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Assessing the physical strength development of the 3rd grade primary school student in Thai Nguyen Province, Viet Nam through the use of sports games: A branched study

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Abstract
Through the use of basic scientific research methods in the field of sports such as document research method, interview method and statistical math method, the paper has selected 20 sports games to develop physical skills for 3rd grade primary school students in Thai Nguyen Province and apply them in practice. The application process was carried out in two forms: extracurricular educational activities and extracurricular activities of physical education subject. Initial application results show that the selected sports games have an effect in physical development for 3rd grade primary school students, especially those who are very interested in the experimental sports games.

Keywords: Sports games, primary school students, physical development; extracurricular educational activities outside class time; Thai Nguyen Province

Introduction

1. Rationale

As we all know, children are the most valuable asset of the family and the whole society. Therefore, the development of children attracts the special and leading attention of families and society. Playing plays an important role in a child's development, and especially sports games that help children develop physically, mentally and intellectually. It can be clearly seen that a healthy body depends not only on diet but also on physical activities. In particular, primary school students need this more than anyone else [1].

Sports games not only help them develop physically but also improve their intelligence effectively. Movement development contributes to strengthening and protecting health. Movement exercises both help the body relax and stimulate the activity of internal organs such as the circulatory system, nervous system, respiratory system, digestive system... Especially, when children exercise under natural factors such as sunlight, water, air... it helps children better adapt to the outside environment, enhance the body's resistance [7].

Playing activities are a key activity while studying yhysical education in primary schools, which has a decisive influence on the formation of student personality and is a premise for learning activities at the following ages. Participating in sport games helps them become more and more confident in obtaining their achievementsm, helping students confidently communicate, get along with people, overcoming the initial shyness and difficulties. In addition, when playing with friends, children will increase the ability to share, understand and unite with teammates to achieve the desired results, the ability to work in groups will be formed [9].

The preliminary survey at primary schools in Thai Nguyen Province shows that: Extracurricular sports activities are underdeveloped in primary schools, the forms and methods of organizing sports movements in the primary schools are still poor, so the physical strength of primary school students in general and especially 3rd grade students in Thai Nguyen Province is weak. Besides, the organization of sport games in extracurricular programs have also revealed many limitations; the reason may be due to the lack and weaknesses of facilities and physical education teachers, and the students are still not given opportunities to

comfortably play with their favorite sports games... Therefore, choosing the sports games that are suitable for the psychophysiological characteristics of 3rd grade students are very important and necessary to contribute to the physical strength development of 3rd grade students in particular and improve their effectiveness of physical education for primary schools in Thai Nguyen Province in general.

2. Research method

In the research process, the researchers used the following research methods: Document analysis and synthesis; Interview, seminar; Pedagogical observation; Pedagogical examination; Pedagogical experiment; and Mathematical statistics.

3. Research result and discussion

3.1. Selecting sports games to develop physical strength for 3rd grade students in Thai Nguyen Province.

Through reference to materials, surveys of physical education as well as consultation of experts, we have gathered 35 sports games to develop physical strength for 3rd grade primary school students in Thai Nguyen Province. We then conducted interviews with 125 people including: 32 experts and 93 good teachers with long-term and teaching [7, 10]. The results are shown in Table 1.

Table 1: Results of selecting sports games for for 3rd grade students (n = 125)

Sports games	Groups	The first time		The second time	
		n	%	n	%
Hide and seek	1	38	30,40	34	27,20
Tâng cầu	1	112	89,60	108	86,40
Following orders	1	91	72,80	99	79,20
Who is better	1	81	64,80	83	66,40
Cock fighting	1	96	76,80	100	80,00
Hula hoop	1	102	81,60	110	88,00
Morning and evening	1	41	32,80	39	31,20
Relay	2	110	88,00	108	86,40
Ready for order	2	52	41,60	49	39,20
Win the victory flag	2	106	84,80	111	88,80
Running with pinwheel	2	101	80,80	109	87,20
Thả đĩa ba ba	2	72	57,60	69	55,20
Dragon and snake	2	96	76,80	111	88,80
Handing towels	2	79	63,20	72	57,60
Chicken chasing toad	3	68	54,40	65	52,00
Leapfrog	3	113	90,40	115	92,00
Hopping relay	3	89	71,20	97	77,60
Rope skipping	3	108	86,40	116	92,80
Avoid the ball	3	62	49,60	58	46,40
Hopscotch	3	98	78,40	98	78,40
Jumping sheep	3	25	20,00	25	20,00
Horse riding	4	99	79,20	94	75,20
Throwing	4	96	76,80	119	95,20
Who pulls well	4	99	79,20	101	80,80
Throw the target	4	111	88,80	116	92,80
Toss the ball to each other	4	54	43,20	54	43,20
Chanting while sawing wood	4	71	56,80	68	54,40
Armwrestling	4	75	60,00	74	59,20
Transferring objects	5	97	77,60	99	79,20
Who is faster and more skillful	5	95	76,00	95	76,00
Hurdle relay	5	28	22,40	32	25,60
Pass fast, jump quickly	5	97	77,60	100	80,00
Chồng đống chồng đe	5	71	56,80	65	52,00
Planting flower buds	5	97	77,60	99	79,20
Jumping down from above	5	42	33,60	58	46,40

After two rounds of interview, the results of selecting sports games of experts and teachers were quite similar, which was reflected by the value of Wilcoson index: $T > W\alpha$ (with $n > 20$ and $\alpha = 0.05$) [9]. Thereby, the authors have selected 20 games of 5 groups of skill training to develop physical health for grade 3 elementary school students in Thai Nguyen province with the selection rate of 70% or more. Specifically:

Group 1: Including games training the ingenuity, balance and orientation in space: "Tâng cầu"; Following orders; Cock fighting; Hula hoop.

Group 2: Including games that train the ability of walking, running and agility: Relay; Running with pinwheel; Win the victory flag; Dragon and snake.

Group 3: Including games to practice jumping skills and develop leg strength: Relay; Leapfrog; Rope skipping; Hopscotch.

Group 4: Including games to practice throwing, carrying, pulling skills and develop chest strength: Horse riding; Throwing; Throw the target; Who pulls well.

Group 5: Including games to train coordination skills and develop endurance: Who is faster and more skillful; Pass fast, jump quickly; "Chồng đống chồng đe"; Planting flower buds.

3.2. Application of selected sports games in extracurricular activities for 3rd grade primary students in Thai Nguyen Province and evaluation of effectiveness.

3.2.1. Experimental organization

The pedagogical experiment process was conducted in 9 months (equivalent to 1 academic year) on the study subjects including 192 2nd and 3rd grade students of Doi Can primary school, Thong Nhat primary school of Thai Nguyen Province and is divided into 2 groups: The control group consists of 89 students and the experimental group consists of 103 students.

For the selected sports games, we experimentally conducted during extracurricular activities, for 4 periods/week on Friday afternoons and extracurricular activities [3].

The experimental process is detailed in Table 2.

Table 2: Process of teaching selected sports games for 3rd grade primary students in Thai Nguyen Province

Sports games \ Month	1	2	3	4	5	6	7	8	9
Tâng cầu		x	x			x		x	
Following orders	x		x	x			x		x
Cock fighting		x			x	x		x	
Hula hoop	x		x	x			x		x
Relay		x			x	x		x	
Running with pinwheel	x		x	x			x		x
Win the victory flag		x			x	x		x	
Dragon and snake	x		x	x			x		x
Hopping relay		x			x	x		x	
Leapfrog	x		x	x			x		x
Rope skipping		x			x		x	x	
Hopscotch	x			x		x	x		x
Horse riding		x		x	x			x	
Throwing	x		x			x	x		x
Throw the target		x		x	x			x	
Who pulls well	x		x			x	x		x
Who is faster and more skillful	x			x	x				x
Pass fast, jump quickly		x		x	x			x	
Chồng đống chồng đe	x		x			x	x		x
Planting flower buds		x	x		x	x		x	

Building a process of using curricular sports games for 3rd grade primary school students in Thai Nguyen Province in 2 forms: Extracurricular educational activities and extracurricular activities of physical education subject which are science, logic, ensuring that sports games can be built in accordance with practical conditions, promoting advantages and overcoming weaknesses in the process of organizing educational activities for students. This is also the result of a number of authors in Vietnam [4, 5, 6, 8].

3.2.2. Evaluation of experimental results

Before the experiment, we conducted physical strength tests of students in experimental group with 10 tests, based on the results of the Vietnam Physical Strength Survey of the same age in 2001 of the Institute of Physical Education and Sports [2, 11]. The test results are shown in Table 3

Table 3: Comparison of physical strength of primary school students in control and experimental groups (The time before the experiment)

Indicators	Male students					Female students				
	Control group (n=50)		Experimental group (n=58)		Statistical differences	Control group (n=39)		Experimental (n=45)		Statistical differences
	$\overline{X}$	± δ	$\overline{X}$	± δ	t	$\overline{X}$	± δ	$\overline{X}$	± δ	t
Standing height (cm)	128.54	4.08	128.05	4.76	0.5760	125.00	4.94	125.27	5.32	0.2410
Weight (kg)	28.74	4.42	27.89	5.52	0.8881	26.86	5.35	26.40	4.57	0.4203
Cardiac function	13.04	1.89	12.97	1.64	0.2039	13.35	1.78	13.73	1.86	0.9556
Run 30m XPC (s)	6.76	0.45	6.81	0.46	0.5700	7.39	0.78	7.45	0.52	0.4082
Long jump stand (cm)	136.38	10.24	134.69	12.47	0.7731	131.30	12.04	129.13	11.2	0.8508
Flexible body folding (cm)	5.72	2.76	5.71	2.60	0.0193	5.50	2.81	5.51	2.40	0.0174
Lie on your back with belly bend (time/30s)	13.84	2.22	13.57	3.02	0.5338	11.62	2.35	12.02	2.28	0.7888
Force squeeze of preferred hand (kg)	14.68	1.61	14.43	1.82	0.7574	13.01	1.29	13.14	1.38	0.4459
Shuttle run 4x10m (s)	12.88	0.96	12.98	0.79	0.5850	13.97	1.02	14.07	1.00	0.4522
Free running for 5 mins (m)	758.06	81.98	750.95	80.65	0.4528	703.20	76.42	699.87	65.69	0.2125

The results of Table 3 show that: Before the experiment, the physical strength condition of the 3rd grade primary school students with the control group and the experimental group on both male and female subjects obtained the same results $t_{calculation} < t_{table}$ at threshold $P > 0.05$, that is, before the experiment, the physical strength condition of the control group students and the experimental group were similar, or the grouping is completely objective, ensuring the experimental organization requirements. We use this result as a basis for conducting experiments of selected sports games.

After 1 year of experiment, we continue to use the above 10 tests to test the physical strength of the control group and the experimental group. The results of Table 4 show that, after 1 year of experimental study, the physical strength of the experimental group is much higher than that of the control group at the probability threshold $P < 0.05$. This proves that the sports games we selected applied to the 3rd grade primary school students in Thai Nguyen Province is highly effective in physical strength development for research subjects.

Table 4: Comparing the physical strength of 3rd students of control group and experimental group (After the experiment)

Indicators	Male students					Female students				
	Control group (n=50)		Experimental group (n=58)		Statistical differences	Control group (n=39)		Experimental (n=45)		Statistical differences
	$\overline{X}$	± δ	$\overline{X}$	± δ	t	$\overline{X}$	± δ	$\overline{X}$	± δ	t
Standing height (cm)	132.56	4.42	137.10	4.99	5.0130	128.56	4.52	133.71	4.23	5.3649
Weight (kg)	30.90	4.68	33.88	4.67	3.3030	29.49	2.91	32.02	4.44	3.1256

Cardiac function	12.62	1.62	11.86	1.62	2.4310	13.11	1.71	12.04	1.81	2.7834
Run 30m XPC (s)	6.60	0.53	6.24	0.51	3.5817	7.11	0.62	6.80	0.51	2.4791
Long jump stand (cm)	146.2	12.90	156.79	13.32	4.1900	138.4	10.16	152.31	11.94	5.7684
Flexible body folding (cm)	6.04	2.19	7.14	2.59	2.3910	5.97	2.05	7.16	2.30	2.5070
Lying on back and crunching (time/30s)	15.42	2.83	18.21	2.00	5.8280	12.87	2.02	15.33	2.71	4.7534
Force squeeze of preferred hand (kg)	16.39	1.53	17.59	2.35	3.1840	14.70	1.56	16.11	1.84	3.8006
Shuttle run 4x10m (s)	12.43	1.03	11.41	0.81	5.6553	13.60	0.87	12.73	0.90	4.4982
Free running for 5 mins (m)	771.54	64.30	815.74	83.37	3.1060	722.90	73.91	773.38	73.93	3.1215

To better understand the differences in physical strength development of the experimental and control groups, we calculated the physical strength growth rate of male and female students in the control and experimental groups. The results are presented in Tables 5 and 6 and charts 1 and 2.

Table 5: Physical growth of male students in 3rd grade after the experiment

Indicators	Control group (n=50)			Experimental group (n=58)		
	$\overline{X}_1$	$\overline{X}_2$	W (%)	$\overline{X}_1$	$\overline{X}_2$	W (%)
Standing height (cm)	128.54	132.56	3.08	128.05	137.1	6.83
Weight (kg)	28.74	30.90	7.24	27.89	33.88	19.40
Cardiac function	13.04	12.62	3.30	12.97	11.86	8.90
Run 30m XPC (s)	6.76	6.60	2.40	6.81	6.24	8.70
Long jump stand (cm)	136.38	146.20	6.95	134.69	156.79	15.20
Flexible body folding (cm)	5.72	6.04	5.44	5.71	7.14	22.30
Lying on back and crunching (time/30s)	13.84	15.42	10.80	13.57	18.21	29.20
Force squeeze of preferred hand (kg)	14.68	16.39	11.00	14.43	17.59	19.70
Shuttle run 4x10m (s)	12.88	12.43	3.60	12.98	11.41	13.00
Free running for 5 mins (m)	758.06	771.54	1.76	750.95	815.74	8.27

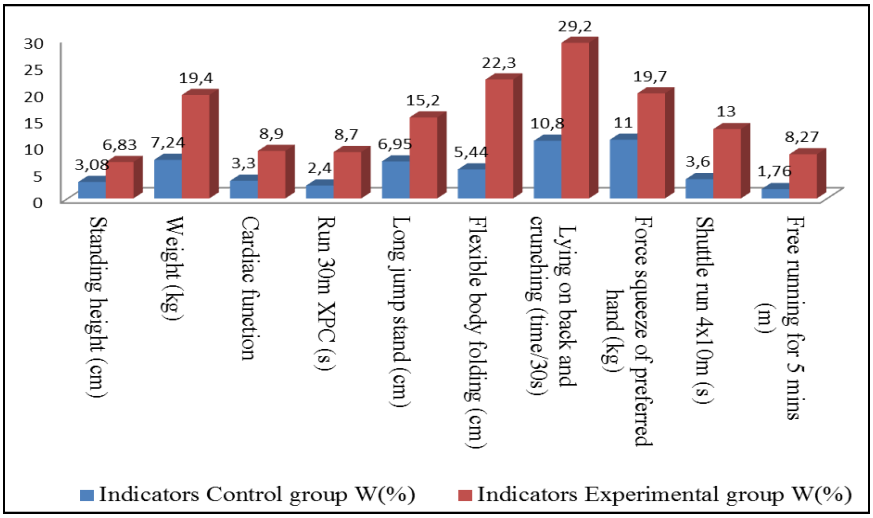

Chart 1: Comparison of physical growth of male students in 3rd grade after the experiment

Table 5 and chart 1 show that the male students in 3rd grade, after the experiment, have the following results: All the physical strength indicators of the two research groups have grown. Of which, the experimental group has many higher indicators, as follows:

10/12 physical indicators of the experimental group are significantly higher than those of the control group. In which the target "Lying on back and crunching" increases the highest, to 29.20%.

Table 6: Physical growth of female students in 3rd grade after the experiment

Indicators	Control group (n=39)			Experimental group (n=45)		
	$\overline{X}_1$	$\overline{X}_2$	W (%)	$\overline{X}_1$	$\overline{X}_2$	W (%)
Standing height (cm)	125.00	128.56	2.81	125.27	133.71	6.52
Weight (kg)	26.86	29.49	9.33	26.40	32.02	19.20
Cardiac function	13.35	13.11	1.80	13.73	12.04	13.00
Run 30m XPC (s)	7.39	7.11	3.90	7.45	6.80	9.10
Long jump stand (cm)	131.30	138.4	5.27	129.13	152.31	16.50
Flexible body folding (cm)	5.50	5.97	8.20	5.51	7.16	26.00
Lying on back and crunching (time/30s)	11.62	12.87	10.20	12.02	15.33	24.20
Force squeeze of preferred hand (kg)	13.01	14.70	12.20	13.14	16.11	20.30
Shuttle run 4x10m (s)	13.97	13.60	2.70	14.07	12.73	10.00
Free running for 5 mins (m)	703.20	722.90	2.76	699.87	773.38	9.98

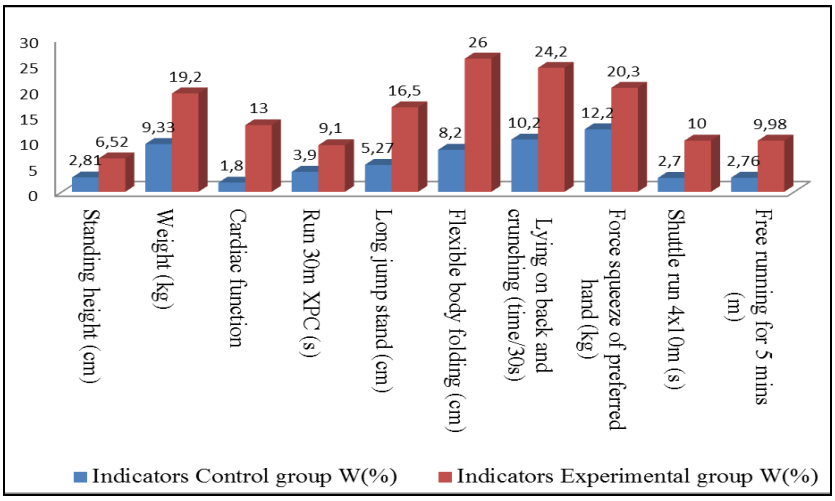

Chart 2: Comparison of physical growth of female students in 3rd grade after the experiment

The results of table 6 and graph 2 show that female students in 3rd grade have all the physical growing indicators for both research groups. Of which, the experimental group has many higher indexes, as follows:

12/12 physical indicators of the experimental group are significantly higher than those of the control group. Of which the indicator "flexible body folding" increases the highest to 26.00%.

Conclusion

1. Through the research process, by means of document research, interviewing methods and using statistical algorithms, the paper has selected 20 sport games of 5 skill training groups to develop physical strength for 3rd grade primary students in Thai Nguyen Province and conducted experimental organization of the selected sports games in practice in two forms to evaluate their effectiveness.
2. Experimental results have confirmed the effectiveness of the selected sports games. Specifically, after 1 year of experimental study, the indicators of physical strength of students in experimental and control groups showed significant differences with statistical significance, showing $t_{calculation} > t_{table}$ threshold $P < 0.05$ in all test indicators on both male and female students, especially, clearly showing a much higher growth rate of the physical evaluation indicators of the experimental group than those of the control group. This proves that the sports games selected and applied in practice have brought about efficiency in developing and improving the physical strength in experimental Students.

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