



**The Influence of Challenge and non-Challenge Games on the
Motor Skills development of Children**

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

**The Influence of Challenge and non-Challenge Games on the Motor Skills
development of Children**

Shahrzad Hosseinirokh^{1*}, Shahab Parvinpour¹, Abbas Bahram¹

1 Kharazmi University

***Corresponding author: rokh_nazanin@yahoo.com**

ABSTRACT

The purpose of present study was to compare the influence of Challenge and non-Challenge Games in dynamical environment on the dribbling and overarm throwing Skills development of (5-6) preschool children. Thirty children were selected from two kindergartens in Tehran and were two grouped according to pretest scores. The intervention was 15 days. Primary level skills before of intervention were assessed. The games were designed for developing manipulative skills in both groups; however, the task difficulty of these games was increased in challenging group according knowing the child from his/her own, while in non-challenging group it was kept constant. Test of Gross Motor Development – second version was used in the beginning and the end of the intervention and for fallow test. Results presented that challenge and non-challenge games cause the improvement of overarm throwing and dribbling skills development of children. But influence development challenge game relative to non-challenge game in overarm throwing is significant, but dribbling skill isn't significant. According to results, appear existence option and control for individuals about appointment task difficulty level, even in during childhood could the benefit; of course the effective depended to factors for example task complication.

Keywords: affordance, challenge and non-challenge game, challenge point hypothesis, fundamental motor developmental.



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

1. INTRODUCTION

Pre-school years are a good time to apply motor skills because fundamental motor skills have not been established at these ages. It is obvious that creating opportunities for practicing and playing in critical ages will make it possible for children to master the fundamental manipulative skills and motor skill development and result in proper growth. Pre-school years are a good time to apply motor skills because fundamental motor skills have not been established at these ages. Robinson et al. (2009) stated that developmental and educational approaches are beneficial in developing fundamental motor skills and planned motor experiences are an urgent requirement in learning environment (24, 18). Ecological theory is one of the new theories that have affected the studies carry out on motor skill development in recent years and Dynamic Systems Theory (DST) is considered as one of the branches of this theory. According to this theory, dynamic changes occur over time but it is very individual and influenced by a variety of factors, such as affordances and speed limiters in the system (6). Previous studies that assess the influence of interventions based on this theory in terms of fundamental motor skills are very small in number. There are also some limitations in the history of this area, including the lack of a precise definition of fundamental motor skills, an organized program, the manner of assessing them, and a well-designed and desired syllabus for teachers and instructors in the academic year that covers all aspects simultaneously (7, 19, 20). Challenge point framework is one of the theories that addresses the issue of individuality and dynamism and refers to optimizing the practice conditions in order to promote motor learning and it states that the amount of information should not be either too low or excessive so that learning takes place and the amount of information varies depending on the level of individual skill and functional difficulty of the task that is to be learned (11). Functional task difficulty can be a cognitive or physical challenge posed by a motor problem and is originated from individual perception (psychological factors), task difficulty, or biomechanical limitations of task (such as degrees of freedom) (6, 9). In recent years, challenge point framework has attracted the attention of many researchers and the results of the majority of these studies confirmed the challenge point framework



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

(25, 21, 13, and 2). But limited research such as the study performed by Hitchcock and Byun (2012) focused on individuality in relation to task difficulty (13). In most investigations, participants who are in a wide range of age and participants with developmental delays or motor disorders are selected (25, 27). Several studies are performed based on the challenge point framework; however, as mentioned before only a few of them have examined the influence of the challenge point framework based interventions on healthy people (2, 21, 27) and among the carried out studies, only Balali (2017) examined healthy children who also did not address all aspects of the challenge point framework, including the fact that according to Dynamic Systems Theory (DST), each individual has a specific challenge point and according to the nonlinear training view, attention to individuality should be considered in practices; moreover, the age range of participants was vast, which can also influence the amount of learning in that age. One of the weaknesses in Balali's research was the practice of a high number of highly various skills which in turn could be a factor in not achieving acceptable results due to the short term of study and the need for any skill to be prepared and a different level of attention. Educational programs can play an important role in the development of a child's growth as an affordance (16, 17). On the other hand, intervention and educational programs should be designed according to the age of the child because at young ages it would be very useful to use gaming as a mean of pleasure, but limited research has used the game as intervention (22); and the type of their selected task was not as games which were based on the theory and particularly the challenge point framework (25). Due to the fact that paying attention to the dynamic and non-linear nature of motor development (6), facilitating learning by manipulating and changing the constraints of an individual, environment, and task, that are boundaries of objective-oriented behaviors (3), become possible in accordance with the nonlinear training approach. According to this approach, there is no central controller (such as an instructor) for motor learning who determines how to behave (3); this approach provides an opportunity for instructors to use different types of movement patterns tailored to different people by taking into account individual differences and the dynamic learning environment. In recent years, self-control has also



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

entered the field of learning, and some researchers have suggested self-control method for responding to the question of how much and when pattern should be offered during the physical exercise, that is, the beginners decide on the time and quantity of offering the pattern. A few investigations have been carried out in this area in recent years and all of which emphasized the effective role of this method in optimizing practice conditions. Self-control method, that adjusts the frequency of providing additional feedback based on the characteristics of each individual, is a method in which additional feedback is provided only when the learner requests it. The learning advantages resulting from this approach seem to have increased due to the learner's more active participation in determining the characteristics of practice conditions through the self-regulation of the additional feedback program (25); as Nassiri (2013) compared the two self-control and domain techniques in the modeling field through three experiments carried out a sequential scheduling task in which the time structure was very important. Overall results showed that using these two techniques with the mentioned processes is well suited for optimizing the practice conditions with beginners needs. Furthermore, the results confirmed the prediction made by challenge point theory as the reason for the formation of two methods of domain modeling and self-control pattern was justifying this theory which pointed out the importance of providing educational information to the optimum level for beginners (74). Therefore, the purpose of present study is to use the recommendations of challenge point framework to design motor interventions based on the ecological task analysis on kindergarten children to develop and improve the development of motor skills and compare the influence of challenge point framework based games with games that are not based on this theory in the development of dribbling and overarm throwing skills.

2. METHODOLOGY

The method of this research is quasi experimental with pre-test and post-test research design. The statistical population of this study consists of all 5 to 6-year-old kindergarten children in Tehran province that are selected randomly from two kindergartens and participated in this study as participants. Individual characteristics questionnaires were distributed among the parents of the children aged 5 to 6 years old. After collecting the



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

questionnaires, 60-minute intervention sessions were held for 15 children from each kindergarten based on the questions of the questionnaire and the objectives of the selection plan and challenge and non-challenge games in separate kindergartens during 5 weeks and these sessions were held three times per week (48 minutes of intervention without grouping, warming up and cooling down children in each session). One week after the sessions were completed, a post-test was given to children and a follow up test was given to children two weeks after the post-test. The fundamental motor skills of dribbling and overarm throwing of the children were selected through the second edition of the test of gross motor development.

Challenge and non-challenge game groups

In designing challenge game group programs which were in accordance with the (Ecological Task Analysis) ETA methodology, first, the main components of the task, that resulted from the analysis of the effective environmental and task constraints in the degree of difficulty of the task, were determined and the task was subsequently regulated to fit the children by modifying the degree of difficulty according to the individual constraints and the nonlinear teaching method. For example, in the task of overarm throwing that has components such as ball size, ball weight, and distance to goal, and so on, the instructor planned the task from easy to difficult by manipulating each of these components.

Challenge games are fitted and designed to develop the fundamental manipulative skills of children by manipulating the task difficulty so that the task, environment, and playing situations are developing in a challenged manner. In nonlinear training, the instructor uses manipulating of task constraints such as instructions, rules, and tools (e.g. rocket, ball, and ground size) in order to facilitate learning and encourage the learner to create a variety of motor solutions that are best suited to beginners (12, 14, and 15). In designing challenge games, these principles which are emphasized in nonlinear training and developmental task difficulty have been used. However, in the control group, games with constant difficulty (non-challenge) have been used; that is, the size of balls, distances, cross-sections, goals, and rules remained constant throughout the course of practicing.



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

One of the points of interest in challenge point framework is self-control which is considered in this study in the way that in challenge group, all games were ranged from easy to hard. The instructor then explained to the children how to play each game and asked them to play any game that they were able to perform. Since one of the factors to be considered in this research and in the challenge point framework is self-control, the instructor should not intervene in the selection of game level of the children of challenge group but the instructor should only observe the type of games and time allocated to each game and gives the children the necessary feedback to play the game correctly and acquire skill.

Intervening skills are two sub-scales of dribbling and overarm throwing which are parts of the six fundamental manipulative motor skills of the second edition of Ulrich's gross motor skill test (TGMD 2). Six types of games were used to apply these skills in game design. Dribbling in the open space, dribbling in the cage, dribbling in the course, throwing to the goal, throwing in the goal, throwing in the basketball basket were the games used in the interventions, which the aim in the design of the first three games was to increase the skill of dribbling and the aim in the next three games was to improve and develop the overarm throwing skill. Each game has three levels: simple, medium and difficult which were created by modifying and manipulating the components of environmental and task conditions, for example, at the beginning and on the first day, children of the challenge game group engaged in any level of dribbling skill games that they wanted and then each child started to dribble according to his/her ability to play in that level of game and the correct way of playing the first game in the middle level of the first game but because he/she was unable to perform the skill at that level, he/she played at another level at the end of the session. The manner of playing the game is in the way that in each session, all games were used for 8 minutes and the overall time of the games in each session was 48 minutes for both groups.

The same games of challenge group were used in the non-challenge group with the difference that non-challenge group has enjoyed constant games with constant challenges and conditions and the difficulty of games has not changed anytime throughout the



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

intervention. In fact, the non-challenge group only played the games of the second stage of difficulty and the participants repeated to play the same games until the end of the interventions, regardless of the skill level of participants and the difficulty of the game has been unchanged throughout the intervention; that is, some children in the challenge group may not experience the non-challenge group level games until the end of the session or the difficulty of the task may have increased and reached a difficult level for a number of children in the challenge group; however, in the non-challenge group, no change was made in games. In this group, the instructor only gives children feedback on how to perform fundamental skills correctly and observes the game performance and the time allocated to each game.

3. INSTRUMENTS OF DATA COLLECTION

The sub-tests of the second edition of Ulrich's gross motor skill test (TGMD 2) have been used to measure the participants in the pre-test, post-test, and follow-up tests. This test is used to measure the fundamental motor skills of children aged 3 to 11 years and has two sub-scales of displacement and manipulation and measures the score of gross motor gain in addition to the scores of these two sub-tests. This test has been validated in Iran in March 2009 and has a reliability of 96% and validity of 87% for the sub-test of displacement, reliability of 74% and validity of 81% for the sub-test of manipulation and reliability of 87% and validity of 91% for gross motor gain. In this test, the score is either zero or one and the scores of the executive parts of skills are added together and totally, the score of the subscales is obtained. Eventually, these scores are obtained according to the age (to month) in the standard score table that has the capability to be analyzed statistically (Zarezaheh, Farrokhi, and Kazemnezhad, 2009).

Questionnaire of individual characteristics

This questionnaire which included questions such as age, body health, eye health, the number of children in the family, the birth order of child in the family, and the amount and type of activities that children undertake throughout their lives to collect the initial data about participants and at the end, the parent's consent or dissatisfaction with their child's company was questioned.



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

Procedure

After obtaining permission from the Department of Welfare of the City of Tehran to conduct the research on participants through individual questionnaires which were distributed among families, children were selected who were children aged 5 to 6 years old and these children did not participate in any sports activities during the intervention period and were physically and mentally healthy. In the first session, a pre-test of Ulrich's gross motor skill test (TGMD 2) was performed to assess manipulative subscale in which each participant performed each of the two skills of manipulating dribbling and overarm throwing twice successively and two referees who were motor development expert examined and evaluated the children's movement. Pre-test scores were recorded to be compared with the post-test scores; in the next stage, the participants were divided into two equal groups of control and experimental according to the pre-test scores. The intervention period lasted 5 weeks, and the number of sessions was three 60-minute sessions per week and the precise timing of the intervention was determined in accordance with previous investigations. Games were designed based on the ETA table and the book of games for motor learning in which games are designed for children to learn fundamental motor skills and cognitive-motor activities, and a variety of participatory games involving all of the gross and subtle motor skills were used (4). In both groups, the time allocated to each game, the type of games provided, the time of skill implementation, the feedback provided, and any activity that was under the supervision of the instructor were presented equally. The only difference between the groups was that developmental games were used in the challenge group while non-challenge games and games with constant task difficulty were used in the non-challenge group. One week after the completion of the intervention sessions, TGMD-2 post-tests were performed for both groups and two groups were compared and four weeks after the post-test, follow up test was performed so that the temporal effects are removed and the exact learning of children can be examined.

Data analysis was carried out using SPSS software version 23 and appropriate statistical methods (Mafi et al. 2012). The mean and standard deviations were used for describing



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

the variables, the Kolmogorov-Smirnov test was used to determine the normality of data distribution, ANOVA was performed repeatedly to examine inter-group differences and the one-variable ANOVA test was performed to examine the inter-groups differences at significance level of $P < 0.05$.

4. FINDINGS

Individual characteristics of children in two groups of challenge and non-challenge games are presented in Table 1, by frequency and age.

Table 1. Statistical indicators related to the age of participants by gender.

Group	Gender	Frequency	Mean	Standard deviation
Challenge games	Girl	12	5.4	0.3
	Boy	3	5.7	0.1
Non-challenge games	Girl	12	5.7	0.1
	Boy	3	5.8	0.2

The statistical results related to the effect of practicing (inter-group factor) for each skill are presented in Table 2. As the results of the table indicate, the influence of practicing is significant for both dribbling and overhead throwing skills. This means that different timing of pre-test, post-test, and follow-up tests have had a significant effect on dribbling and overhead throwing skills. Table 3 presents a dual comparison between different times for each skill. According to this table, dribbling and overarm throwing skills have developed significantly in both challenging and non-challenging groups from pre-test to post-test and from pre-test to follow-up test ($p < 0.05$).



**The Influence of Challenge and non-Challenge Games on the
Motor Skills development of Children**

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

Table 2. Significance of practicing influence on dribbling and overarm throwing skills at different times.

Variable	Wilks ' λ	F	Ig	S	Partial Eta Square d
Challenge dribble	0/049	125/13 7	0/00 0	0/95 1	
Non- challenge dribble	0/055	110/77 3	0/00 0	0/94 5	
Challenge e throwing	0/048	129/69 3	0/00 0	0/95 2	
Non- challenge throwing	0/227	22/131	0/00 0	0/77 3	

Table 3. The results of Bonferroni test in pair-wise comparison of skills at different times

Sub- assumptions	Pair-wise comparison of each test at different times		Difference in means	Sig
Challenge game dribbling	Pre- test	Post- test	-4/733	0/000
	Pre- test	Follow up test	-3/867	0/000



**The Influence of Challenge and non-Challenge Games on the
Motor Skills development of Children**

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

	Post-test	Follow up test	0/867	0/000
Non-challenge game dribbling	Pre-test	Post-test	-4/067	0/000
	Pre-test	Follow up test	-3/400	0/000
	Post-test	Follow up test	0/667	0/009
Challenge game throwing	Pre-test	Post-test	-2/933	0/000
	Pre-test	Follow up test	-2/267	0/000
	Post-test	Follow up test	0/667	0/009
Non-challenge game throwing	Pre-test	Post-test	-1/933	0/000
	Pre-test	Follow up test	-1/467	0/000
	Post-test	Follow up test	0/467	0/041

* $p < 0.05$

One-way ANOVA test was used to examine the difference between two groups of challenge and non-challenge in the development of dribbling and overarm throwing skills in children from pre-test to post-test and from pre-test to follow-up test, the results of which are presented in Table 4. Based on the results presented and non-significance of the group effect ($p > 0.05$), the difference in development of two groups in the dribbling skill from the pre-test to the post-test and from the pre-test to the follow-up test as the result of



**The Influence of Challenge and non-Challenge Games on the
Motor Skills development of Children**

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

the type of game was not approved ($p>0.05$), but in the overarm throwing skill in children, there was a significant difference between the pre-test to post-test and pre-test to follow up test in both non-challenge and challenge game groups.

Table 4. Results of One-Way ANOVA analysis of the development in dribbling and overhead throwing skills of challenge and non-challenge game groups from pre-test to post-test and from pre-test to follow up test.

	Challenge group (standard deviation±mean)	Non-challenge group (standard deviation±mean)	D f	F	Sig
Development in dribbling skill from pre-test to post-test	4/73±1/33	4/06±1/09	1	2/2 29	0/17 4
Development in dribbling skill from pre-test to follow up test	3/86±0/91	3/40±1/40	1	1/1 63	0/29 0
Development in	2/93±0/70	1/93±1/09	1	8/7 99	0/00 *6



**The Influence of Challenge and non-Challenge Games on the
Motor Skills development of Children**

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

throwing skill from pre-test to post- test					
Develop ment in throwing skill from pre-test to follow up test	2/26±1/03	1/46±0/91	1	5/0 4	0/03 *3

*p<0.05

5. DISCUSSION AND CONCLUSION

The results showed that making use of challenge and non-challenge games led to the development of dribbling and overarm throwing skills in children. The result of the development of scores of both tested skills in two challenge and non-challenge game groups are in line with the results of meta-analysis performed by Logan (16, 17); and the results of the research performed by Donath and Anderson, and Mulla Norouzi regarding the influence of interventions on fundamental motor skills development and with the results of the study done by Balali on using the interventions based on challenge point framework. Considering that in a limited number of investigations, the game was used in interventions, and because the use of game-based interventions seems to accelerate the development of fundamental motor skills in children, and increases the enjoyment of skill participation and gives better sense of participation in activity to a child; therefore, the child tries harder to learn the skills better and perform them (16, 6, 27).

Comparing the development of the two groups, the results showed that there was no significant difference between the development of the performance of children in



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

dribbling skills of challenge and non-challenge groups from pre-test to post-test and from pre-test to follow-up test; although the results of challenge game was far better than non-challenge one, but it was not significant statistically (Aleksandrovna Maximova and Aleksandrovich Belyaev, 2017). The results of comparing the development of two groups from the pre-test to the post-test showed no difference between the development of the performance of children from the pre-test to the follow-up test on dribbling skill. This result confirms the post-test results. Donath et al. (2015) carried out research and promoted dribbling skills by applying manipulative games (5). Moreover, in the investigation done by Balali (2017), dribbling skills was more superior in challenge group as compared with non-challenge group; however, this superiority was not statistically significant. Perhaps the difference between the results of the present study and previous ones stems from taking self-control and individuality into consideration; because the previous research, these principles are not considered while investigating the influence of applying intervention on children and the child did not have the opportunity to be practiced and challenged at a level beyond his/her level and all children practiced at a certain level and this led to the lack of development of the child in the skill (Zareinejad et al., 2014). There is a significant difference between the influence of challenge and non-challenge games on the development of overarm throwing skill from the pre-test to the post-test and from the pre-test to the follow-up test and the influence of challenge game on overarm throwing skill was more than the influence of non-challenge game. According to the results of investigation carried out by Donath (2015), motor interventions did not influence the overarm throwing skill. Balali also did not observe any significant development in overarm throwing skill both in the challenge and non-challenge groups from the pre-test to the post-test and from the pre-test to the follow-up test. Most children do not instinctively know how to overarm throw effectively and they need a variety of practicing and recreational opportunities in order to get to the forefront of skill. Since it seems that overarm throwing skill is among the skills that a child uses more than other fundamental manipulative motor skills during the day, it seems that the quality of the interventions was increased due to designing games in a free environment and taking the



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

principles and recommendations of challenge point framework, self-control, and individuality into consideration and this was the reason for the better development of challenge group as compared with non-challenge group.

The results showed that the development of two groups was contrary to each other in overarm throwing and dribbling skills; that is, the hypotheses, assumptions, and propositions of challenge point framework were confirmed in overarm throwing skill while these hypotheses and assumptions were rejected in dribbling skill. It seems that since the dribbling skill is a complex manipulative skill, and it is more difficult in terms of rhythm and hand-eye coordination as compared with overarm throwing skill, applying task difficulty and making use of challenge point interventions led to less development of this skill than overarm throwing skill. Because dribbling skill is more difficult, it seems that it has been possible to further develop this skill with making use of more challenging and more focused games (Foroughi and Esfahani, 2012). The results of comparing the development of the two groups from the pre-test to the follow-up test showed that there is a difference between the development in the performance of children from the pre-test to the follow-up test in the overarm throwing skill; and this result confirms the post-test results and shows that the results obtained in the post-test indicate real learning and this result is a proof for challenge point framework which states that optimum information results in learning and not merely a desirable performance.

The results of this study are in line with the results of most studies that have measured the influence of various interventions on the motor development and fundamental skills of children, as it is not the first time in investigations on manipulative skills that applying interventions in some skills have been more effective than other skills. Balali (2017) stated that the use of manipulative games and interventions which are based on the theory led to the development of catching skill, but did not lead to an improvement in dribbling, overarm throwing, kicking, knocking, and rolling skills. These results are in line with the results obtained by Donath et al. (2015) who stated that applying motor interventions improved manipulative skills, such as dribbling and receiving, but there was not a significant difference between two groups in simpler skills such as kicking, overarm



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

throwing, and rolling. However, these results are contradictory with the results of present study in terms of the development of a skill that is affected by intervention. In contrary to previous research, the results of the present study showed that applying interventions had more influence on overarm throwing skill which is a simpler and more effective skill as compared with dribbling skill. Perhaps the reason for the present results is self-control and self-regulation of tasks of this research. Since in previous studies, tasks were designed and presented based on the diagnosis of instructor, it was possible for the child to practice at a lower level than his/her skill level. As a result, the child would not be promoted to a higher level of skill and remained at his/her level (5, 25).

Shahrzad et al. (2009) compared the effect of variability of practice on retention and transfer of the overarm throwing accuracy children aged 4-5 and 5-6 years old. They observed that age differences were significant at all stages of the age group; that is, six years old children were better than four and five year old children; however, there was no significant difference between the fixed group and the practice group in the retention test. According to the results of previous studies and the results of the present research, it may be stated that motor skills can grow with relatively stable changes in motor ability through practicing and learning activities. In fact, positive encouragement, adequate educational presentations, appropriate environment and practice can help the child to acquire motor skills better. Given that in previous studies, the influence of interventions on motor skills development has often been positive, it seems that applying the game-like motor intervention should be of interest of people who are communicating with children (26).

To sum up the results of this research, it can be said that due to the fact that most assumptions were confirmed, the present study proved the predictions of the challenge point framework in a real context and in the age group studied. Moreover, the results acknowledged that making use of the game as an intervention contributed to the growth of both challenge and non-challenge groups. Yet increasing the quality of intervention also resulted in increased classroom performance. When the results of this research and previous studies are examined, it seems that specifying skills and reducing the age range of participants also affect the results of the research as in the present study, both two skills



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

gained relative improvement under interventions. For better results, the quality of the challenge criterion may seem to improve or unisex participants may be selected (only girls or boys), a more comprehensive measurement scale can be considered for participants that may eventually lead to more significant findings; however, due to the relative superiority of the challenge game group in both skills in pair-wise comparative tests from the pre-test to the post-test, as well as the significant superiority of the development of the challenge group in both skills, this study seeks to help the instructors of kindergartens as well as sport coaches working in this age group to maximize to make the maximum practicing and educational use of the minimum available time so that children can develop better in their motor skills.

REFERENCES

- Aleksandrovna Maximova, O & V. Aleksandrovich Belyaev (2017). Generational Indigenation in a Multi-Ethnic and -Religious Society (Tatarstan, Russia). *Opción*, Año 33, No. 84 (2017): 38-64.
- Anderson G. Lemos¹, Eric L. Avigo², José A. Barela. (2011). Physical Education in Kindergarten Promotes Fundamental Motor Skill Development, *Advances in Physical Education* 2012. Vol.2, No.1, 17-21
- Balali, M, Vaezmousavi, M, Ghase & Parvinpour, S, (2017). Effects of challenging games on manipulative motor skills of 4-6 ye ars old children: an application of challenge point framework, *Early Child Development and care*, DOL: 10.1080/03004430.2017.1339276
- Cantin, N., Ryan, J., & Polatajko, H. J. (2014). Impact of task difficulty and motor ability on visual-motor task performance of children with and without developmental coordination disorder. *Human movement science*, 34, 217-232 .
- Dauids, K. W., Button, C., & Bennett, S. J. (2008). Dynamics of skill acquisition: A constraints-led approach: *Human Kinetics*.
- Dienstmann, R. (2008). Games for motor learning: *Human Kinetics*.



**The Influence of Challenge and non-Challenge Games on the
Motor Skills development of Children**

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

- Donath, L., Faude, O., Hagmann, S., Roth, R., & Zahner, L. (2015). Fundamental movement skills in preschoolers: a randomized controlled trial targeting object control proficiency. *Child: care, health and development*, 41(6), 1179-1187 .
- Foroughi, A & Esfahani, M. (2012). A robust AHP-DEA method for measuring the relative efficiency: An application of airport industry. *Management Science Letters* , 2(1), 93-100.
- Gallahue, D. L., Ozmun, J. C., & Goodway, J.(2012). *Understanding motor development: Infants, children, adolescents, adults: Mcgraw-hill Boston.*
- Goodway, D., Crowe, H., & Ward, P.(2003). Effects of motor skill instruction on fundamental motor skill development. *Adapted Physical Activity Quarterly*, 20(3), 298-314 .
- Goodway, J. D., & Branta, C. F. (2003). Influence of a motor skill intervention on fundamental motor skill development of disadvantaged preschool children. *Research quarterly for exercise and sport*, 74(1), 36-46 .
- Guadagnoli, M. A., & Bertram, C. P. (2015). Optimizing practice for performance under pressure. *IJGS*, 3(2).
- Guadagnoli, M. A., & Lee, T. D. (2004). Challenge point: a framework for conceptualizing the effects of various practice conditions in motor learning. *Journal of motor behavior*, 36(2), 212-224 .
- Guadagnoli, M., Morin, M. P., & Dubrowski, A. (2012). The application of the challenge point framework in medical education. *Medical education*, 46(5), 447-453 .
- Haywood, K., & Getchell, N. (2009). *Life span motor development: Human Kinetics.*
- Hitchcock, E. R., & Mcallister Byun, T. (2015). Enhancing generalisation in biofeedback intervention using the challenge point framework: A case study. *Clinical linguistics & phonetics*, 29(1), 59-75.
- Lee, M. C. Y., Chow, J. Y., Komar, J., Tan, C. W. K., & Button, C. (2014). Nonlinear pedagogy: An effective approach to cater for individual differences in learning a sports skill. *PLoS One*, 9(8), e104744 .



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

- Lee, M., et al.(2014). Nonlinear Pedagogy: An Effective Approach to Cater for Individual Differences in Learning.
- Logan, S. W., Webster, E. K., Lucas, W. A., & Robinson, L. E. (2011). Effectiveness of a student-led motor skill intervention in preschool children. *Research quarterly for exercise and sport*, 82, A31.
- Logan, S., Robinson, L., Wilson, A., & Lucas, W. (2012). Getting the fundamentals of movement: a meta-analysis of the effectiveness of motor skill interventions in children. *Child: care, health and development*, 38(3), 305-315 .
- Marsh Dowda, James F.Sallis, Thomas L. McKenzie. (2005). "Evaluating the sustainability of SPARK physical education : A case study of Translating research into Practice". *Research Quarterly for exercise and Sport*, Vol.76, No.1, PP:11-19.
- Martin, E. H., Rudisill, M. E., & Hastie, P. A. (2009). Motivational climate and fundamental motor skill performance in a naturalistic physical education setting. *Physical Education and Sport Pedagogy*, 14(3), 227-240 .
- McKenzie. T.L., Alcatraz. J.E, Sallis . J.F., Faucette. N.F. (1998). "Effects of a physical education on children's manipulative skills". *Journal of Teaching in physical education*, 17; PP:327-341.
- Mehdi Mafi, "A Hierarchical Model of ICT in Digital Society to Access Information," *Canadian Journal on Electrical and Electronics Engineering*, vol. 3, issue 7, 2012, pp. 366-374.
- Mehdi Mafi, "Integration of Mobile Ad hoc and WIMAX Networks with Approach of Admission Control and Hand off Combination Applied in Telemedicine Services," *American Journal of Scientific Research*, vol. 83, 2012, pp. 14-24.
- Mehdi Mafi, "The Role of Mobile and Remote Sensing Satellites in Disaster Management," *International Journal of Modern Engineering Research*, vol. 2, issue 6, 2012, pp. 4010-4013.
- Nassiri, E. (2013). The effect of domain modeling and self-control on learning a sequential scheduling assignment. A doctoral dissertation, University of Tehran.



The Influence of Challenge and non-Challenge Games on the Motor Skills development of Children

Revista Publicando, 5 No 15. (1). 2018, 283-302. ISSN 1390-9304

- Norouzi, K., Khalaji, H., Sheikh, M., and Akbari, H. (2011). The effect of a selected motor program on manipulative skills in 4-6-year-old boys. *Journal of Development and Motor Learning*, 1, 21-25.
- Pesce, C., Crova, C., Marchetti, R., Struzzolino, I., Masci, I., Vannozzi, G., & Forte, R. (2013). Searching for cognitively optimal challenge point in physical activity for children with typical and atypical motor development. *Mental Health and Physical Activity*, 6(3), 172-180 .
- Riethmuller, A. M., Jones, R. A., & Okely, A. D. (2009). Efficacy of interventions to improve motor development in young children: a systematic review. *Pediatrics*, 124(4), e782-e792.
- Rigoli, D., Piek, J. P., Kane, R., & Oosterlaan, J. (2012). Motor coordination, working memory, and academic achievement in a normative adolescent sample: Testing a mediation model. *Archives of clinical neuropsychology*, 27(7), 766-780 .
- Robinson, L. E., & Goodway, J. D. (2009). Instructional climates in preschool children who are at-risk. Part I: Object-control skill development. *Research quarterly for exercise and sport*, 80(3), 533-542.
- Shahrzad, N., Bahram, A., Shafizade, M., and Safari, M. (2009). The effect of variability of practice and age on retention and transfer of the over-arm throwing accuracy in children. *Journal of Development and Motor Learning*, 1, 115-133.
- Zahiri, M. (2015). The effect of the theoretical framework of the challenge point on some motor disorders in patients suffering from Multiple Sclerosis. An unpublished M.A. thesis, University of Tehran.
- Zareinejad, M., Kaviani, M., Esfahani, M & Masoule, F. (2014). Performance evaluation of services quality in higher education institutions using modified SERVQUAL approach with grey analytic hierarchy process (G-AHP) and multilevel grey evaluation. *Decision Science Letters* , 3(2), 143-156.