IMPACT OF THE DEVELOPMENT OF COORDINATION ABILITIES ON THE SPEED OF CARTWHEEL ACQUISITION

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ABSTRACT

The work presents the results of a research on the impact of the programme of exercises on the development of selected coordination abilities and the speed of acquisition of cartwheel in 10–11-year-old pupils. The object of the research were 34 pupils from the 8-year secondary grammar school in Nitra. Coordination abilities were developed during the period of 5 months and then, the acquisition of cartwheel was implemented. Each pupil should realize 15 attempts, which were assessed by the panel of three independent evaluators – teachers using the marks between 1 and 5. The following results were calculated based on average values: The speed of acquisition was showed more strikingly in the experimental group, as a consequence of the special coordination training. When assessing the quality of cartwheel performance we came out of the statements by Melicher & Slezák (2004), who consider the standard to be fulfilled, when 75% of pupils from the observed group fulfilled the criterion. We also followed the opinions of Antala (1997), who presents that the mark 2 (praiseworthy) corresponds to the technically independently acquired gymnastic element with a sporadic occurrence of medium errors of aesthetic character. By the combination of these criteria and based on the results of the work it was proved that the speed of motor learning was higher in the experimental group. The speed of acquisition was influenced mainly by the changes in the level of dynamic balance and to a limited level also in the level of static balance and kinesthetic-differentiation ability of legs. Rhythmic and spatial orientation abilities showed only a small share on the final performance.

Key words: coordination skills, speed, development, gymnastics, cartwheel

INTRODUCTION

The importance of coordination abilities in school physical education is very low. It is scientifically proven that the coordination abilities and motor skills have relationship in some way. Problems of development of coordination abilities and its subsequent impact on the rate of acquisition of technique in various sectors and sports disciplines are currently not sufficiently developed. Possible shortening of the process of motor learning in school physical education through coordination exercises will not only contribute to the attractiveness of physical education, but especially for their more efficiency.

Coordination abilities defined by Hirtz (1985) are as complex, relatively independent assumptions of output regulation of movements that are formed and developed in physical activities on the basis of dominantly inherited, but influenced to neuro - physiological mechanisms and they can be developed by systematic training. For the purposes of school education provides the following abilities: The kinesthetic - differentiation, space-orientation, balance, rhythmic and reaction speed.

METHODS

The aim of this work was to verify the effectiveness of the program on the development of coordination abilities to acquisition rate technique of cartwheel for 10-11 year - old at grammar school.

We realized a two group experiment (Havliček, 1998). In an experimental group (VE, n = 18), we applied the experimental stimulus (PE1) focused on the development of selected coordination abilities. After some time (t0 - t1), we researched the changes in the level of selected coordination abilities. The control group (VK n = 16) was applied general educational - learning process (PK). For both groups, the monitoring time (Δt1) and equal to 5 months. After applying the first mean in experimental group PE1 in a PK in the control group were detected changes in the level of coordination abilities of both files. After testing all probands was included in the learning process experimental mean PE2, which contains a set of preparatory exercises and workout advice from a methodological range cartwheel aside. The mean PE2 in the time range Δt2 (6 lessons) was its content in both files identical.

$(V_E\ S1)t_0 \rightarrow P_{E1}\Delta t_1 \rightarrow (V_ES)t1 \rightarrow P_{E2}\Delta t_2 \rightarrow (V_ES)t_2$
$(V_K\ S_1)\ t_0 \rightarrow P_K\Delta t_1 \rightarrow (V_KS)t1 \rightarrow P_{E2}\Delta t_2 \rightarrow (V_KS)t_2$

Research monitoring we conducted in classes Prima A and B at Grammar School on Golianova Street in Nitra. Overall, research included 18 students in the experimental group and 16 students in the control group. Both groups of pupils attended physical education classes three times a week for one lesson.

To test the selected coordination abilities, we used the following tests:
Test no. 1: Bench walk with 3 turns (Šimonek, 2008)
Test no. 2: Movement rhythm observation (Šimonek, 2008)
Test no. 3: Flamingo balance test (Měkotu – Blahuš, 1983)
Test no. 4: Target standing broad jump (Šimonek, 2008)
Test no. 5: Shuttle run (Šimonek, 2008)

PE1 - experimental mean 1 - exercises to develop coordination abilities. The set of exercises were taken from the authors Doležajová - Refrigerators (2002), Šimonek (2008) Strešková (2005), Šimonek (2007), Šimonek - Zrubák (2003), Miklovičová (2002), Halmová (2005). The exercises were included in the overall scope of 56 lessons, taking turn's one exercise each monitored ability for one lesson. PE2 - experimental mean 2 - preparatory exercises to practice cartwheel. We made a video of 15 attempts practicing cartwheel for each student after implementation of the mean (PE2). The total range was 6 lessons. Individual attempts from video tape was professionally assessed by three independent teachers by blindly assessment with the evaluation from 1 to 5 based on the evaluation Antala (1997) and according to the table of general errors and precipitation (FIG), which gives Rupčík (2003).

The level of coordination abilities we describes by the basic statistical characteristics. The statistical processing and comparing the results, we used the Wilcox test for two dependent samples and the Mann-Whitney U-test, with statistical significance, we tracked changes and differences assessed at 5% and 1% level of significance. Objectivity of the evaluation of experiments as well as the detection of dependence between attempts and coordination abilities we investigated by using Kendall Tau coefficient (Munk, 2006).

RESULTS

Table 1 The statistical significance of differences in input and output data in the control group

	Imput control group	output control group	difference	T-test
Test 1	12,89281	12,61000	0,28281 (s)	**0,178811**
Test 2	1,261875	1,606875	-0,345 (s)	**0,108942**
Test 3	25,47875	26,58375	1,105 (s)	**0,147661**
Test 4	6,288125	5,559375	0,72875 (cm)	**0,070327**
Test 5	11,58188	11,51063	0,07125 (s)	**0,717381**

p <0.05* p <0.01**

Table 2 The statistical significance of differences in input and output data in the experimental group

	Imput experimental group	**Output experimental group**	**diference**	**T-test**
Test 1	10,96722	9,74222	1,225 (s)	**0,001370****
Test 2	1,606111	1,067778	0,538333 (s)	**0,002139****
Test 3	22,12111	32,46056	-10,33945 (s)	**0,000293****
Test 4	4,460000	2,867778	1,592222 (cm)	**0,000438****
Test 5	10,81833	9,97944	0,83889 (s)	**0,000599****

p<0.01** p< 0.05*

Table 3 The statistical significance of differences in output data in the control and experimental group

	Output control group	**Output experimental group**	**diffrerence**	**U-test**
Test 1	12,61000	9,74222	2,86778 (s)	**0,000****
Test 2	1,606875	1,067778	0,539097 (s)	**0,022***
Test 3	26,58375	32,46056	-5,87681 (s)	0,198
Test 4	5,559375	2,867778	2,691597 (cm)	**0,000****
Test 5	11,51063	9,97944	1,53119 (s)	**0,002****

p<0.01** p< 0,05*

The request made by Antal (1997) can be seen as a demonstration of exercise to shape mark 2 for technically mastered independently, with occasional small standard errors of aesthetic character. Mark three requires some teacher´s help with errors and aesthetic character exceptionally talking about the majority of medium and large errors. Based on the arguments of Melicher - Slezak et al. (2004) as meeting the standards for a group of students deemed to meet the requirements result in 75% of pupils in a given thematic units. This information was used as a criterion for mastering techniques in both groups in cartwheel. Percentage of pupils achieving at marks 2.00 and low above the level of 60% resulted in no try no. 9, 11, 13 and 15. The comparison of scores of demonstrations cartwheel with individual tests of coordination abilities we have reached the following results:

Dynamic balance: Its influence in the experimental group showed significantly since the first attempt with the exception of attempts no. 6, 8, 10 and 13. This is its effect on the cartwheel itself significant and its development was significantly affecting his technique. The level of this ability has even resulted statistically in attempts no. 7 and 11 experiments and the control group, as its influence in the shape of a practice only confirms.

Rhythmic and space – orientation ability: was not statistically significant even one of the files.

Static balance: level of this ability in the experimental group showed a statistically significantly longer in 1st and 3rd attempt. The average marks in these attempts do not reflect its influence. Subsequently it resulted in attempt no. 9, 10, 12 and 14 in which the percentage of pupils who achieved a 2.00 grade and less meant 61 respectively 56% share of all group. This ability was significantly reflected in attempt no. 8 and 9 and in the control group which however with marks meant only 6 respectively 13% share of the whole group. It can be argued that greater development of this ability could be significantly affecting higher by cartwheel.

Kinesthetic – differentiation ability: development of this ability showed a statistically significant in the experimental group in attempts no. 5 and 6. The average of marks achieved 67 in both cases 50%. In the control group, the level of this ability demonstrated in experiment no. 7. In connection with the grades did not achieved consider this effect in two or one of 15 attempts for substantial. What, however, could improve longer developing this ability, respectively the development in later life.

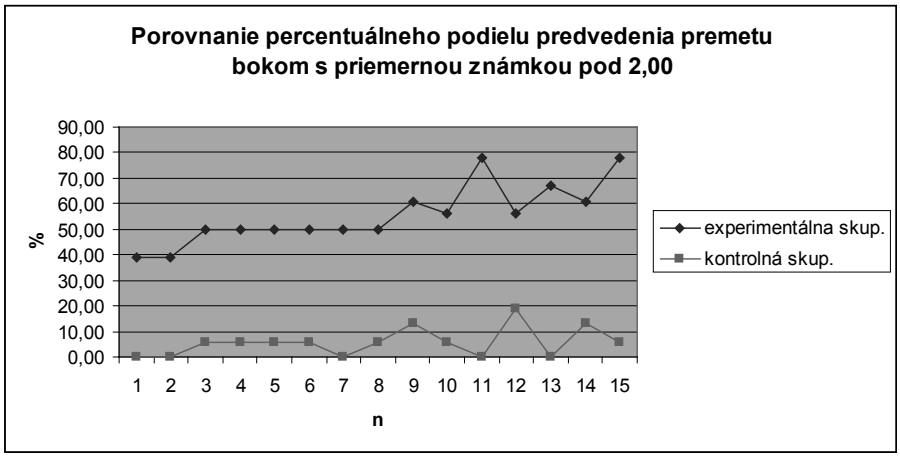

Figure 1
Comparison of the percentage of the cartwheel with an average mark below 2.00

DISCUSSION

The analysis of objectivity of expert assessment of cartwheel we can conclude that the values of correlation coefficients ranging from 0.94 to 1.00 in the interpretation by Cohen (1992, in Munk, 2006) are an almost perfect correlation. This nearly perfect correlation between teachers can be explained by experience, 5-point scale evaluation or clearly defined evaluation criteria.

The speed of motor learning was higher in probands from experimental group. This confirmed the opinions of the author Raczek (1990) and Diaczuk (1994) who dealt with this issue in tennis, respectively in handball.

CONCLUSION

The aim of this work was to verify the efficiency of program for development coordination abilities to speed acquisition of technique of cartwheel for 10-11 year - old at 8 - year grammar school. Based on the results of the work we can conclude that the exercise program was effective, but not in all monitored indicators. The assumption that the development of selected coordination abilities affect the rate of acquisition of technique cartwheel compared with the control group was confirmed. The largest share was in dynamic balance. Similarly, it was reflected in static balance but to a lesser extent in view of the correlation between a given ability and individual attempts. Rhythmic ability, kinesthetic – differentiation ability of and space-orientation ability of the cartwheel of the demonstrations showed little or not at all.

We can conclude that the structure of the theme Gymnastics requires comprehensive development of condition and coordination abilities as functional assumption for mastering gymnastic skills. Experience confirms that the lack of development of coordination abilities is causing stagnation of sports - gymnastics performance.

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