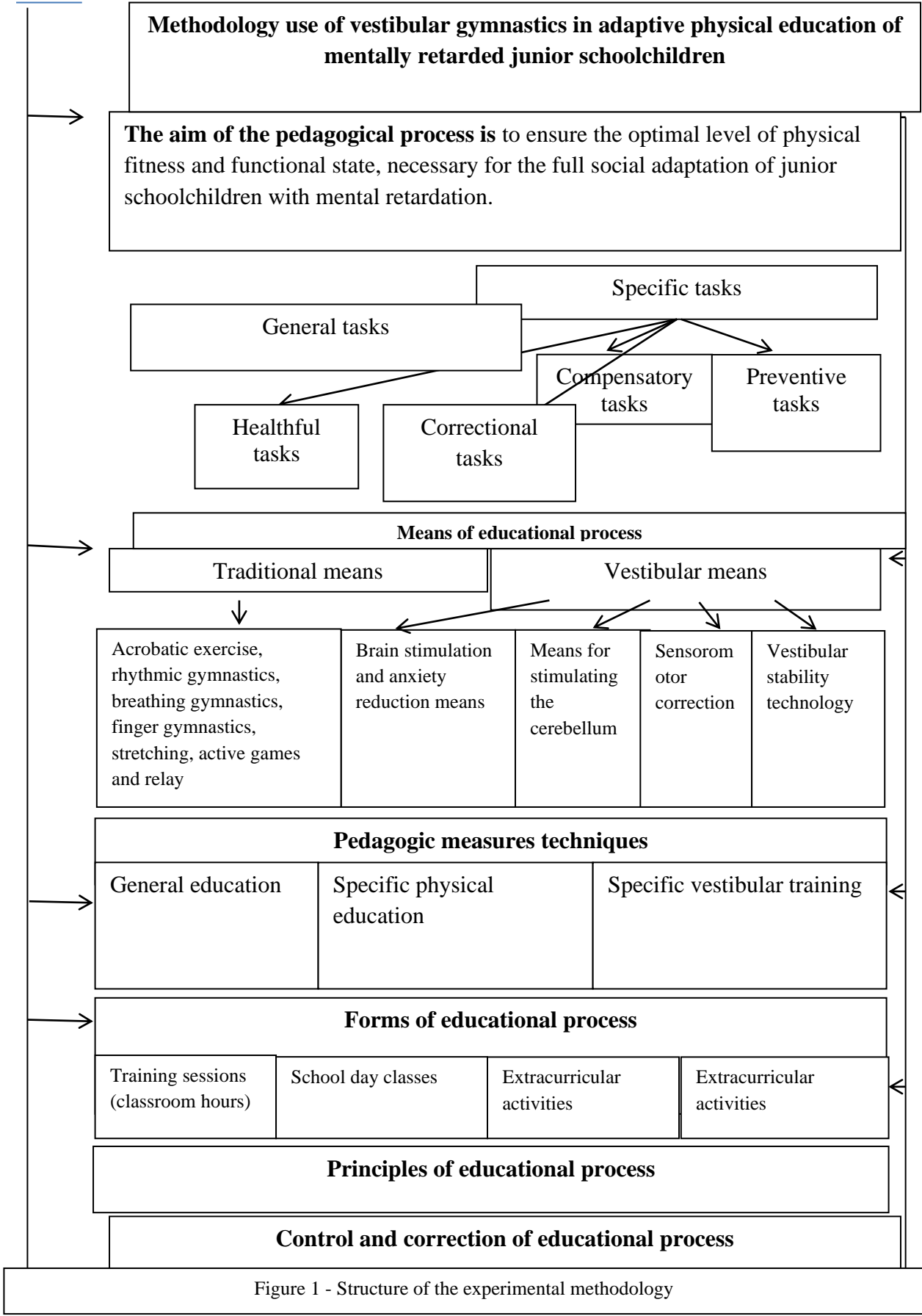
tested. In this connection, the development of methods for optimizing the physical fitness and functional state of junior schoolchildren with mental retardation through vestibular gymnastics is updated.

Methodology and organization of the research

The purpose of our research is to develop and scientifically support the optimization methods of physical fitness and functional state of junior schoolchildren with mental retardation through vestibular gymnastics. In order to achieve this goal, we have used the following methods: analysis and synthesis of scientific and methodological data; questionnaires; methods for evaluating the development of vestibular stability; pedagogical experiment; mathematical and statistical analysis of experimental data. Our research was carried out at schools of Volgograd during the academic year 2019-2020 with students of the 3rd grade (9-10 years) who have the decision of the psychological-medical-pedagogical commission with recommendations for teaching on the educational program of AGEF FSES PGE, options 7.1 and 7.2. Eighty people (40 boys and 40 girls) [3] were examined.

Research results and their discussion

In order to develop a pedagogical process, set and implement educational activities, it is necessary, first of all, to know the health, mental, physical and personal characteristics of pupils with developmental disorders, because the characteristics of pedagogical impact subject are the starting point of any educational process. We examined the morphofunctional state, vestibular stability, physical, mental and stabilizing characteristics of junior schoolchildren with mental retardation. The data obtained from the research were used in the development of a method to optimize the physical fitness and functional state of junior schoolchildren with mental retardation through vestibular gymnastics. The structure of the experimental methodology is shown in figure 1. From September to December 2019 experimental training was provided twice a week in an after-school form of 40 minutes and once a week in a rhythmic form. From January to March 2020, classes were held 3 times a week in the form of a physical education lesson and once in the form of a rhythmic lesson. From April to May, classes were held 3 times a week for 40 minutes using information technology in ZOOM training mode. The control group of junior schoolchildren with mental retardation trained in traditional APE techniques at physical education classes three times a week, mastering the program material consisting of the following sections: athletics, cross-country training, gymnastics with elements of acrobatics, active games; the variation part was represented by a section of active games based on basketball [1]. The variation part of the experimental group of junior schoolchildren with mental retardation completely included the program material on the method of vestibular gymnastics developed by us. The specific features of the technique are the exercises of vestibular gymnastics.



The effectiveness of the developed methodology was tested in a pedagogical experiment. At the beginning of the experiment, the level of vestibular resistance was determined in children of control and experimental groups. The data revealed that the level of development of the vestibular function did not differ significantly ($P>0.05$) among the junior schoolchildren with mental retardation.

The following tests were chosen to determine the vestibular stability: Phirileva test, going 1 m straight after three rolls forward; distance throwing; dynamic balance testing: bench balancing (P. Hirtz), gymnastics bench turns (P. Hirtz); static balance testing: Romberg test and Yarotsky test.

After the experiment, it was found that the indicators of vestibular stability had changed in both groups, but in the experimental group (Tab.2) there was a larger increase than in the control group (Tab.1).

Table 1 – Trend analysis of vestibular stability of junior schoolchildren with mental retardation – control group.

Control tests	Gen der	Control group (n=40)				
		Baseline data	Finite datum	Increase %	Test	p
U- test						
Phirileva test (b)	G	3,9±0,1	3,6±0,1	10,1%	101,5	p<0,05
	B	4,9±0,2	4,7±0,1	5,7%	134	p<0,05
T- test						
Stability after 3 rolls forward, (s)	G	10,8±0,2	10,6±0,2	3,2%	1,6	p>0,05
	B	10,9±0,3	10,6±0,1	2,6%	1,4	p>0,05
Long-range throw of a tennis ball, (M)	G	8,4±0,6	9,4±0,4	8,3%	2	p>0,05
	B	13,8±0,7	14±0,4	0,2%	0,3	p>0,05
Dynamic balance						
Benchbalancing, (s)	G	10,6±0,1	10,5±0,1	1,5%	1,4	p>0,05
	B	10,4±0,1	10,1±0,2	3,3%	1,9	p>0,05
Gymnastics bench turns, (quantity)	G	2,8±0,2	2,8±0,2	1,3%	0,3	p>0,05
	B	2,9±0,2	2,9±0,2	3,8%	0	p>0,05
Static balance						
Romberg test, (s)	G	9,9±0,6	9,7±0,7	8,6%	0,3	p>0,05
	B	8,4±0,5	9±0,5	4,2%	1,2	p>0,05
Yarotsky test, (s)	G	7,6±0,5	7,2±0,5	10,9%	0,8	p>0,05
	B	5,7±0,4	6±0,4	1,4%	0,6	p>0,05

Note: G – girls, B – boys, U- Mann-Whitney U test, T- Student t-test.

Table 2 – Trend analysis of vestibular stability of junior schoolchildren with mental retardation – experimental group.

Control tests	Gen der	Experimental group (n=40)				
		Baseline data	Finite datum	Increase %	Test	p
U- test						
Phirileva test (b)	G	4±0,1	2,8±0,1	44,6%	0	p<0,05
	B	5,1±0,1	3,3±0,1	56,7%	0	p<0,05

T- test						
Stability after 3 rolls forward, (s)	G	10,7±0,2	6,6±0,4	68,6%	12,5	p<0,05
	B	9,8±0,3	7,8±0,4	29%	5,5	p<0,05
Long-range throw of a tennis ball, (m)	G	7,6±0,5	9,1±0,7	14,5%	2,4	p<0,05
	B	14,8±0,9	16,6±1,7	9,4%	2,5	p<0,05
Dynamic balance						
Benchbalancing, (s)	G	10±0,1	8,9±0,1	13,6%	9,8	p<0,05
	B	10±0,1	8,4±0,2	19,3%	10	p<0,05
Gymnastics bench turns, (quantity)	G	3±0,2	4,1±0,3	25,5%	4,8	p<0,05
	B	3±0,2	4±0,2	22,4%	4,5	p<0,05
Static balance						
Romberg test, (s)	G	10±0,7	13,5±0,7	24,8%	5,1	p<0,05
	B	9,2±0,7	11,5±0,8	18%	3,1	p<0,05
Yarotsky test, (s)	G	7,2±0,5	9±0,7	16,2%	3	p<0,05
	B	5,4±0,4	6,5±0,6	13,1%	2,2	p<0,05
<i>Note: G – girls, B – boys, U- Mann-Whitney U test, T- Student t-test.</i>						

In the control group (Tab.1) there was an improvement in the Phirileva test. The observed increase was significant and reliable ($P<0,05$). The values of the other indicators in children of the control group have also improved, but these differences are statistically unreliable ($P>0,05$). A similar pattern was observed in the analysis of the performance of the Phirileva test and in the experimental group. In the experimental group of children, all other indicators of the targets: going 1 m straight after three rolls forward; distance throwing; dynamic balance testing: bench balancing (P. Hirtz), gymnastics bench turns (P. Hirtz); static balance testing: Romberg test, Yarotsky test during pedagogical experiment, the researched indicators have statistically increased with confidence ($P<0,05$) while in the control group the differences between average statistics were not reliable ($P>0,05$).

Conclusions

Development of a method for using the vestibular gymnastics for junior schoolchildren with mental retardation is caused by the urgent need to further significantly improvement the effectiveness of healthful, educational, correctional and preventive school work using modern APE means. The method of optimizing the physical fitness and functional state of junior schoolchildren with mental retardation by means of vestibular gymnastics improves their morphological, motor and psychophysical state and brings them closer to available psychological and physical standards for that age.

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