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MOTOR KNOWLEDGE ACCUMULATION AND MOTOR CREATIVITY MANIFESTATION

Abstract: Movement during preschool age is the primary way of action, expression, learning and development. The aim of the paper is to consider the relation between motor creativity and motor knowledge in preschool children. According to contemporary creativity theories, knowledge has an important role to play in forming of a critical level below which creativity is not possible. Insufficiently stimulated and developed motor skills and knowledge at this age can be the cause of decreased or 'slumbered' motor creativity. Estimation of motor performance (motor testing - validated battery of 7 motor tasks) and motor creativity (Torrens TCAM test) has been carried out in Vrsac on the sample of 224 preschool children aged 6 to 6,5. The results show that motorically more able children (with higher level of motor knowledge) have made better results in TCAM test tasks. The obtained results point to the need to provide preschool children with suitable conditions leading to their optimal motor development and creative motor expression.

Key words: motor creativity, motor knowledge, preschool children.

Introduction

Motor creativity can be defined as an ability to produce numerous and original motor responses to a stimulus (Wyric, 1968). Majority of the well-known motor creativity concepts are based on the Gilford's (1967, 1977) theory and divergent production factor. Sub factors of divergent production - fluency, originality, flexibility and elaboration are considered the main components of creativity. Fluency is in a correlation with originality, while original ideas appear after a long series of stereotypical ones. Children motor creativity is a phenomenon which has been modestly studied, in spite of the fact that creativity is one of the most appreciated human traits (Renzulli, 2006; Sternberg & Lubart, 1993). It is accepted that all children are creative by nature, and that the (non)manifestation of creativity depends on the environment and the intrinsic child motivation. Furthermore, in an attempt to explain the nature of creative behaviour of a child, it must be taken into consideration that childhood has its own features and characteristic characteristics that makes it different from any other period of an adult life. Creativity is one of the most appreciated human abilities. In the attempts to shed light on the nature of child creative behaviour, a difference has been made between creativity with "capital C" and "small c" (Winner, 2000). Creative children with a "small c" are those who mainly independently discover the rules and master the skills of a certain field and

invent unusual strategies for problem solving within the same field. Creativity with "big C" implies a change and transformation of certain field, requiring a great grounds of knowledge and experience. It is thought that children cannot (or are very rarely) be creative in such a way. According investment creativity theory of Sternberg & Lubart (1993), creativity demands acquisition of six different components: abilities, knowledge, cognitive style, personal features, motivation and environment. Creative act is supplemented by experience (knowledge) and skills (practical abilities) necessary for realization of an idea. Highly productive individuals (even children) are characterized by three groups of abilities which overlap: above average ability in a certain domain (doesn't necessarily have to be superior), motivation (dedication to the task) and creativity. It is necessary to ensure learning experience in order to promote interaction of all giftedness components and to provide occasions, resources, as well as support to development and application of gifted behaviour (Renzuli, 2006; Subotnik & Jarvin, 2005; Tassel-Baska, J.V. & Little, C.A., 2003). According to modern theories of creativity, knowledge has an important role in forming a critical line under which creativity is not possible (Sternberg *et al*., 1997; Schi, 2002, according to Gojkov, 2008). Parnes (according to Kvascev, 1981) holds that creativity is a function of knowledge, imagination and evaluation. The greatest part of knowledge or experience in creative learning is organized in such a way that it is possible to combine ideas and achieve various achievements. The use of knowledge in an imaginative way is the essence of creative productivity. Knowledge and logic open the doors of unexplored, unknown ("I know what I don't know"), even beyond concrete reality. By using knowledge and through knowledge more and more is realized about what is remote and distant, what is beyond immediate reach of senses and means. Making connections between logical relations in one domain of reality according to the principle of analogy alleviates and shortens the process of finding relations in the realm of the unknown (Sefer, 2000, 2009). The lack of adequate skills and knowledge, use of inefficient methods of learning, lack of motivation, troubles in perception of relations, fear from failure and criticism, disturb individuals in creative problem solving. In considerations of the ratio between knowledge and creativity, the importance of reaching certain knowledge is not neglected, but it seems that the ways and processes needed to reach knowledge are equally important. Knowledge acquired through small number of examples and in only one way are mostly narrow and not adaptable to new situations. In a sense, it can limit creative processes. On the other hand, knowledge reached through a number of different processes can be sound precondition for creativity (Sefer, 2009; Taylor, 1978). The stated standpoint is supported by constructivistic epistemology and developmental theory, defining learning as "knowledge reconstruction through new revelation" (Piaget, 1973, according to Sefer, 2009: 19).

Participation and success in physical education and sports ask for the development of many complex movements in children. Majority of these movements are anchored in natural (fundamental) forms at preschool age, so that the general movement pattern becomes a base for certain number of special skills to be mastered by a child in time (Sturza Milic, 2012). Motor performance of a child depends to a great degree on situations in which basic movements used to appear, as well as on the existence of conditions for expressing a variety of movements and provision of problem situations for motor task solving (Sturza-Milic, 2008; 2009c, 2012a; Trevlas et al., 2003). Structure,

functional maturation and motor experience maturation create conditions for various types of movement acquisition. The influence of maturation is a significant, but not decisive factor for children to successfully master fundamental movement patterns at mature level, representing a precondition for qualitative development of specialized movements, as well as subsequent motor achievements of a child. It was thought earlier that fundamental movements are developed exclusively under the influence of maturation and that children will develop them until 7th year provided that they have conditions necessary for development. Nevertheless, it is nowadays known that these abilities are not developed exclusively through maturation, but movement quality rather depends on learning and practicing, i.e. with planned and organized influence in the sense of creating a setting for acquisition of various forms of movements and timely influence on motor potential development (Gallahue, 2010; Malina, 2004; Sturza Milić, 2012; Trevlas et al. 2003).

Certain studies (Galvis Panqueva, 2000; Trevlas et al. 2003) examined how far fluency and flexibility in movement patterns' production, as indicatory elements of divergent thinking and critical thinking, are related to a variety of psychological elements (physical spontaneity, social spontaneity, cognitive spontaneity, manifest joy, sense of humour) that compositely contribute to playfulness, an internal personality characteristic. The study conducted by Trevlas et al pointed out that divergent movement ability test was used to rate children's motor creativity. The data indicated a significant correlation between total playfulness and motor fluency and motor flexibility. This means that playfulness and motor creativity are interconnected because movement during preschool age is the primary way of action, expression, learning and development.

Abilities and fundamental development have to succeed each other. If they did not have a chance to integrate, confirm and appreciate conceptual knowledge which is the cornerstone of many different disciplines, many children would not be able to learn different kinds of expertise which are necessary for optimization and complete realization of their potential. Focusing solely on skills could lead to cumulative deficits since children will never get a chance to learn and appreciate the concepts supporting (Griffin, 1992). Achievement in motor activities depends on education based on concepts and necessary knowledge acquisition that can prepare them for later, more sophisticated challenges within a discipline (Bloom, 1985; Sturza-Milić 2009, 2011; Feldman & Pirito, 1992).

Unfortunately, children today are not provided with optimal conditions (regarding environmental and educational conditions, etc) when physical activity is in question, and such a reality has negative effects on their overall development. Within their study on talents, Abbott, Collins, Sowerby & Martindale (2007) have pointed out that teachers believe that children will be "illiterate" in movement if they are deprived from suitable conditions for its development. Decreased physical activity in this period of life, i.e. at preschool age, has negative effects on life quality, i.e. health, family relationships (Duvillard, 2012; Matejak & Planinšec, 2008; Pišot et al. 2010; Pišot, 2012; Rajtmajer, 2008; Sturza Milić, 2012; Sturza-Milić & Firika, 2004). Roncenvalles (according to Bala & Popovic 2006) holds that children in kindergarten do not reach appropriate fundamental levels of motor patterns expected for that period of life. It has been found that children are below

the expected level of development regarding adequate locomotor skills and object control skills. Motorically more able children, compared to other children, have more sense for coherency; they can manage the stress better and are more immune to everyday stress that modern life brings (Sturza-Milic, 2008).

Insufficiently stimulated and developed motor skills and motor knowledge in children can be a cause of decreased or "slumbered" motor creativity which can have unfavourable effects on motor and overall development of a child (Sturza-Milic, 2009b). Some studies focused on preschool children motor creativity, or, more precisely, on the differences between boys and girls in motor creativity (Sturza-Milic, 2009a; Serbetar, 2003) point to the fact that certain types of motor knowledge in the case of the studied preschool children (especially with girls) are too low and that the phenomenon has reflected on motor creativity manifestation. Children are today not encouraged to play motor games and pursue motor activities, which has negative effects on "non-verbal, concrete, spatial, emotional and aesthetic material" so that there is a lack of perceptive memories in the right hemisphere (Torrance & Mourrad, according to Cudina-Obradovic, 1991: 54).

The above outlined research findings and insights refer to the statement that the ration between motor achievement (motor skills and knowledge) and motor creativity in the case of preschool children is significant but insufficiently explicated issue of theory and practice, especially in the field of education. As a consequence, the aim of the research was to examine whether there is a link between motor achievements and motor creativity at preschool age.

Method

Participants
The study included a total number of 224 children aged 6 to 6,5 years (117 female and 107 male). All the children attended preschool institutions in Vrsac. The research was undertaken in 2009.

Procedure
The whole sample was subjected to motor testing, through the application of motor task battery. Having in mind that we are talking about preschool children, motor tasks were aiming at motor skill estimation, as well as children's motor knowledge (in the case of motor testing, it is not possible to measure skills separate from knowledge, especially at younger age).

Having undertaken motor testing, the next step was to evaluate motor creativity, again on the whole sample. The testing was carried out individually due to specific age of the subjects. Each child was recorded in order to undertake additional, i.e. further analysis and more precise assessments.

Instruments
Motor effectiveness was estimated according to application of 7 mobile tasks battery:

1. Standing long jump (SLO) – a child jumps as far as possible on the mat marked in cm. The result is the length of jump in cm.

2. Running 20 m (R20) – a child runs 20 m starting from standing position. The result of running is measured in tenths of a second.
3. Polygon with obstacles backwards (POB) – Moving backwards as fast as possible on hands and knees a child passes a distance of 10 m, going over a Swedish box and crawling through the frame of a Swedish box. The task is measured in tenths of seconds.
4. Moving hands along bent surface (MHBS) – A Swedish box is hung on the ripstol at the height of 1 m. Sitting in a certain position on a bench, a child has a task to move his/her hands along the bent surface to reach the ripstol. The task is measured in tenths of seconds.
5. Sit-ups (SIU) – A child lies on his/her back on a mat, with bent knees and crossed arms, with hands resting on opposite shoulders. The examiner fixes the child's feet, while a child raises him/herself into sitting position and then slowly back into lying position. The result is the number of properly made sit-ups in the period of 60 seconds.
6. Tapping rate (TAP) – A child sits on a chair at a desk and in the period of 15 s uses his dominant hand to tap alternately two spots 50 cm apart on his right and left side. The result is the number of double taps.
7. Deep forward bend while seated straddled (DSS) – Sitting on the floor, with his/back on the flat vertical surface and legs straddled under the angle of 60 degrees, a child bends forward as much as possible. The result is the difference in cm between the reach of fingers when sitting straight and the reach of fingers in maximum bend position.

Motor tasks were adjusted to the sample of children and had shown optimal measuring characteristics in previous research (Bala & Popovic 2006; Sturza, 1999; Sturza-Milić, 2009). Motor creativity was evaluated according to Torrance's test *Thinking Creatively in Action and Movement* (TCAM), which is standard in testing children in pre-school period (Torrance, 1981). The used problem task was *In how many different ways can you carry a ball?* but it was slightly modified compared to original Torrence TCAM (in the original TCAM test the problem was *In how many different ways can you throw the ball at the basket?*). The rest of TCAM problem tasks are: *In how many different ways can you move*?, *What can you do with a plastic glass*? etc. TCAM produces three types of results (fluency, originality and flexibility). When measuring motor creativity, fluency cannot be defined in terms of the number of relevant movement responses, i.e. motor reactions (motor movement quantity). Consequently, fluency (LFLU) was calculated according to counting of all successful motor responses of a child. Originality (LORI) was determined according to the frequency of appearance of a response within subject population (motor response is considered original if it is statistically infrequent in the response sample offered by the subjects). Flexibility (LFLE) is ability of varying of ideas, i.e. making changes during motor task solving, i.e. revealing new ways and strategies of problem solving. In order to check reliability of the used test retesting has been undertaken in the case of the problem task *In how many different ways are there you can carry a ball* (fluency – CFLU, originality – CORI and flexibility - CFLE). According to the obtained statistically significant coefficient of correlation (for CFLU r = 0.84; p = 0,01, for CORI r = 0.81; p = 0,01 and for CFLE r = 0.75; p=0,01), as well as the value of Alfa reliability coefficient under the classical sum model

(for CFLU Alfa = 0.9223; for CORI Alfa = 0.8617, and for CFLE Alfa = 0.8922) it can be concluded that the used test is of optimal reliability.

Data processing

Data processing referred to the calculation of main descriptive indicators and the indicators of deviation from the normal distribution of motor variable (SLO, SIU, POB, MHBS, DSS, TAP, R20), as well as motor creativity variable (LORI, LFLU and LFLE).

In order to confirm the link between the variables motor achievement and motor creativity (originality and fluency components) Pearson's linear correlation was used.

Results

The Tables 1 and 2 show the basic descriptive indicators and the indicator of deviation from normal distribution for motor variables and the variables of motor creativity:

Table 1 Main descriptive indicators and the indicators of deviation of normal distribution for motor variables

Variable	N	Min	Max	Mean	Std	Sk	Ku
SLO	224	63.00	132.00	104.891	14.125	-.507	.081
SIU	224	7.00	38.00	21.036	3.7122	1.427	4.626
POB	224	13.89	37.65	28.648	5.818	-.977	.194
MHBS	224	8.16	36.32	18.899	4.665	.849	1.453
DSS	224	24.70	52.00	39.132	6.067	.055	-.446
TAP	224	10.00	25.00	18.812	3.333	.409	.532
R20	224	4.11	5.98	4.7945	.3505	.229	.772

N – number of subjects
Min – min. value
Max – max. value
Mean – arithmetic mean
Std. - standard deviation
Sk – skjunis
Ku – kurtosis

Table 2 Main descriptive indicators and the indicators of deviation from normal distribution for the variables of motor creativity (fluency – CFLU, originality – CORI and flexibility – CFLE)

Variable	N	Min	Max	Mean	Std	Sk	Ku
CFLU	224	2.00	22.00	11.24	3.259	.040	.082
CORI	224	0.00	9.00	3.225	1.866	1.774	2.513
CFLE	224	0.00	11.00	8.27	2.323	1.856	3.543

N – number of students
Min – Min. value
Max – Max. value
Mean – Arithmetic mean
Std. - standard deviation
Sk – skjunis
Ku – kurtosis

The next step was to correlate the results (Pearson's linear correlation) obtained by motor testing and motor creativity testing. Table 3 shows the results obtained according to the correlation of all motor variables (SLO, SIU, POB, MHBS, DSS, TAP and R20) and the variables of motor creativity CFLU (fluency), CORI (originality) and CFLE (flexibility).

Table 3 Correlation coefficients and the achieved level of significance between motor variables (SLO, SIU, POB, MHBS, DSS, TAP and R20) and the variables of motor creativity (fluency – CFLU, originality – CORI and flexibility – CFLE)

	CFLU	CORI	CFLE
SLO	**r = .498* p =.000**	**r = .459* p =.000**	**r = .425* p =.000**
SIU	r = .144 p =.122	r = . 124 p =.235	r = .201 p =.173
POB	**r = .412* p =.000**	**r = .473* p =.000**	**r = -.389* p =.000**
MHBS	r = -.309 p =.013	r = -.313 p =.066	r = -.356 p =.037
DSS	r = -.045 p =.671	r = -.032 p =.489	r = -.041 p =.651
TAP	**r = .417* p =.000**	r = .244 p =.023	**r = .299* p =.000**
R20	**r = -.433* p =.000**	**r = -. 403* p =.000**	**r = -.412* p =.000**

r – Pearson's correlation coefficient
p – level of significance

Discussion

Having compared the obtained values, it can be noticed that the majority of motor variables statistically significantly correlates with the variable (fluency) - CFLU. The result leads to the conclusion that in the case of some motor tasks there is a link between motor successfulness and motor creativity, or more precisely, the ability of production of creative motor response. It has been assumed that the children motorically more successful in the stated motor tasks had achieved better results in the test of motor creativity, that is, they had been able to give higher number of motor response to the given tasks in comparison to children who had been less motorically successful. The highest correlation with CFLU (fluency) is shown in the case of motor task Standing long jump (SLO) and the task Polygon with obstacle backwards (POB). The lowest correlation is evident in the case of motor task (TAP). It should be noted that numerous authors suggest that with children the motor task long jump is not to estimate explosive strength (as it is the case with older children and adults), but the coordination of a whole body (Kukolj, 2006; Starosta, 2002; Sturza-Milic, 2012a). It is similar to the motor tasks Running 20 m (R20) and Tapping rate (TAP) which do not originally estimate speed and the speed of alternative movements; in the case of children these tests are used for estimation of the way they solve coordination problems (Bala & Popović, 2006; Kukolj, 2006; Malina, 2004). It is between coordination as motor ability and intellectual abilities (especially with younger age) that a link has been noticed in numerous studies (Ismail, 1976; Ismail & Gruber, prema, Ismail, 1976; Kirkendall & Ismail, 1976; Sturza, 1999, 2012a). Having in mind that in the test of motor creativity a child solves a specific motor problem (he/she should reflect on possible solutions, to remember the ways of carrying a ball), it might be that, among other things, this very moment contributed to the link between the mentioned motor tasks and LFLU (fluency). The motor variables of the tasks *Moving hands along bent surface* (MHBS), *Sit-up* (SIU), as well as *Deep forward bend while seated straddled* (DSS), i.e. motor task dominated by strength as motor ability, as well as flexibility, have not shown statistically significant link with the motor creativity variable (fluency) – LFLU.

Similar results (as well as their analysis) have been obtained after the correlation of motor variables with the variable of motor creativity CORI (originality). The highest correlation is established in the case of the motor task *Standing long jump* (SLO), the motor task *Polygon with obstacle backwards* (POB) and *Running 20 m* (R20). It has been assumed that the children who had achieved the best results in the variable of motor

creativity CORI (originality), i.e. those children who had given the largest number of original motor responses had been the most successful, and vice versa. It has to be emphasized here that in this case statistically significant correlation with the motor variable *Tapping rate* (TAP) has not been established. The same is with the motor variables *Sit-ups* (SIU), *Moving hands along bent surface* (MHBS) and *Deep forward bend while seated straddled* (DSS).

Having correlated the motor variables with the third variable of motor creativity (flexibility) – LELE, it is noticeable that the link has been established in the case of motor tasks of predominantly coordination character, i.e. *Standing long jump* (SLO), *Running 20 m* (R20), *Tapping rate* (TAP) and *Polygon with obstacles backwards* (POB). This component of motor creativity has also shown that the children who had manifested high ability of varying of ideas were motorically most successful. In the case of the tasks *Deep forward bend while seated straddled* (DSS), *Moving hands along bent surface* (MHBS) and *Sit-ups* (SIU) statistically significant correlation has not been confirmed between LFLE and the motor variables.

In spite of the fact that a link between motor achievements and creativity has been established, the research has shown low results in the fluency component (LFLU), which can be brought into relation with the level of motor knowledge of children, which is apparently too low. Namely, fluency is in correlation with originality, while original ideas appear only after a large number of stereotypic ones. It is beyond dispute that other components of personal traits of children should also be born in mind. Consequently, a fact should be respected that at younger age motor creativity should be studied in multivariant fashion (Serbetar, 2003, Sturza-Milic, 2008, 2009a, 2012a).

Having in mind intra and inter individual factors, it could be noted that the higher level of abilities an individual posses, the greater creative performance he/she can achieve is (provided that there is support of a setting, if the personality features are appropriate and if the time is mostly used for creative activities (Gojkov, 2008; Djordjevic, 2005). Due to the fact the results of the research show a correlation between success of children in the performance of certain motor tasks and motor creativity manifestation (fluency and originality), it can be concluded that system positive influences on physical activity can have a decisive role, both in the development of motor successfulness and in the development of motor creativity. It is assumed that the mentioned features complement each other, especially in situations when children are faced with a motor problem of coordination nature. Consequently, during the period of childhood, we should strive to provide all the children with suitable conditions in order to ensure optimal development of movement skills and possibility of motor creative expression. Motor activities of problem and coordination character should be a part of work with preschool children. The task imposes itself as in imperative, having in mind that creative behaviour is in the basis of the development of the overall child potential, human self-actualization and progress (Sefer, 2009, Sturza-Milic, 2009c, 2012a). It is therefore necessary to ensure "enriched" environment, indicating interesting, versatile and encouraging setting for a child, offering challenges and rising the standards of his/her success. What is also essential is a complex learning setting, provocative and rich learning opportunities, abundance and variety of equipment and requisites, the increase of motor contents

paying special attention to various developmental fields at early age, as well as the adults who are "curious" and willing to comprehend the ways children perceive, understand and represent the world (Sturza-Milic, 2009c; Sefer, 2009).

Bibliography:

- Abbott, A., Collins, D., Sowerby, Martindale, R. (2007). *Developing the Potential of Young People in Sport. Edinburgh.* /http://www.sportscotland.org.uk/ 18.09.2009.
- Bala, G. i Popović, B. (2006). Motoričke sposobnosti predškolske dece. Bala, G. (Ur.) *Zbornik radova "Antropološke karakteristike i sposobnosti predškolske dece"*, 103-151. Novi Sad; Univerzitet u Novom Sadu, Fakultet sporta i fizičkog vaspitanja.
- Bloom, B. (1985). *Developing Talent in Young People*. New York; Ballantines.
- Duvillard, S. (2012). Do not Blame the Blame – fix the problem! Obesity and Cardiovascular Disease in Youth. Pišot, R., Dolenc, P., Retar, I. & Pišot, S. (Eds.). *Proceedings of the 7th international scientific and expert symposium „Child in motion for Healthy aging"*, 9-10. Koper; Univerza na Primorskem, Znanstveno-raziskovalno središče, Univerzitetna založba Annales.
- Đorđević, B. (2005). *Darovita i kreativna deca.* Vršac; Visoka škola strukovnih studija za obrazovanje vaspitača „Mihailo Palov".
- Đordić, V. (2006). Fizička aktivnost predškolske dece. Bala, G. (Ur.). *Zbornik radova: Antropološke karakteristike i sposobnosti predškolske dece,* 331-360. Novi Sad; Univerzitet u Novom Sadu, Fakultet fizičke kulture.
- Feldman, D., Pirito, J. (1992). Handbook of Parenting, I.M. Borenstein (Ed.), pp. 285-304, New York: Longman. http//www.gt-cybersource.org/Record.aspx?rid-10581-128k
- Firika, J. & Sturza-Milic, N. (2004). *The effects of globalization of World social relations and the production of Mass-media and Sports goods*. Vrsac; Preschool Teacher Training College.
- Feldhousen, J.F. (1998). *Talent Development, Expertise, and Creative Achievement.* http://www.eric.ed.gov preuzeto 3.05.2007.
- Gajić, M. (1985): *Osnovi motorike čoveka*. Novi Sad; Fakultet fizičke kulture.
- Gallahue, D.L. (2010): *Understanding Motor Development in Children and Youth.* Pišot, R., Štemberger, V., Šimunič, B., Dolenc, P & Melej, R. (Eds.). Proceedings of The 6th international scientific and expert symposium "Contemporary views on the Motor Development of a Child", 17-23. Portorož; Pedagoška fakulteta Koper, Znanstveno-raziskovalno središče Koper, Pedagoška fakulteta.
- Galvis Panqueva, A. (2000): *Play, Puzzles and Creativity*: Learning Engines for the knowledge society. Santa Fe de Bogotá; Universidad de Los Andes.
- Gojkov, G. (2008). *Didaktika darovitih.* Vršac; Visoka škola strukovnih studija za obrazovanje vaspitača „Mihailo Palov".
- Griffin, S. (1992). Young children's awareness of their inner world: a neo-structural analysis of the development of intrapersonal intelligence, in: R. Case (Ed.). *The mind's staircase: exploring the conceptual underpinnings of children's thought and knowledge*, 269-284. Hillsdale, Nj, Lawrence Erlbaum.
- Guilford, J.P. (1967). *The nature of human intelligence.* New York: McGraw Hill.
- Guilford, J.P. (1977). *Way beyond the IQ creative education foundation*. New York: Bufalo.
- Ismail, A.H. (1976). Integrirani razvoj: teorija i eksperimentalni zadaci. *Kineziologija.* Vol.:6, Br.:1-2, God.:6, (7-29). Zagreb; Fakultet za fizičku kulturu.
- Kirkendall, D.R. i Ismail, A.H. (1976): Mogućnost razlikovanja triju grupa različitog intelektualnog statusa pomoću motoričkih varijabli. *Kineziologija.* Vol.:6, Br.:1-2, God.:6, (59-64). Zagreb; Fakultet za fizičku kulturu.

- Kvašćev, R. (1981). *Psihologija stvaralaštva*. Beograd; Zavod za udžbenike i nastavna sredstva.
- Kukolj, M. (2006). *Antropomotorika.* Beograd; Fakultet sporta i fizičkog vaspitanja.
- Malina, R.M. (2004). *Motor Development during Infancy and Early Childhood: Overview and Suggested Directions for Research.* http://www.soc.nii.ac.jp/jspe3/index.htm. Preuzeto 15. 06. 2008.
- Matejak, Č., Planinšec, J. (2008). Motor activity and quality of life of younger children. Štemberger, V., Pišot, R. & Rupert, K. (Eds.). *Proceedings of The the 5th international scientific and expert symposium „ A Child in motion*", 342-350. Ljubljana; Univerza na Primorskem, Znanstveno-raziskovalno središče, Pedagoška fakulteta Koper, Univerza v Ljubljani, Pedagoška fakulteta.
- Pišot, R., Šimunič, B., Šarabon, N., Jelovčan, G., Plevnik, M., Čeklič, U., Pišot, S., Volmut, T., Dolenc, P., Gerževič, M. (2010): Pristopi k ugotavljanju skladnosti elementarnih gibalnih vzorcev v zgodnjem otroštvu. Pišot, R., Štemberger, V., Šimunič, B., Dolenc, P & Melej, R. (Eds.) *Proceedings of The 6th international scientific and expert symposium "Contemporary views on the Motor Development of a Child", 298-300.* Portorož; Pedagoška fakulteta Koper, Znanstveno-raziskovalno središče Koper, Pedagoška fakulteta.
- Pišot, R. (2012). Gibalna kompetenca – temelj samostojnosti od otroka do starostnika. Pišot, R., Dolenc, P., Retar, I. & Pišot, S. (Eds.). *Proceedings of The the 7th international scientific and expert symposium „Child in motion for Healthy aging", 14-15.* Koper; Univerza na Primorskem, Znanstveno-raziskovalno središče, Univerzitetna založba Annales.
- Rajtmajer, D. (2008). Sports didactics is an orderly Science. Štemberger, V., Pišot, R. & Rupert, K. (Eds.). *Proceedings of The the 5th international scientific and expert symposium „ A Child in motion*", *449-456.* Ljubljana; Univerza na Primorskem, Znanstveno-raziskovalno središče, Pedagoška fakulteta Koper, Univerza v Ljubljani, Pedagoška fakulteta.
- Renzulli, S. J. (2006): *A Practical System for Identifying Gifted and Talented Students.* The National Research Center on the Gifted and Talented, University of Connecticut. http://www.gifted.uconn.edu/. Preuzeto 15.06.2008.
- Robinson, N. M. (2002). *Assessing and Advocating for Gifted Students: Perspectives for School and Clinical Psychologists*. http://eric.ed.gov Preuzeto 11.08.2007.
- Starosta, W. (2002). Selected bio-social conditions determining the effectiveness of sport training of children and youth. Bokan, B. (Ur.). *Invited lecture, Scientific Symposium "Sport in the Youth"*. Belgrade; Faculty of Sport and Phisical Education.
- Sternberg,R.&Lubart, T. (1993). Creative giftedness:a multivariate investment approach*. Gifted Child Quarterly*, 37, 7-15.
- Sternberg, J.R., A.L. O'Hara & I.T. Lubart (1997). Creativity as investment. *California Menangement Reviev*, Vol. 40, No.I, 8-21.
- Sturza, N. (1999). *Relacije između motoričkog ponašanja i intelektualnih sposobnosti kod dece uzrasta 5-6 godina* (magistarski rad). Beograd; Fakultet fizičke kulture.
- Sturza-Milic, N. (2008). Multivariant Research on Motor Giftedness in Pupils. Štemberger, V., Pišot, R. & Rupert, K. (Eds.). *Proceedings of The the 5th international scientific and expert symposium „ A Child in motion*", 471-478. Ljubljana; Univerza na Primorskem, Znanstveno-raziskovalno središče, Pedagoška fakulteta Koper, Univerza v Ljubljani, Pedagoška fakulteta.
- Sturza-Milic, N. (2009). *Identifikacija motorički darovitih učenika mlađeg školskog uzrasta.* Vršac; Visoka škola strukovnih studija za obrazovanje vaspitača „Mihailo Palov".
- Sturza-Milic, N. (2009a). Odnos između motoričke kreativnosti i motoričke uspešnosti kod dece predškolskog uzrasta. Bokan, B. (Ur.). *Zbornik sa Međunarodne naučne konferencije „Teorijski, metodološki i metodički aspekti fizičkog vaspitanja*", 37-43. Beograd; Fakultet sporta i fizičkog vaspitanja.
- Sturza-Milic, N. (2009b). Otpornost na stres motorički darovitih učenika. Kevereski, Lj. (Ur.). *Zbornik radova sa Prve internacionalne konferencije "Daroviti i talentovani kreatori u progresu", 398-405.* Bitola; Univerzitet Sv. Kliment Ohridski i Pedagoški fakultet.

- Sturza-Milić, N. (2009c). Diverzifikovana nastava fizičkog vaspitanja kao osnova razvoja motoričke uspešnosti i kreativnosti učenika. Kadum, V. (Ur.). *Monografija, Međunarodni znanstveni skup „Škola po mjeri"*,307-317. Pula; Sveučilište Jurja Dobrile u Puli, Odjel za obrazovanje učitelja i odgajitelja.
- Sturza-Milić, N. (2011). Uticaj dominantnog društvenog razmišljanja na vreme uključivanja dece u sport i ranu specijalizaciju. Gojkov, G. (Ur.). *Zbornik radova sa 16. Okruglog stola na temu „Daroviti u procesu globalizacije"*, 613-629. Vršac; Visoka škola strukovnih studija za obrazovanje vaspitača „Mihailo Palov".
- Sturza-Milić, N. (2012): *Fizička aktivnost i motorni razvoj dece predškolskog uzrasta.* Vršac; Visoka škola strukovnih studija za obrazovanje vaspitača „Mihailo Palov".
- Sturza-Milić, N. (2012a): The relation between Motor behaviour and Intellectual Abilities of Preschool Children. Pišot, R., Dolenc, P., Retar, I. & Pišot, S. (Eds.) *Proceedings of The the 7th international scientific and expert symposium „Child in motion for Healthy aging"*, 166-173. Koper; Univerza na Primorskem, Znanstveno-raziskovalno središče, Univerzitetna založba Annales.
- Subotnik, R.F. & Jarvin, L. (2005). Beyond expertise: conceptions of giftedness as greath performance, in: R.J. Sternberg& J.E. Davidson (Eds). *Conceptions of giftedness (2nd end), 343-357.* New York; Cambridge University Press.
- Tejlor, C. (1978). *How many types of giftedness can your program tolerate*. University of Utah.
- Torrance, E.P. (1981). *Thinking Creatively in Action and Movement*. Bensenville, Scholastic Testing Service.
- Trevlas, E., Matsouka, O. & Zachopoulou, E. (2003) : Relationship between playfulness and motor creativity in preschool children. *In Early Child Development and Care,* Vol.173, Issue, 5, 535-543.
- Šerbetar, I. (2003). Razlike između djevojčica i dječaka u varijablama motoričke kreativnosti, *Zbornik radova sa naučnog skupa "Drugi Dani Mate Demarina"*, 139-144. Zagreb.
- Šefer, J. (2000). *Kreativnost dece.* Beograd; Institut za pedagoška istraživanja i Viša škola za obrazovanje vaspitača u Vršcu.
- Šefer, J. (2009). *Evaluacija kreativnih aktivnosti u tematskoj nastavi*. Vršac; Institut za pedagoška istraživanja i Viša škola za obrazovanje vaspitača u Vršcu.
- Van Tassel-Baska,J.& Little, C.A. (2003). *Content-Based Curriculum for Gifted Learners.*Waco, TX: Prufrock Press.
- Wyrik,W. (1968). The development of a test of motor creativity. *Research Quarterly,* No. 39.
- Winner, E. (2000). The Origins and Ends of Giftedness. *American Psychologist,* 55,1,159-169.

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