

Ключевые слова: спортивна орієнтація, технологія, програма тестування, здатності, рівні.

THE TECHNOLOGY OF SPORTS ORIENTATION OF YOUNG ATHLETES FROM 10-12 YEARS OF AGE IN GROUPS OF PRIMARY TRAINING AT SPORTS SCHOOLS

Volodymyr YAKOVLIV, Olena YAKOVLIVA, Oхana KHARCHENKO

Vinnitsya State Pedagogical University named after Mykhailo Kotsiubynskyi

Abstract. The way a problem is put. One of the principal targets in groups of primary training at sports schools is search for the most promising young athletes for further sports perfection.

Key words: sport orientation, technology, testing programme, ability, level.

SELECTED SOMATIC AND FUNCTIONAL FACTORS AND THE SPEED OF LEARNING AND TEACHING OF SWIMMING ACTIVITIES TO TEN-YEAR-OLD CHILDREN

Ewa DYBIŃSKA

Academy of Physical Education in Cracow, Poland

Introduction

Learning to swim consists in relatively durable changes in the manner of motor behaviour as a consequence of gaining various experiences connected with exploration of the aquatic environment (water resistance and its displacement) as well as the acquisition of swimming strokes, which will ensure floatation on water and locomotion (Czabański, Fiłon et al. 2003). It has been generally acknowledged – as indicated by practice (Bartkowiak 1999) that the children learn swimming the fastest at the younger school age, i.e. during the period of favourable biological changes and during a stable phase of their development. This period is characterised by a general harmony in physical development and a peculiar perfection in movement (Szopa, Mleczko, Żak 1996). This does not mean, however, that all children at the younger school age acquire their swimming skills equally fast.

During the learning and teaching of swimming skills, which occurs in the aquatic environment, a number of factors play an essential role for this process to be effective, starting with the energy aspect of the pupil, which finds its expression in strength and endurance during motor activities, until the effective reception of information, which determines the precision in executing actions according to intention (Czabański 1998). Yet, the stimuli that come to the pupil from outside (from the teacher) are constantly disturbed by the specific conditions of the environment, so the function the senses of

vision and hearing, the functions of the muscular and locomotion organs as well as those of the sense of touch act differently than they do on land. In connection with the above, it appears that the efficiency of the co-ordination predispositions such as: receptor and motor co-ordination, spatial and motor orientation as well as that of simple reaction time to visual and aural stimuli may be of a considerable importance in effective acquisition of swimming skills.

According to many authors, one of the significant factors that is important for faster and more accurate acquisition of new kinds of motor activities – especially at school age – is the level of co-ordination and physical fitness predispositions of training individuals (Zimmerman, Nicklisch 1981, Schmidt 1988, Raczek 1989, Hirtz, Nüske 1990, Hirtz 1995, Juras, Waśkiewicz 1998, Ljach 1993, Raczek, Mynarski, Ljach 2002). One can hypothetically assume that – like in other sports disciplines – the pupils with a higher level of co-ordination fitness will acquire swimming skills faster than their contemporaries who evince a lower level of those predispositions. The issue related with the significance of selected co-ordination predispositions during the learning and teaching of swimming skills inspired in-depth observations about this problem.

This study is an attempt at answering the following research question: How did the level of the swimming skills acquired by the children at a younger school age change in relation to the somatic and functional factors as well as their co-ordination and physical fitness predispositions?

Material and Methods

This research was conducted on 10-year-old school children from third forms from the selected primary schools in Cracow who attended their obligatory swimming lessons during the 2004 / 2005 school year. Those lessons took place once a week at the swimming pool of the Academy of Physical Education in Cracow. Throughout the school year, the swimming syllabus was implemented during 30 lesson units and it included the acquisition of basic swimming skills as well as the mastering of the backstroke and the crawl. Their swimming prowess was evaluated by means of the Skills Test, which consisted in covering a distance of 15 or 25 metres as well as in evaluating their swimming technique according to a scoring system. On the basis of the results relating to the level of their swimming skills after the last, sixth test, the following three physical fitness groups were created among the children. Group One included poor swimmers, the children who learnt how to glide on the chest and could swim on the back for a distance of up to 15 metres by alternating their leg movements. Group Two – intermediate – consisted of the children who covered a distance of 25 metres using the backstroke and made feet-first jumps into the water. Group Three were good swimmers, i.e. the children who covered a distance of 25 metres using the backstroke as well as 25 metres by the crawl and executed straight headers into the water. The measurements of the somatic and functional factors concerned: 1. body height, 2. body fat, 3. lean body mass and 4. vital lung capacity. Additionally, we also calculated the Rohrer index. The measurements of the co-ordination as well as physical fitness predispositions concerned: 1. receptor and motor co-ordination (measured by the Piórkowski apparatus), 2. spatial and motor co-ordination (measured of the AKN-102 cross apparatus), 3. simple reaction time to aural stimulus, and 4. simple reaction time to visual stimulus (measured by means of electronic meter), 6. foot flexibility (measured by means of a goniometer) and 6. flexibility – this trial is one of the components of “Eurofit” motor fitness test.

Careful attention was paid only to those school children, whose attendance at

swimming classes was over 70 %. 271 children were qualified to this group, including 142 boys and 129 girls. The material collected in the course of the research was subjected to a statistical and descriptive analysis. The basic values of statistic characteristics for all the tested features were calculated in the groups of girls divided according to their swimming skills. Their statistic significance of differences between groups was assessed with t-Student's test.

Results

At the end of the school year, a practical test was carried out in order to evaluate the level of swimming skills acquired by the pupils. The results obtained during the final Fourth Test revealed that the swimming skills mastered by the subjects were at a diversified level. Most of the schoolchildren – 65.49 % of the boys and 62.02 % of girls – learnt to swim at an intermediate level (Group Two), whereas only 19.02 % of the boys and 15.50 % of girls achieved good results (Group Three). A large percentage of those children – 15.49 % of the boys and 22.48 % of girls – did not make any significant progress in swimming because those pupils displayed skills at a poor level (Group One) at the end of the school year.

While evaluating the results relating to the level of the subjects' swimming skills in relation to the somatic and functional factors, the average values of the analysed parameters were compared in terms of the results of the swimming test conducted at the end of the school year.

The analysis of mean values of the subjects' somatic and functional factors with respect to their swimming skills (tables 1 and 2) allows to state that among male and female schoolchildren who learnt to swim at a poor level (Group One) and those who attained the intermediate (Group Two) as well as the good level (Group Three), some significant differences occurred in the majority of the considered parameters of body height, body mass, body fat, as well as lean body mass. Statistically significant differences in the mean values of the vital lung capacity occurred among the children from the group of

Table 2

Differences between the results on boys' somatic and functional parameters

Tests	Level of swimming skills	Number	Average	Level of swimming skills	Number	Average	Significance of differences
Height (centimetres)	1	22	138.31	2	93	139.84	-1.32 *
	1	22	138.31	3	27	140.57	-1.301 *
Body mass (kilograms)	1	22	33.01	2	93	34.92	-1.801 *
	1	22	33.01	3	27	35.17	-1.371 *
Rohrer's Index	1	22	1.24	2	93	1.27	-0.018
	1	22	1.24	3	27	1.26	-0.012
Body Fat (millimetres) (arm, shoulder, abdomen)	1	22	33.53	2	93	35.11	-0.686
	1	22	33.53	3	27	36.31	-0.838
Lean body mass (LBM)	1	22	17.32	2	93	19.02	-1.679 *
	1	22	17.32	3	27	18.52	-0.837
Vital lung capacity (centimetres)	1	22	2459.09	2	93	2454.83	0.066
	1	22	2459.09	3	27	2548.14	-0.834

Significance of differences – * < 0.05, ** < 0.01, *** < 0.001

Table 2

Differences between the results on girls' somatic and functional parameters

Tests	Level of swimming skills	Number	Average	Level of swimmin g skills	Number	Average	Significance of differences
Height (centimetres)	1	29	134.16	2	80	137.32	1.801
	1	29	134.16	3	20	136.57	1.327
Body mass (kilograms)	1	29	27.66	2	80	32.78	3.511 **
	1	29	27.66	3	20	34.00	2.579 *
Rohrer's Index	1	29	1.24	2	80	1.27	-0.018
	1	29	1.24	3	20	1.26	-0.012
Body Fat (millimetres) (arm, shoulder, abdomen)	1	29	33.531	2	80	35.113	-0.686
	1	29	33.531	3	20	36.318	-0.838
Lean body mass (LBM)	1	29	17.322	2	80	19.027	-1.679
	1	29	17.322	3	20	18.522	-0.837
Vital lung capacity (centimetres)	1	29	2248.27	2	80	2240	0.11
	1	29	2248.27	3	20	2310	-0.591

Significance of differences – * < 0.05, ** < 0.01, *** < 0.001

Table 3

Differences between the results on boys' their physical fitness and co-ordination predisposition

Test	Level of swimming skills	Number	Average	Level of swimmin g skills	Number	Average	Significance of difference
Receptor and motor co-ordination	1	22	43	2	93	42.6	-0.325
	1	22	43	3	27	41.125	1.19 *
Spatial and motor co-ordination (time)	1	22	130.655	2	93	125.1	0.506
	1	22	130.655	3	27	112.925	2.434 **
Spatial and motor co-ordination (errors)	1	22	8.172	2	93	6.015	1.651 *
	1	22	8.172	3	27	5.75	1.06
Simple reaction time to aural stimulus (hearing)	1	22	31.65	2	93	27.573	1.65
	1	22	31.65	3	27	29.57	0.714
Simple reaction time to visual stimulus (sight)	1	22	29.918	2	93	28.105	0.842
	1	22	29.918	3	27	27.362	1.158
Foot flexibility (grades)	1	22	61.272	2	93	67.473	-2.288 *
	1	22	61.272	3	27	76.592	-4.231 ***
Flexibility (centimetres)	1	22	60.545	2	93	62.578	-1.541
	1	22	60.545	3	27	63.518	-1.751 *

Significance of differences – * < 0,05, ** < 0,01, *** < 0,001

beginners (Group One) and those from the good group (Group Three). The differences in the values of the Rohrer index were not statistically important.

While analysing the results concerning the co-ordination parameters of the tested boys in comparison with their achievements in swimming (table 3), it was noticed that statistically significant differences occurred both between Group One (weak one) and Group Two (intermediate one) as well as between Group One and Group Three (good one) when testing their spatial and motor orientation (during error trial), as well as simple reaction time both to aural and visual stimuli. During the measurement of their receptor and motor co-ordination as well as spatial and motor orientation (during time trial), statistically significant differences occurred between the boys who learnt to swim at a

poor level (Group One) and the pupils who mastered this skill at a good level (Group Three).

When comparing the average values of co-ordination predispositions in the case of the girls, one can find (table 4) that statistically significant differences occurred during studying their receptor and motor co-ordination and spatial and motor orientation (during time trial) between the Weak Group and the Intermediate one, as well as when testing their spatial and motor orientation (during error trial) and simple reaction time to aural and visual stimuli among the girls who did not learn to swim very well and those who acquired the skills at intermediate and good levels which were set forth in the syllabus. While testing the physical fitness predispositions, the most significant differences between the analysed parameters became visible in the case of the flexibility of the spine and that of the foot (table 3 and 4) They occurred both in the case of the boys and girls from the Weak Group and the Intermediate one as well as in those from the Poor Group and the Good One.

Table 4

Differences between the results on girls' their physical fitness and co-ordination predispositions

Test	Level of swimming skills	Number	Average	Level of swimming skills	Number	Average	Significance of differences
Receptor and motor co-ordination	1	29	41.34	2	80	41.12	-1.19 *
	1	29	41.34	3	20	42.6	-0.325
Spatial and motor co-ordination (time)	1	29	130.655	2	80	112.92	2.434 **
	1	29	130.655	3	20	125.1	0.506
Spatial and motor co-ordination (errors)	1	29	8.172	2	80	6.01	1.11
	1	29	8.172	3	20	5.75	1.087 *
Simple reaction time to aural stimulus (hearing)	1	29	31.65	2	80	27.573	1.65 *
	1	29	31.65	3	20	29.57	-1.097
Simple reaction time to visual stimulus (sight)	1	29	30.348	2	80	28.752	1.132
	1	29	30.348	3	20	27.362	1.658
Foot flexibility (grades)	1	29	64.206	2	80	68.562	-1.329 *
	1	29	64.206	3	20	76.592	-4.231 ***
Flexibility (centimetres)	1	29	61.586	2	80	63.35	-1.319 *
	1	29	61.586	3	20	66.15	-2.605 **

Significance of differences – * < 0.05, ** < 0.01, *** < 0.001

Discussion and Conclusion

When learning swimming skills, the pupil continually gains motor experiences through the reception of sensations that come from the aquatic environment. Swimming provides the training individual with kinaesthetic sensations, unknown from motor activities on land, such as the feeling of water as well as the feeling of location and movement of individual body parts. These sensations include temporal and spatial motor activities such as: motion, rhythm and speed of movements, style of breathing, maintenance of balance, as well as spatial orientation (Czabański 1991). The motor efficiency of the swimmer's body in the aquatic environment depends on a number of factors, such as: body position, forces of resistance, volume of the propelling force, synchronisation of the locomotion movements of lower and upper extremities in relation to each other. Thus, a number of the subjects' individual predispositions relating to both their physical and psychical features as well as motor abilities or co-ordination predispositions may have some bearing on swimming prowess, which in turn leads to their

ability for quick and durable learning of new motor activities – swimming techniques that is (Bartkowiak, 1999, Czabański, Fiłon et al. 2003). This in-depth analysis concerning the co-ordination predispositions of the ten-year-old children has made it possible to state that the pupils – both the boys and girls – who obtained better results during the assessment of their receptor and motor co-ordination, spatial and motor orientation as well as simple reaction time to visual and aural stimuli attained a higher level of swimming skills than their contemporaries who were characterised by lower values of the studied parameters.

It seems that on the basis of the above analyses and observations concerning the progress in the mastering of swimming skills by 10-year-old children in relation to the somatic and functional as well as co-ordination and physical fitness predispositions the following conclusions may be drawn:

1. The schoolchildren with the higher indices of somatic and functional parameters made more progress in mastering their swimming skills, than their male and female schoolmates in whose case lower results were observed during the factor analysis. Thus, one could venture an opinion that the somatic features like: *body height, body weight, thickness of the fat tissue, and lean body mass*, as well as the functional ones: vital capacity of lungs, have a bearing on the swimming progress of those 10-year-old children.
2. The boys and girls, whose progression was the greatest in the mastering of swimming skills obtained better results in the majority of trials concerning the co-ordination predispositions than the schoolboys who made little progress in swimming. In relation to this statement, it could be said that the predispositions such as: receptor and motor co-ordination, spatial and motor orientation, as well as visual-auditory reaction time may be of some importance for the swimming progress of the 10-year-old children.
3. The flexibility of the foot turned out to be the factor that diversified the subjects the most: the lowest results of this feature were obtained by the schoolchildren who did not manage to learn to swim very well, while the best results were achieved by those who mastered their swimming skills at a good level.
4. The presented research findings showed one of the aspects of the issues connected with the learning and teaching of swimming and that there is a need to continue further research in this field.

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Ewa DYBIŃSKA

Academy of Physical Education in Cracow, Poland

Abstract. This study is an attempt at determining the pace of learning swimming skills by children at a younger school age, with reference to some selected somatic and functional factors as well as to co-ordination and physical fitness predispositions. The study involved a total of 271 children, including 142 boys and 129 girls. The selected somatic and functional factors concerned: body height and mass, body fat, lean body mass as well as the vital lung capacity. While studying co-ordination predispositions, attention was paid to visual-auditory reaction time, receptor and motor co-ordination as well as spatial and motor orientation. Physical fitness predispositions, however, included the flexibility of the foot and that of the spine. The pupils' swimming prowess was evaluated by means of a Skills Test. The significance level of differences between the average values of the tested parameters was verified by means of Student's t-test. The presented observations have led to a number of views concerning the dependency of the results during the teaching of swimming on the physical development of school children, especially during the initial stage of their schooling. An in-depth analysis concerning co-ordination and physical fitness predispositions among the ten-year-old children made it possible to draw a conclusion that the pupils who mastered swimming skills at a higher level attained considerably better results in the tested parameters than their male and female schoolmates who swam poorly.

Key words: 10-year-old children, somatic and functional features, swimming prowess