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СЪДЪРЖАНИЕ

PRECISSENES AT 6 YEARS OLD CHILDREN – MANIFESTATION, ASSESSMENT AND DEVELOPMENT

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This paper analyses the manifestation and assessment of preciseness at 6 years old children and possibilities for its development applying PE contents noted in PE curricula in primary education in Republic of Macedonia. Preciseness was analyzed using 6 motor tests, four tests for estimation of preciseness with throwing and two applied for preciseness with leading. Tests were applied on a sample of 123 six year old male examiners, first grade pupils in five primary schools in Republic of Macedonia. Using adequate statistics methods and procedures we determined the manifestation of preciseness in latent motor space, as well as tests characteristics: discriminativity, reliability, validity and represenatativity. According the obtained results, applied tests have a good validity and poor reliability of applied tests. Following tests: Throwing tennis ball in vertical goal with arm (PITET), Throwing ball in vertical goal with leg (PIVCN), Leading with short stick (PVGKS) are recommended for future use for estimation of preciseness. The analysis of current PE curriculum for first grade was used as a starting point in recommendation of activities suitable for development pf preciseness in children.

Key words: *preciseness, motor tests, tests characteristics, PE curriculum.*

Introduction

Motor abilities defines human motor space and suggest on different levels of motor efficiency related with development of human individual potentials (Jovanovski, 2013). Preciseness is one of the abilities that define human motor space. Preciseness is one of the main components for success in many sports such as handball, football, basketball, volleyball, biathlon, karate, gymnastics, bowling etc. Preciseness is commonly defined as ability to perform properly directed and optimally dosed movements (Kurelić et al, 1975; Gajič, 1985; Nicin, 2000). It is manifested in movements when certain target should be hit, or when the movement should be performed by precisely defined path (Jovanovski, 2013). Maniffestation of precissenes and its efficiency is related with proper evaluation of spatial and time parameters on defined system, of movement and with appropriate movement reactions on those changes. Basic information for creation of main and corrective movement patterns for preciseness is created in the middle brain, helped by visual and kinesthetic senses (Jovanovski, 2013). Considering that the realization of precise movements requires visual information or coordination eye – hand and eye – leg, preciseness is closely related with coordination (Gajic, 1985).

Based on a different criteria and manifestation in different movement, preciseness could be manifested as: preciseness with leading, where objects or body parts are leaded toward certain goal and preciseness with pitching/ throwing (Kurelić et al, 1975; Gajič, 1985); preciseness with arm and preciseness with leg; according to the speed of realization of movements: fast and slow preciseness; considering the duration of preciseness movement: long – lasting and short lasting preciseness (Gajic, 1985; Jovanovski, 2013). Manifestation of preciseness and results achieved in movements that require preciseness often are influences by other subjective and objective factors, such as: fatigue, emotional condition, visual sensation and visual ability, speed of flow of information, concentration, balance, as well as the level of training, age, gender, alcohol use etc. There is a lack of information related to development of preciseness during the childhood, the degree of heredity, as well as the differences between males and females regarded the manifestation of preciseness. Analyzing the studies related to children's motor development and structure of motor space in children, as independent latent dimension in children, preciseness is isolated in studies conducted by Rajtmajer, & Proje (1990); Rajtmajer (1993); Perić (1991); Popeska (2009; 2011).

Children's motor abilities are manifested and developed differently, compared with the same of adults (Jürimäe & Jürimäe, 2001; Pišot & Planinšec, 2005, Bala & Katić, 2009). Considering the fact that every age period has its own specifics, important issues of PE teaching process are manifestation, estimation and development of each motor ability in certain age period. Therefore, the aim of this paper is to suggest motor tests with good metric characteristics which are used for estimation of preciseness at 6 years old children and to suggest contents for improvement different types of preciseness identified at 6 years old children.

Method of work

The research was realized as a part of larger study (Popeska, 2011), realized on a sample of 123 examiners, 6 years old male children, pupils in first grade in five primary schools in Skopje, Macedonia. Six motor test were applied for estimation of preciseness: four tests for estimation of preciseness with throwing and two applied for preciseness with leading. Following tests were used: Throwing circles on stick (PIOBS), Throwing tennis ball in ver-

tical target with arm (PITET), Throwing ball in horizontal target with arm (PITHC), Throwing ball in vertical target with leg (PIVCN), for estimation of preciseness with Throwing and Leading with short stick (PVGKS), Leading with long stick (PVGKD) for estimation of preciseness of leading. Applied tests were previously used in other studies with children and recommended by researchers that previously explored this issue (Dukovski, 1984; Rajtmajer & Proje, 1990; Rajtmajer, 1993; Perić, 1991; Popeska 2009; 2011). All six tests were applied as three item tests, realized with three repetitions. The number of repetitions is acceptable considering the age, functional capacities and development characteristics of examiners. Small number of repetitions (two – three) when testing motor abilities in children is acceptable and recommended by other authors who realized similar researches with same age groups (Bala 1999; Pisot & Planinsec, 2005; Bala, Stojanović & Stojanović, 2007; Bala & Katić, 2009; Popeska, 2009; 2011).

Tests characteristics: discriminativity (sensitivity), asymmetric, homogeneity, reliability, validity and representatively are fortified for all four used tests. Discriminativity, asymmetric and homogeneity were determined using measures for tendency and dispersion, while reliability, validity and representativity were estimated based of Crombah α and Spearman – Brown‘s (SB) coefficients of reliability[1], the value of significant root, the projections of isolated factor and communalities obtained using Hotelling procedure for determination of validity[2] and Kaiser-Meyer-Olkin‘s measure[3] for reliability and representativity. Regarded the manifestation of preciseness in PE contents as well as to determine the possibilities for improvement of preciseness using different indoor and outdoor activities, we made an analyses of national PE curriculum for first grade currently used in nine year compulsory education in Republic of Macedonia.

Results and discussion

Basic descriptive statistics parameters for all three measures at all six applied tests for estimation of preciseness at 6 years old children are presented

1 Coefficients higher than 0.80 are considered significant

2 Internal validity, between items from each test is significant when value is higher or equal to 0.80

3 KMO – Kaiser-Meyer-Olkin – coefficient around .90 is excellent representativity, around.80 very good; around .70 good; .60 average; .50 the test have bad representativity and below.50 unacceptable

in Table 1. Results from data analyses obtained for coefficients of reliability and representativity, as well as the values for internal and factorial validity for every certain test applied for estimation of preciseness of six years old children are presented in tables 2, 3, 4, 5, 6 and 7.

Table1: Basic measures of central tendency, dispersion and normality of distribution of motor tests used for estimation of preciseness at 6 years old children (first grade pupils).

	Mean	SD	Sx	KV	MIN	MAX	Range	skew	kurt	KS	p
PIOBS1	0,69	0,85	0,08	123,08	0	3	3	0,97	-0,04	0,32	p <,01
PIOBS2	0,89	0,84	0,08	93,68	0	3	3	0,54	-0,53	0,23	p <,01
PIOBS3	0,93	0,88	0,08	94,88	0	3	3	0,51	-0,71	0,24	p <,01
PITET1	5,18	3,17	0,29	61,21	0	14	14	0,44	-0,30	0,12	p <,10
PITET2	5,79	3,32	0,30	57,39	0	14	14	0,24	-0,80	0,13	p <,05
PITET3	5,54	3,12	0,28	56,28	0	12	12	0,13	-0,87	0,11	p <,10
PITHC1	2,70	2,59	0,23	95,81	0	14	14	1,19	2,33	0,15	p <,01
PITHC2	3,07	2,86	0,26	93,38	0	12	12	0,84	-0,05	0,17	p <,01
PITHC3	3,45	2,76	0,25	79,94	0	12	12	0,69	-0,06	0,14	p <,05
PIVCN1	3,09	2,19	0,20	70,94	0	10	10	0,74	0,47	0,16	p <,01
PIVCN2	3,53	2,31	0,21	65,35	0	11	11	0,62	0,35	0,13	p <,05
PIVCN3	3,37	2,40	0,22	71,24	0	14	14	1,48	3,86	0,16	p <,01
PVGKS1	43,93	9,38	0,85	21,35	22	61	39	-0,32	-0,84	0,09	p >,20
PVGKS2	43,21	9,86	0,89	22,81	20	64	44	-0,34	-0,57	0,07	p >,20
PVGKS1	44,35	9,07	0,82	20,44	22	58	36	-0,41	-0,65	0,08	p >,20
PVGDS1	42,89	9,47	0,85	22,08	22	58	36	-0,32	-0,72	0,10	p <,15
PVGDS2	44,02	9,62	0,87	21,85	20	64	44	-0,64	-0,18	0,12	p <,05
PVGDS3	44,37	9,02	0,81	20,33	21	60	39	-0,70	-0,03	0,13	p <,05

According the results for basic descriptive statistics parameters presented in Table 1, declination from normal distribution is obtained for three tests: throwing circles on stick (PIOBS) in all three repetitions, throwing ball in horizontal target with arm (PITHC) in two repetition and throwing ball in vertical target with leg (PIVCN) in one of three repetitions. Continuous improvement of results from first to third repetition is noted for the following three tests: throwing circles on stick (PIOBS), throwing ball in horizontal target with arm (PITHC) and leading with long stick (PVGDS). Best result in first repetition is obtained only for the test leading with short stick (PVGKS). Same tests were applied a year later, at the age of 7 years at same group of children (Popeska, 2011). As expected, better results were obtained at the age of 7 that suggest on positive changes related to growth and development processes at

children. Values of the tests for discriminativity that means that tests measure/ discriminate the smaller differences between children point out on low discriminativity of tests for preciseness with throwing and good discrimantivity and homogeneity for preciseness with leading. Values for skweness suggest that tests for preciseness with throwing are hard for six years old children.

Table 2: Throwing circles on stick (PIOBS), reliability, validity and representativity obtained at 6 years old children

Item	r и SMC			H 1	h²
PIOBS 1	(.08)			.65	.42
PIOBS 2	.05	(.06)		.57	.33
PIOBS 3	.29	.25	(.14)	.81	.66
Cronbach′s α	.42			Lambda	1,40
SB	.42			%	46,71
KMO	.51				

Table 3: Throwing tennis ball in vertical goal with arm (PITET), reliability, validity and representativity obtained at 6 years old children

Item	r and SMC			H 1	h²
PITET 1	(.15)			.72	.52
PITET 2	.34	(.19)		.77	.60
PITET 3	.28	.35	(.16)	.73	.53
Cronbach′s α	.59			Lambda	1,66
SB	.59			%	55,18
KMO	.63				

Values for coefficients of reliability, represenativity and validity for all six tests applied for estimation of preciseness at 6 years old children are presented in Tables 2, 3, 4, 5, 6 and 7. From all six tests for estimation of preciseness, both preciseness with throwing and leading, one significant root is isolated, which suggest that applied tests are valid, or measure same ability. Isolated factor explanes the variability of the applied systems from 47% – 57,74% for tests for preciseness with throwing. The variability of the test leading with short stick (PVGKS) is explained 65,47%, while 57,42% is the explanation of validity of the system of the test leading with long stick (PVGDS). Obtained percent for validity suggest that other external factors could influence to the

final test result. Internal validity equal or higher than .80 is obtained only at the tests applied for preciseness with leading, leading with short stick (PVGKS) and leading with long stick (PVGDS).

Table 4: Throwing ball in horizontal goal with arm (PITHC), reliability, validity and representativity obtained at 6 years old children

Item	r and SMC			H 1	h²
PITHC 1	(.21)			.77	.59
PITHC 2	.43	(.23)		.79	.63
PITHC 3	.31	.35	(.16)	.71	.51
Cronbach′s α	.63			Lambda	1,73
SB	.63			%	57,57
KMO	.63				

Table 5: Throwing ball in vertical goal with leg (PIVCN), reliability, validity and representativity obtained at 6 years old children

Item	r and SMC			H 1	h²
PIVCN 1	(.12)			.63	.39
PIVCN2	.22	(.27)		.79	.62
PIVCN 3	.34	.52	(.32)	.85	.72
Cronbach′s α	.63			Lambda	1,73
SB	.63			%	57,74
KMO	.66				

Values for coefficients of reliability Spirman – Brown (SB) and Cronbah α obtained for all four tests for preciseness with throwing (from .42 to .63) are low, not satisfactory and suggests on bad reliability of applied tests. Two tests applied for estimation of preciseness with leading, higher values for Spirman – Brown (SB) and Cronbah α compared with tests for preciseness with throwing, but yet under the required limit of .80 to consider reliable. Values .74 for both SB and Cronbah α for leading with short stick (PVGKS) and .62 obtained for both SB and Cronbah α at the test leading with long stick (PVGDS). Values for KMO index from .51 to .63 obtained at four tests applied for precissenes of throwing, and .69 and .61 for preciseness with leading point out on average level of representativity of the tests for estimation of preciseness.

Table 6: Leading with short stick (PVGKS), reliability, validity and representativity obtained at 6 years old children

Item	r and SMC			H 1	h²
PVGKS 1	(.31)			.81	.65
PVGKS 2	.47	(.31)		.81	65
PVGKS 3	.49	.49	(.33)	.82	.67
Cronbach′s α	.74			Lambda	1,96
SB	.74			%	65,47
KMO	.69				

Table 7: Leading with long stick (PVGKD), reliability, validity and representativity obtained at 6 years old children

Item	r and SMC			H 1	h²
PVGDS C 1	(.11)			.65	.42
PVGDS 2	.28	(.26)		.80	.64
PVGDS 3	.30	.49	(.27)	.81	.66
Cronbach′s α	.62			Lambda	1,72
SB	.62			%	57,42
KMO	.61				

Lower values of coefficient of reliability point out on great dependence of the final results from the influence on other unsystematic factors such as concentration, problems with sight, bad coordination eye – arm and eye – leg, emotional anxiety etc. Related to this are some development characteristics determined that occurs at early school period such as: not completed synchronization of body parts and slower process of information analyses, not completely finished process of coordination between eyes, arms and legs; general farseeing of children in period between 5 and 7 years and their not preparedness to look close for a long period (Gallahue, 1987, in Age group development). Therefore, a certain number of children with minor problems with vison included in testing, could be one of the explanations for variety of results. Development studies pointy out that a period between 5 and 7 years of age is important period for improvement of visual sensation which develops continuously until the age of nine (Haywood & Getchel, 2004), while after the age of 5 improves the ability to follow objects with eyes and control of movements with eyes (Williams,1983 referred in Haywood & Getchell, 2004). The lower reliability of the test applied with young children is confirmed in other

similar studies (Rajtmajer & Proje, S, 1990; Rajtmajer, 1993; Perić, 1991; Ikeda & Aoyagi, 2007; Popeska, 2009, 2011). Authors Ikeda & Aoyagi (2007) determined that tests that have lower reliability are more valid. They also suggested that it is especially hard to select a motor test for children, that will be enough reliable, valid and practical because little children still have not developed sense for time and rivalry (Matsuda, 1961, in Ikeda & Aoyagi, 2007).

Preciseness in national PE curriculum for first grade (manifestation and possibilities for development)

Development of motor abilities, including preciseness, aqusition of different movement skill according to the personal ability of every child as well as learning to selfesteem personal abilities are some of general aims of PHE curiculum in the first cycle of nine year education. These aims and tasks suggested in PHE curriculum are according with the main educational goal: holistic and harmonious children development, according with their individual abilities and development characteristics. PHE aims and goals are realizing using different PE contents and sport activities, based on fundamental movements that are fundament for enrolment in different sports activities in the further education and everyday life. In the primary education in Macedonian educational system, the school subject Physical and health education is realized with three school hours during a week, or 108 school hours during a school year. PE teaching process is realized according the national curriculum as a fundamental document, suggested by the Bureau of Education PHE curiculum for second grade is structured in six compulsory thematic unions and five optional thematic units. Optional thematic units are named as *activities in water, activities at snow, driving a bike, rollers; hiking, school sport and sports project*. They are realized according the possibilities of local environment, its natural and material facilities and cooperation with parents and local community. The six compulsory thematic units are named as: *Get know yourself*, *Lining and organized movements, Movements for body shaping, Basics of athletics, Basics of gymnastics and Games.* They anticipate variouse fundamental movements, particularly different forms of locomotor, unlocomotor and manipulative movements selected by every certain unit and it‘s requirement. For every thematic union in PHE curriculum following parameters are

prescribed: aims, contents, examples of concrete activities, method of work, didactic recommendations for successful implementation of curriculum and its efficient practical realization as well as manners for evaluation of children‘s achievements.

Activities that require manifestation of preciseness with throwing and leading, development of coordination when throwing as well as coordinated and precise movements with different body parts are composed part of PE curriculum for first grade. Activities such as throwing ball at certain distance, throwing ball to hit concrete target, throwing ball in net, throwing ball over lower net or other barrier, as well as throwing and catching a ball at different manners, are activities suggested for improvement and development of preciseness at first grade pupils. All these activities are realized as a part of thematic unit *Bases of athletics.* Considering that preciseness exist in children‘s motor space (Rajtmajer & Proje, S, 1990; Rajtmajer, 1993; Perić, 1991; Popeska, 2009; 2011) and defines there motor behavior, the analyses of PE curriculum for first grade gives the impression that although the development of preciseness is defined as one of the goals of PE, very few contents are suggested. Therefore, according our opinion, PHE curriculum should be enriched with PE contents and activities that will improve preciseness with pitching and leading. Regarded to this we suggest:

Implementation of movement tasks and games which aim will be to strike at certain goals – horizontal or vertical, static or moving targets with different size, placed on a different distances using different objects to strike (tennis balls, standard balls, medical and pilates balls with different size etc.). For example: leading sticks with different length used to strike static and moving targets; picado on the wall (vertical goal) or at the floor (horizontal goal) with ball with different sizes leaded with arm or with leg; leading the ball using other object for example sticks, with or without hitting in certain goal or target, or activities like golf, cricket, baseball etc. Realizing activities like these or similar to them, beyond development of preciseness, in the same time we also improve the ability for performance of precise and explosive movements, as well as coordinated movements with arms and legs.

Application of movement tasks and games with leading objects with dif-

ferent size and length. For example: sticks with different length used to strike certain static or moving targets, picado played with different sticks with different length, leading ball or other object using sticks, with or without striking a certain goal, activities similar like cricket, golf, grass hockey, baseball and others. Suggested contents could be implemented in the current PE program as new innovative contents and which will have a positive influence on improvement of preciseness with leading.

Suggested contents, based on exercises for preciseness are especially applicable in schools with lack of material conditions, equipment or sports facilities, because these types of activities could be applied and realized at small space, with objects used in children's everyday life and what is very important, are safe for use from children.

Conclusion

Preciseness is one of the abilities that defines motor space in children and influence in motor achievements and efficiency especially in sports such as football, basketball, volleyball, handball, fencing, biathlon, karate, gymnastics and other, where preciseness is one of the main components for success. Relations between preciseness and other motor abilities, as well as the impact of regular physical activity on maintaining different types of preciseness are one of the main reasons why this motor ability should be improved and developed during PE teaching process using PE contents. Regarding this, one of very important issues of PE and kinesiology as well is to determine the manifestation and development of motor abilities, including preciseness in every certain period of children's age; to determine possibilities for their improvement, as well as the standardized procedures for estimation and evaluation in children.

The aim of this paper is to suggest a motor tests with good metric characteristics for evaluation of preciseness at 6 years old children and based on analyses of current PHE curriculum for first grade to suggest contents that will enrich the current curicculum and will have an impact to improvement and development of preciseness. The research was realized on a sample of 123 examiners, 6 years old male children, pupils in first grade in five primary schools in Skopje, Macedonia. We used following six tests for estimation of preciseness: Throwing circles on stick (PIOBS), Throwing tennis ball in ver-

tical target with arm (PITET), Throwing ball in horizontal target with arm (PITHC), Throwing ball in vertical target with leg (PIVCN), Leading with short stick (PVGKS) and Leading with short stick (PVGKD). According the obtained results, the general conclusion is that all 6 tests applied for estimation of preciseness have good validity, low and bad reliability and average represenativity. Applied tests for evaluation of preciseness with throwing are hard for six years old children and not discriminative compared with two tests used for preciseness with leading. Comparing results between four applied tests for preciseness with throwing as suitable for further use with six years old children, we recommend the tests: throwing tennis ball in vertical target with arm (PITET) and throwing ball in vertical target with leg (PIVCN). Implementation of these tests in PHE teaching process is important because they estimate preciseness with throwing and pitching with different body parts (arms and legs) that allow development on different movement qualities. Comparing both tests for preciseness with leading for future use we recommend the test leading with short stick (PVGDS).

Obtained results confirms the findings of Ikeda & Aoyagi (2008) that it‘s difficult to determine both the reliability and validity of tests for young children‘s motor ability. Lower values for reliability are explained by factors that have an influence on preciseness, children‘s age and development characteristics. Final result in tests for preciseness are conditioned with proper perception of the target, the speed of transfer of information, relations with coordination and its level of development, as well as the ability to perform a technically correct movement that means proper synchronization of the speed or strength of the movement with movement with the object that should be thrown, pitch or leaded; emotional condition, perception, attention and other factors contribute to lower results of reliability of the tests. Some of suggested tests should be modified in order to be more suitable for application with young children. Related to children‘s development characteristics are certain difficulties regarded to motor measures with children. In this sense, manifestations such as reduced concentration, attention and sort term focus, disorientation from the goal, lack of motivation, emotional instability as well as understanding of testing as a game, not as a assignment are noticed during research studies

with children (Jürimae & Jürimae, 2001; Gallahue, 1987; Rajmajer, 1997). In order to overcome these difficulties, certain procedures like motivation, encouraging, demonstration and previous tries of the motor tasks, which are unacceptable in work with adults, to be justified and recommended in work with children (Bala, 1999; Jürimae & Jürimae, 2001; Ikeda & Aoyagi, 2007, Rajtamer, 1997; Popeska, 2011). Therefore, in researches from this type, as well as in everyday work with children, knowledge and appreciations of characteristics of children emotional and psychological development as well as their influence on children's motor abilities are essential. This means respect of holistic approach in work with children.

Several contents are suggested for development of preciseness. They are based on manipulative movements that requires manifestation of preciseness. They could be implemented in the current PE program as new innovative contents that will have a positive influence on improvement of preciseness with leading. Acquisition of these contents gives children an opportunity to learn new movement skills and to improve the old one. Implementation of these contents at regular PE classes will have an influence on development of other motor abilities, as well as a positive influence on cognitive segment, emotional and social component especially in situations when implementing movement tasks with leading, throwing and striking in different targets as a part of different movement games, etc.

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