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IMPACT OF TEACHING HANDBALL ON THE IMPROVEMENT OF TARGET ACCURACY OF STUDENTS IN CONSIDERATION FOR THE IMPACT ASSESSMENT OF THE PROJECT "HANDBALL AT SCHOOL"

ISTVÁN JUHÁSZ[1*], ESZTER BODA[1], MELINDA BÍRÓ[1], ANETTA MÜLLER[1], MARIA D. MACRA-OŞORHEAN[2]

ABSTRACT. A survey programme was organised by us in the autumn and spring semesters of 2015/ 2016 academic year aiming to prove that project "Handball at School" has positive effect on target accuracy and performance stability results of students, as well as their precision of technical implementation. 183 students were examined (2nd-4th grades) who had two sponge-handball lessons a week out of their 5 physical education lessons. To examine target accuracy two tests were applied. One is "throwing at a target from throwing straddle without previous swing" performed by the students by age-specific sponge-handball from distances corresponding their age. The aim was to hit the small box five times at a time from upper throw. After having a rest, they had another five trials. Shooting surety, performance time and precision of technical implementation were registered. The other test for checking target accuracy was "throwing at a target from throwing straddle with previous swing", where the difference from the previous one was that they had to run two meters forward, take the ball and run back with it to the sign-line the distance of which was the same as the one in the previous test. At this test, also surety, performance time and precision of technical implementation of upper shot were noted. Four groups were formed from the children in accordance with the time they have spent on training: the first one was that of the children not doing any sport regularly apart from the activity at the PE lessons, so their training past is 0 year, the second group were the children having done sports regularly for one year, their training past is 1 year, the third group was the children with 2 years past, while the fourth group was the ones with 4 years of training past. It was stated that target accuracy results or some other parameter (score, technical implementation, implementation time) improved in all the four groups by the spring check compared to the autumn one indicating the benefit of the programme after half a year.

***Keywords*:** handball, every-day physical education, target accuracy, primary school children

[1] *Eszterházy Károly University, Institute of Sports Sciences, Eger, Hungary*
[2] *University of Babeş-Bolyai, Faculty of Physical Education and Sport, Cluj-Napoca, Romania*
[*] *Corresponding author: juhaszi@keziszovetseg.hu*

Introduction

A series of important educational changes were implemented in Hungary, in school physical education, when introducing every-day physical education, the necessity and topicality of which is unquestionable. The increase in the number of physical education classes was verified by the worrying health tendencies experienced among children and young people. There are a lot with various deformities, but various diseases also affected children, eg: diabetes, high blood pressure, asthma, allergy, COPD, coronary diseases.

Recently, education has changed a lot, this way contextual and methodological aspects of public education have been altered. It is proven by the continual modification of the curricula (1995–NAT1, 2003-NAT2, 2007-NAT3, 2012-NAT4). The latest National Basic Curriculum was passed by the government on 4th June 2012 based on Government order 110/2012. (VI. 4.), where different aspects of educational objectives were expressed, like physical- and mental health education.

Organising and ensuring every-day physical education, that is having 5 physical education lessons a week in full-time education is imposed mandatory by Act 27.§. Beginning from 2012/2013 academic year every-day physical education is compulsory in 1., 5. and 9. classes, then it will be in all classes in phasing-out system.

Starting with 2015/2016 academic year every-day physical education has become complete. To fulfil the principles and objectives, skills must be acquired in game and sports culture and it is essential to create needs for healthy and health-centred activities. Objectives of school physical education are as follows: knowledge of the sport, developing, enlarging movement skills, participation in free time and sports events, creating values based on regular physical activity and healthy lifestyle.

"Handball at School" project got involved in this favourable education-political environment, enriching the educational content with the target group specific movement material, ball-skills developing exercises of handball on a weekly basis out of the five physical education lessons. The framework curricula made to the project was published in Magyar Közlöny 2016. year 126. issue 5. attachment 22/2016 (VIII.25) EMMI order, supporting the organisational work of teachers.

Description of "Handball at School" Project

Hungarian Handball Association launched its "Handball at School" project in September 2013 in 50 schools, with 54 PE teachers, 1430 pupils. Thanks to the favourable experience, the programme was enlarged in September 2014 to 91 schools and 98 PE teachers, this way growing the number of the children to 3400. At present, due to further enlargement in 2015, the programme is going on in 117 schools, with 127 PE teachers, with participation of almost 4565 students

(1st-8th grades) in 243 groups. Out of all the participants, 1435 persons are in 2nd-4th grades. The programme and the schools participating in it have become a dominant scene of talent care besides enlarging youth supply base of handball.

The junior section pupils of the schools (2nd-4th grades) participating in the programme learn basic technical and tactical elements, system of rules of handball sport twice a week within every-day physical education, and do various ball exercises (to develop skills and dexterity) with light tool (sponge handball) and playful competitions within the lesson. The PE teachers taking part in the education of the programme are trained by the Hungarian Handball Federation and the schools are supplied with the necessary sports equipment.

The results are controlled by the mentor system and by surveying the lesson plans sent by the teachers. This programme providing professional supervision, continuous training and check-up as well is exceptional in our country. Although a package and retraining of professionals was ensured in the Hungarian programme of kid-athletics as well, the feedback, the continuous control was not fulfilled as thoroughly as in the school programme of handball; therefore, it can be considered unique.

Literature Review

Checking efficiency of handball sport education can be measured, tested in various aspects: by the teacher's activity and by the efficiency of the students.

When organising our research we were interested in students' output and its efficiency.

Having reviewed the theoretical background of movement preciseness and its measuring (Rigler, 1987; Nádori, 1989; Rigler, & Zsideg 1985; Schmidtbleicher et al., 1981; Vas, 1991; Nagy, 1978; Müller et al 1999; Müller, 2000; Müller, 2004) our aim in our test programme was to choose several criteria to evaluate movement. The two aspects we wish to apply in handball sport are:

- accuracy, precision in manifestation, that is in technical implementation
- the biggest, "best" objectively expressed result or efficiency while performing the movement.

Let us have a look what literature says about it:

The Hungarian Thesaurus gives the following definition on **accuracy**: "*Corresponding reality, requirements." "Can be implemented at the designated time." "Working without mistake, reliably."* (Juhász et al 1980) This way it can be stated that requirement in handball in our case is determined by the description of correct technical implementation. Precise, faultless activity, keeping the set times is also mentioned as important. When measuring movement accuracy time precision, ability to assess time, a crucial factor of coordination abilities are important elements. However, the previous definitions and interpretations do not reflect aiming stability, shooting accuracy characteristic in ball games.

Fetz (In Rigler, 1987) writes about scoring- and target accuracy in his work where he relates this concept not only to ballgames, but considers it more general. He often uses **"scoring accuracy and repetitive preciseness"** concepts in his work. Scoring accuracy shows that the result of the movement, which in case of scoring means hitting the target is a very important moment when evaluating how good the implementation was. Repetitive preciseness means that although a target may be hit once by chance, without any practice, but if one can reproduce it several times after having practised it, motion stability is reproduced as a result of the development of implementation, with little statistical deviation.

Motion preciseness, precise implementation, movement accuracy and result accuracy concepts were defined and determined based on target focus by Meinl (in Rigler, 1987). He writes generally about these concepts, therefore his definition is also general.

According to him *movement accuracy* means target focus and sports movements determined by the target, although the objectives are different in cyclic, point-score sports and in handball. He considers practice crucial, saying that having practised more one can perform the different movements, sports technics, more precisely.

According to Allawy (in Rigler, 1987, 14. p.) **movement accuracy** *"is a feature of movement which includes target accuracy of the implementation of a movement, especially its sameness in a pre-determined movement." This definition is more concrete, it has a sports-specific definition.*

He also mentions **scoring** or **target accuracy** where the objective is to improve the quality of passing the ball. The "target" or target surface may be the goal, the basket of the opponents, a part of their playing area, or even their own teammate creating a moving target surface when passing the ball.

Questions and Hypothesis

Before starting our research, the following questions were asked. We tried to find the answer for them during our research:

- Which are the tests and procedures to examine the major fitness and coordinating skills that are suitable to help the selection process of junior section pupils in handball sport?
- How will target accuracy of pupils taking part in the survey change due to the project during the year? **Which parameters will mostly have changed** by the autumn and spring check?
- How will target accuracy, performance stability of students not doing sports and students having different training experience change?

- We consider that tests to check and examine fitness and coordination skills, sports-specific tests must be approached in holistic way when finding talents for a sport in junior school age.
- We think that changes in tests between the autumn and spring surveys will mostly occur accordingly with the alternatives of the sport-specific training.
- We presume that students having more hours of training (in any sport) will have better results in the tests in both checks.
- We presume that project "Handball at School" will result in improvements in target accuracy tasks at students not doing sport (training past 0 year) and the ones doing sport after half a year proving favourable benefits of the programme.

Materials and Methods

Our survey was organised in three schools in autumn and spring, 2015. Primary school children of 2nd and 4th grades having 5 PE lessons a week out of which 2 lessons were spent on acquiring the knowledge of handball sport. They were surveyed in Budapest, Tomori Pál primary school, in Ajka, Fekete-Vörösmarty primary school, and in Gyöngyös, Kálváriaparti primary school. These schools joined the programme on 1st September 2013; the teachers are well-trained professionals, PE teachers having big experience in teaching handball as well.

We aimed at analysing the 10% of the sample. Out of 1430 pupils of the junior section, 183 took part in the survey, that is 12.8% of them. The locations were chosen so that from Western- and Eastern Hungary and a school from the capital city be in the sample, so all the regions of Hungary were represented.

Table 1. Sample by location

	Measured children (person)	Measured children (%)
Ajka	63	34.4
Budapest- Tomori	60	32.8
Gyöngyös	60	32.8
Total	183	100.0

It can be seen in Table 1 that there were about the same proportion of children from all the three locations. 94 persons (51.4%) of the measured junior section children were boys, while 89 persons (48.6 %) were girls. The surveyed ones came from 2nd, 3rd and 4th classes, with about the same proportion: 63 persons (34.4%) 2nd class, 57 persons (31.1%) 3rd class, and 63 persons (34.4%) 4th class children. Table 2 shows the sporting habits of the sample:

Table 2. Sporting habits of the sample

	Measured children (person)	Measured children (%)
Does not do sport	44	24.0
Handball	44	24.0
Other sport	95	51.9
Total	183	100.0

44 persons (24%) of the surveyed children do not do any sport other than at PE lessons, also 44 persons (24%) were the ones who chose handball sport for their afternoon trainings, while 95 of all the children (51.9%) also do training in the afternoon, however, they do not focus on handball.

66% of the sportsmen have one-two trainings a week, while 33.9% do more than two trainings a week.

44 persons of the children surveyed in the programme (24%) do not do sport either at school or at a club, 88 persons of the children (48%) do sport at an association, while 53 persons (29%) do sports activity at school.

The children surveyed in the sample were grouped by decimal age categories as well. In the autumn survey the dominance of 10-year-old children was noticed, making 34.4% of the surveyed ones, the group of the 9 year olds was just 30.6% of the sample, 8 year olds were 25.7% of the sample, 11year olds were 4.4%, while 6 and 7-year-old children took only 5% of the sample.

To test the survey material pilot measurements were done in Ózd, Vasvári Street Primary School, to make sure the test material offered for the survey matched the abilities of the age group and to get information about the feasibility of the exercises and general and special technical level, related to the tasks of the students of different age and pre-training. This school was chosen to have a location where underprivileged children could also be tested and the venue is suitable to play sponge handball.

During the pilot research, alterations were made in the previously suggested material, since the 1st and 2nd class pupils could not perform the 2nd task (Alternate hand dribble with ball) even at basic level in alternative way. Therefore, the above-mentioned age group had to perform this task only with one hand (on the dominant side) during the survey. (the evaluation of this task will be published in a future article)

Besides this aspect, as the pilot test was done at the beginning of the school year, the 1st year pupils could not be surveyed, since even understanding the task caused serious problems for them, as, lacking pre-training, they had never faced such kind of movement material.

The surveyed features and positions

Movement accuracy is a very complex category in handball; therefore, we tried to examine it through different factors in order to be able to give a complex summary on them later.

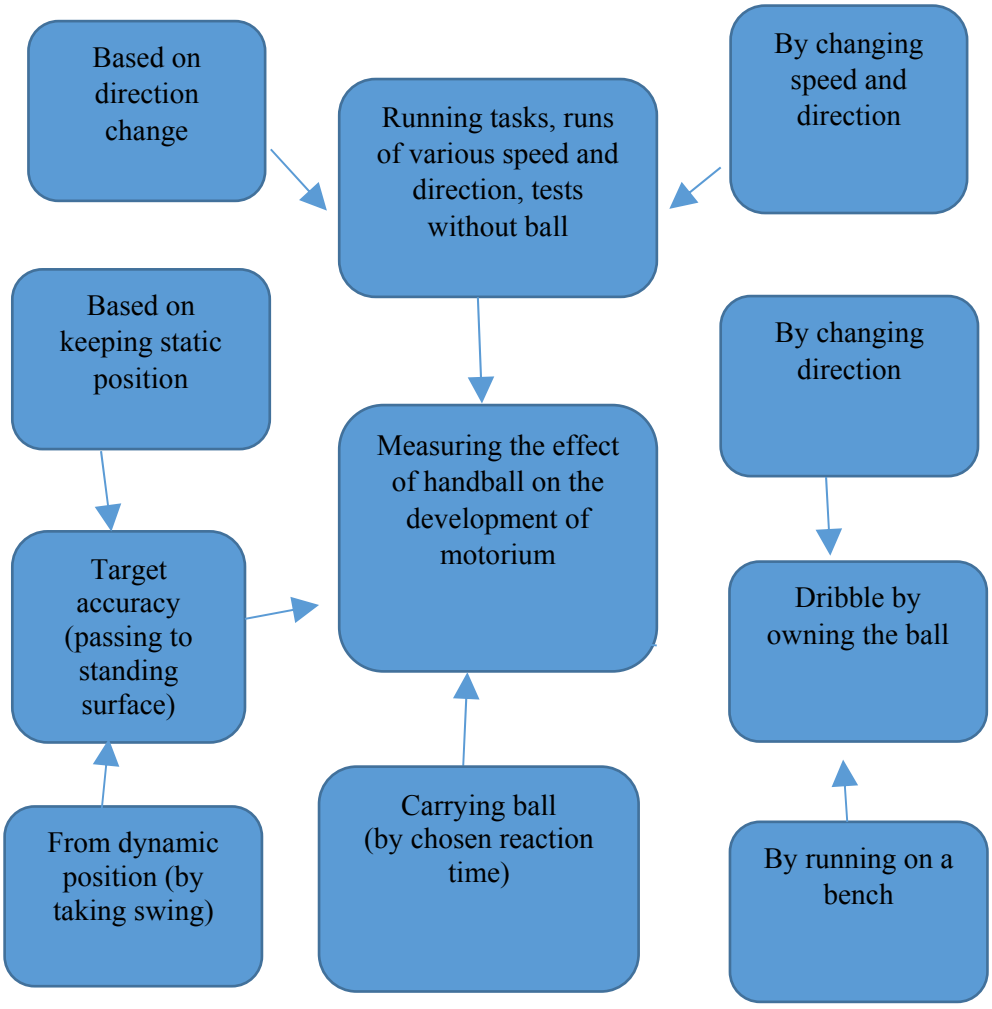

Figure 1. Structure of tests surveyed

In our present article, the results of our two surveys to test aiming accuracy are described. Therefore, the description of these tests and their evaluation is also shown in details.

1. Shooting in transversal straddle position without running up (to survey sport specific coordination skills)

The pupils stood behind the line on the floor, 5 sponge handballs adequate to their age were placed in a turned-up small box on the side of their throwing hand (see test 2) A small box (dimension: 26 cm tall, 62 cm long, 42 cm wide) was placed 5.5 meters away in case of 1st-2nd class children, and 6 meters away in case of 3rd-4th class pupils in the way that the surface covered in leather faced the pupil performing the shot. After having heard the whistle, the pupil had to aim at the surface of the small box with the balls having taken from the small box near him so that the ball hit it with a direct touch. It was performed with upper throw.

The number of attempts were 5, at the survey the number of scores, the time of implementation (with digital watch, sec. centi-seconds accuracy) were taken and accuracy index was counted (average/deviation).

2. Shooting in transversal straddle position with running up (to survey sport specific coordination skills)

The pupils stood behind the line on the floor, (The distance of the line and the target surface was the same as in test 5). 5 sponge handballs adequate to their age were placed in a turned-up small box on the side of their throwing hand (see test 2). After having heard the whistle, the pupil had to run back to the small box and, taking a ball out of it had to run to the line and similarly to task 5, had to aim at the small box. He had to repeat it as long as he used all the 5 balls. It was performed with upper throw.

The number of attempts were 5, at measuring the number of scores, the time of implementation (with digital watch, sec. centi-seconds accuracy) were taken and accuracy index was counted (average/deviation).

The way of calculation

The results of the trials applied in the survey were expressed in quantitative way as well. The data were processed with SPSS.22.0 statistical programme. The results were processed and evaluated following mathematical basic statistics survey procedures.

Based on the instructions of handbook "Introduction to the Methodology of Scientific Research" the population was grouped, then average and deviation values, median and modus were counted with basic statistic methods. The correlation survey was done with a two-sample t-test to show the difference between the groups or difference between the autumn and spring values.

Results

Shooting in transversal straddle position without running up

Table 3. The results of shooting in transversal straddle position without running up related to the years spent with training

	0 year training n=65				1-year training n=74				2-year training n=29				3-year training n=15			
	Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring results	
	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation
First trial Scores	1.11**	1.09**	1.68**	1.30**	1.45**	1.31**	2.09**	1.33**	1.41	1.05	2.28	1.19	1.87	1.41	1.80	1.42
Second trial	1.29**	1.13**	1.46**	1.11**	1.49**	1.16**	2.42**	1.35**	1.59	1.35	2.00	1.00	1.47	1.30	1.73	1.16
First trial Lifted elbow	3.03**	2.02**	3.54**	1.72**	3.30**	1.82**	4.01**	1.49**	3.69**	1.91**	4.17**	1.42**	3.60	1.92	3.20	1.74
Second trial Lifted elbow	3.12**	1.81**	3.68**	1.68**	3.38**	1.85**	3.98**	1.46**	3.59*	2.03*	4.31*	1.31*	3.47	1.73	3.33	1.68
First trial Time (sec)	11.69**	2.58**	10.64**	2.21**	11.61**	1.88**	11.23**	1.94**	11.36**	2.32**	10.33**	1.46**	11.19	1.88	9.96	1.61
Second trial Time (sec)	11.25**	2.31**	10.10**	2.15**	11.52**	2.04**	10.67**	2.08**	10.28**	2.12**	9.87**	1.65**	10.34	1.51	10.00	1.36

(*significant p<0.05 ** very significant p<0.01, showing the change in performance in the surveyed group from autumn to spring)

The test checking target accuracy without running up is not exactly sport-specific. Nonetheless, "Handball at School" project unquestionably had positive effects on the performance of all the four groups.

During the first trial, the students performed 5 throws, which were repeated after some rest (2nd trial). As it can be seen in the table, when focusing on the different training periods, that both in the first and second trial in the non-sporting group and in the case of those doing sport for 1 year the programme of the handball lesson improved the target accuracy (the spring results systematically showed better results compared to the autumn ones, since significant differences could be measured). The target accuracy of those having been going to trainings for two-three years is above the first two groups, shown by the higher score results. The target accuracy of those having been going to trainings for two-three years is merely tendentious, as the values of the Paired Samples t-test do not show significant results.

Concerning the accuracy of technical implementation (the elbow is lifted while throwing) it can be stated that the accuracy of implementation has got better from autumn to spring both at students not doing sports and at the group of the ones having been doing sports for one and two years which can be seen by the improving average figures of scoring and lower deviation figures (stability of performance has got better, proven by the smaller range of variations), the two-trial T-test resulted in significant difference between the autumn and spring measures. In the case of the students having been doing trainings for three years no improvement in technical implementation was experienced.

As for the time results of the implementation it can be declared that it, that the speed component has improved both at students not doing sports and at the group of the ones having been doing sports for one and two years from autumn to spring, proven by the significant values. In the case of the students having been doing trainings for three years, improvement in time can only be seen in its tendency.

Shooting in transversal straddle position with running up

Table 4. The results of shooting with running up T-test related to years spent on training

	0 year training n=65				1-year training n=74				2-year training n=29				3-year training n=15			
	Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring result		Autumn result		Spring result	
	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation
First trial Scores	1.11	1.05	1.57	1.08	1.49**	1.10**	2.38**	1.51**	1.21	1.26	1.72	1.44	1.00	0.93	1.67	0.98
Second trial Scores	1.23	1.17	1.57	1.15	1.46**	1.13**	2.22**	1.36**	1.55	1.09	1.90	1.47	1.33	0.90	1.73	1.03
First trial Lifted elbow	2.95**	1.95**	3.95**	1.59**	3.22**	1.91**	3.69**	1.68**	3.62**	2.11**	3.90**	1.66**	2.47**	2.50**	3.00**	2.07**
Second trial Lifted elbow	3.14**	1.86**	3.80**	1.68**	3.41**	1.90**	3.84**	1.41**	3.66**	1.93**	3.79**	1.80**	2.53*	2.00*	3.27*	1.83*
First trial Time (sec)	18.56**	3.21**	17.84**	3.40**	18.88**	2.86**	17.97**	2.81**	16.90**	2.91**	16.19**	1.89**	16.79*	1.60*	16.48*	1.78*
Second trial Time (sec)	18.43**	3.20**	17.64**	3.64**	18.38**	2.54**	18.19**	2.71**	16.92*	2.33*	16.62*	2.18*	16.19	1.40	16.95	1.48

(*significant p<0.05 ** very significant p<0.01, showing the change in performance in the surveyed group from autumn to spring)

This trial needs sports-specific skills and contains elements characteristic of handball more dominantly.

The score results of shooting with running up trial show lower values in all the four groups. Focusing on the target, scoring combined with running up proved to be more complicated, since this sports specific trial needs higher level of coordination skills, like measuring distance, time speed and sense of direction.

Target accuracy of the first and second trial has shown improvement in all the four groups from autumn to spring, however, significant improvement was seen only in the group having 1-year training experience, while in the other groups, only a slight tendency was experienced.

Evaluating the accuracy of technical implementation (elbow is lifted when throwing) it can be stated that it improved in all the four groups from autumn to spring which can be seen by the improving average figures of scoring and lower deviation figures (stability of performance got better, proven by the smaller range of variations), the two-trial T-test resulted in significant difference between the autumn and spring measures.

Time results show improvement tendency in all the examined groups (exception is the second trial of students having 3 years of sports experience).

The favourable effect of the project is proven by sport-specific tests as well in the case of all the four groups, since the changes between the autumn and spring surveys always showed significant improvement (an exception is the change in scoring accuracy of the non-sporting group and the one having been doing sports for three years).

Conclusion

During our pilot research, we have observed that in small school age tests checking fitness and coordination skills, tests sport-specific to handball must be treated in a complex, holistic way when finding talents for choosing a sport.

"Handball at School" project – involving two sport-specific classes a week, improved shooting accuracy and speed coordination abilities of all the children.

"Handball at School" project showed improvement in all the four examined groups after half a year, since the two sample T-test results of the autumn and spring proved significant improvement in the certain fields. It was stated in our previous article that the best results were achieved by those playing handball, then the ones doing another sport, while target scoring accuracy and performance constancy was lower of those not doing any sport apart from PE lessons.

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