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The impact of development of the special coordination abilities on the general skill ability for table tennis juniors under 12 years old[1]

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Abstract

Indicates each of Muhamad Allawi (2002), Essam Abdul Khaliq (2003), and Walf Droge (2002) that the coordination abilities are closely related to the development of technical motor skills, and that practitioner athletic activity which determines the quality of this abilities should be developed, where the player can not master the technical skills in the special activity in case lack of special coordination abilities for this activity. Both Manfred Muster (1986), Jürgen Schmicker (2000), Wolfgang and others (2000) and Wohlgefahrt, Karlheinz (2004) refers that the special coordination abilities for table tennis include each of: 1- The motor adaptation and adjustment ability, 2- The ability to differentiate, 3- reaction speed ability, 4- orientation ability, 5- balance ability, 6- coupling ability, 7- The ability to sense the rhythm. The aim of this study is design training program to development the special coordination abilities of table tennis and identifies the impact of this program on the general skill ability for table tennis juniors under 12 years old. The researcher used the experimental method into two groups one experimental and the other control group the strength of each of them is 8 of table tennis juniors in Ismailia city in Egypt. The duration of the program is three months, three training units a week the duration of each training unit is 90 minutes. The most important results of this study was the training program led to improvement the special coordination abilities of table tennis for the experimental group, which led to high level of the general skill ability in table tennis for the experimental group more than the control group.

Key Words: table tennis, coordination abilities, general skill ability

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1. Introduction

The coordination abilities are interaction between each of the central nervous system, skeletal and muscles within a certain range of motion (Wolfgang and others 1999), this interaction has enabled the player to control his movements in an economical and safe, whether in situations where unpredictable or which can be predicted (Jürgen Weineck 2002), also helping the player on the speed of learning and mastering the motor skills of the practitioner activity and adjust and orientation his motor activity, as well as implementation of the motor duties in a coordinated and purposeful.

The importance of coordination abilities vary from one activity to another depending on the nature of practitioner activity, and the importance of coordination abilities increases whenever the motor skills of the practitioner activity are more complicated, these abilities does not appear individually but it's always connected to each other and are associated with other elements of sporting achievement such as physical abilities and skills to accomplish the motor duties of this activity (Dieter Steinhöfer 2003, Mohammad Lutfi 2006).

Table tennis Characterized by speed of performance and not expect the reaction of competitor during the game which puts the player always under pressure throughout the game, and with this required from the player to control and dominate of his movements and performance the required strokes accurately and quickly according to the situation existing tags during the match to achievement the required motor duty and scores. From here appears the importance of coordination abilities for table tennis player, where it helps him to control his movements and performance of various strokes with required speed and accuracy in different situations. It also appear the importance of coordination abilities in table tennis that it helps the player to link between foot work and various strokes as well as link the strokes with each other's seamlessly and smoothly, which helps the player on a good tactical performance during the games.

Both Manfred Muster (1986), Jürgen Schmicker (2000), Wolfgang and others (2000) and Wohlgefahrt, Karlheinz (2004) refers that the special coordination abilities for table tennis include each of: 1- The motor adaptation and adjustment ability, 2- The ability to differentiate, 3- reaction speed ability, 4- orientation ability, 5- balance ability, 6- coupling ability, 7- The ability to sense the rhythm.

In spite of the importance of coordination for table tennis players, but the researcher through his experience in the field of table tennis was found that the most Egyptians table tennis coaches especially the coaches of juniors do not pay attention to training the coordination abilities, which prompted the researcher to carry out this study in order to design a training program to development the special coordination abilities for table tennis juniors under 12 years old and to identify the extent of the impact of this program on the general skill ability for these juniors. The researcher hopes that this study serves as a new addition in the field of table tennis training.

Hypotheses:

1. There are significant statistical differences between pre-test and post-test for experimental group in the level of coordination abilities and general skill ability for the benefit of post-test.

2. There are significant statistical differences between pre-test and post-test for control group in the level of coordination abilities and general skill ability for the benefit of post-test.
3. There are significant statistical differences between the experimental group and control group in the post-test in the level of coordination abilities and general skill ability for the benefit of experimental group.
4. There are differences in the ratio of improvement in the level of special coordination abilities and the level of general skill ability of the experimental group more than the control group.

2. Methods

The researcher used the experimental method into two groups one experimental and the other control group the strength of each of them is 8, the study sample was selected intentional way from table tennis juniors under 12 years old in the city of Ismailia. The duration of the program three months in the period between 1/10/2013 to 30/12/2013, with three training units in the week the time of each training unit 90 minutes. The program was implemented on the two groups (experimental and control) with the exception of exercises of development the special coordination abilities and that were applied to the experimental group only and that was immediately after the end of the warm-up and for a period ranging between 15 to 20 minutes, while the control group were they perform the exercises of physical preparation such as (speed, agility, strength, endurance, ... etc.).

Measurements:

The coordination abilities was measured by "The Vienna Coordination Test" establish by Siegfried Warwitz 1976 (Warwitz, S. 1976, Klaus Bös 2001, Weineck, J. 2002)

Test tasks: :Perform the following stations as soon as possible and in the shortest possible time, and if there is any fault in any station must the player re-performance at this station.

Domain of the test:

Age group: From 11 to 18 years old.

Gender: Male & Female.

Target group: Schoolchildren, sporting students, young adults.

Tools of the test:

3 gymnastics mattress, Swedish bench its length 3m, medicine ball 2kg, five cones, thread, two columns, gymnastics hoop, adhesive tape, parallel.

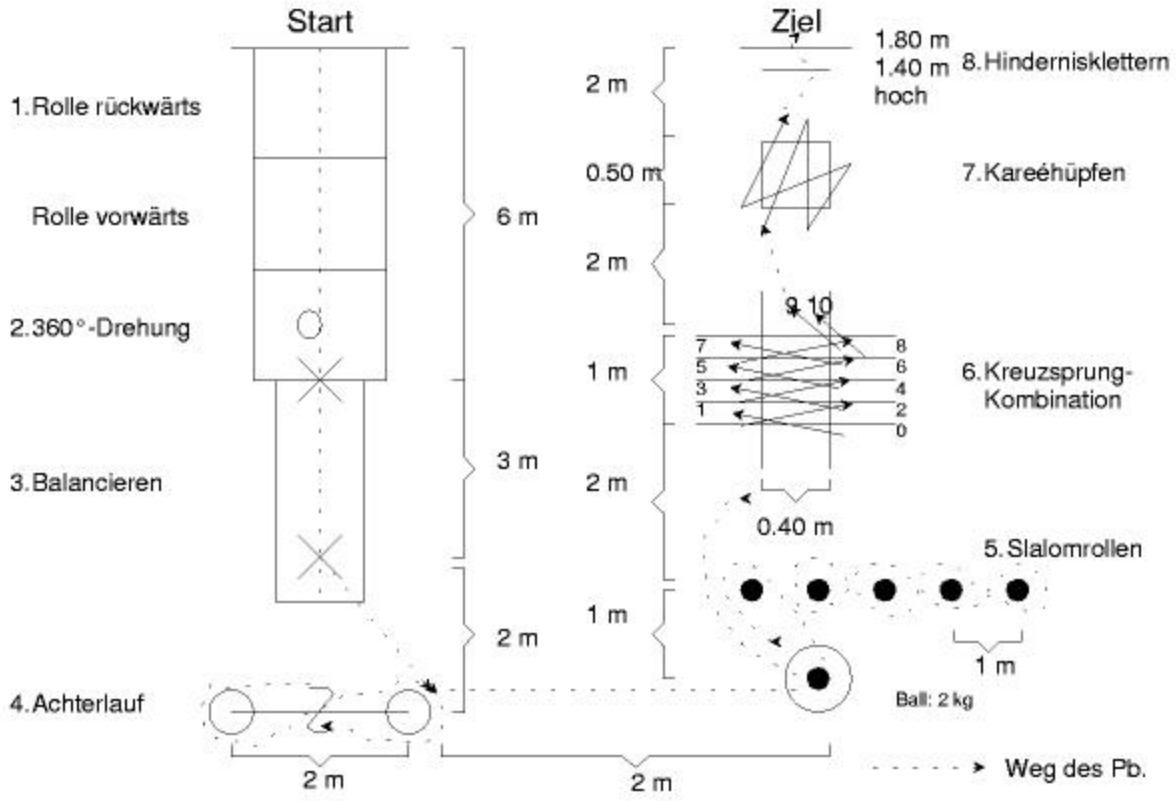

Figure 1. [Der „Wiener Koordinationsparcours‘‘(WKP) von Warwitz (1976)], “The Vienna Coordination Test” establish by Siegfried Warwitz 1976

Test description:

Station (1): Standing back faces, perform backward rolling on the ground, and then perform forward rolling (the rolling must be straight and not sideways).

Station (2): Perform a complete roll 360° around the vertical axis of the body (the minimum degree of twisting 270°).

Station (3): Running on upside down Swedish bench (3m).

Station (4): Jump over tied thread between two columns of the knee height, and then return to go down under the string. Performance in the form of No. 8.

Station (5): Taking medicine ball (2 kg) from the center of the gymnastics hoop on the ground, rolling the ball by hand on the ground between five cones the distance between each 1m, then return to re-performance in reverse direction, then put the ball in its place in the center of hoop (avoid walking over the cones or falling any of them down).

Station (6): Performance side cross jump with both feet one by one (by external foot) from the point 0 to the 9 / 10 which jump on it by both feet (avoid touch the lines during the jump).

Station (7): Jump around the square its side length 50 cm by one foot, begin the jump forward, then to the backward, then to the right, then to the left and then to the forward (avoid touching the lines during the jump).

Station (8): Go down under bar of parallel low-rise then go over the other bar high-rise.

Measurement:

The test contains two arbitrators, one watching the performance and the other calculates the time of performance. The test begins from the moment of given the signal to start and ends with the landing of the player with his both feet from the high bar of the parallel in the eighth station. Every player performs two attempts and recorded to him the result of the better attempt.

Table 1. The requirements of the minimum and maximum performance in "The Vienna Coordination Test"

Test	Points	Female Male
The Vienna Coordination Test	10	≤ 36.0 ≤30.0
(Second)	0	≥ 47.0 ≥38.0

The general skill ability in table tennis was measured by **"The General Skill Ability Test"** by **Ellen Lockhart** (Mohammed Allawi & Muhammad Radwan 1997).

The researcher divided the sample of study into two groups randomly and then the equivalence was made between each of them according to the results of pre-test in chronological age, height, weight, training age, the level of coordination abilities and the level of general skill ability in table tennis, through the application of the Mann-Whitney U test. Table 2 & 3 shows the results of the equivalence between the two groups according to the results of pre-test.

Table 2. The equivalence between the two groups of study in the variables of ages, height, weight and training age (n1 = n2 = 8)

variables	*M* rank		*U*
	G1	G2	
Age(y)	8.50	8.50	32.000
Height(cm)	8.44	8.56	31.000
Weight(kg)	8.38	8.63	31.000
Training age(y)	9.25	7.75	26.000

Through presentation of table (2) which presents the results of equivalence between the two groups of study the experimental group (G1) and the control group (G2) in the variables of age, height, weight and training age, before application the suggestion training program, show that the value of *U* which calculated by applying the Mann-Whitney *U* test has been limited between (26.000 - 32.000) and it is not significant, and this means that the two groups of study are equivalent in these variables before application the suggestion training program.

Table 3. The equivalence between the two groups of study in the variables of coordination abilities and of general skill ability in table tennis (n1 = n2 = 8)

Variables	*M* rank		*U*
	G1	G2	
Coordination abilities	9.06	7.94	27.500
General Skill ability	8.88	7.94	29.000

Through the presentation of table (3), which presents the results of pre-test in the "**The Vienna Coordination Test"** and "**The General Skill Ability Test"** before application the training program, show that the value of *U* which calculated by applying the Mann-Whitney *U* test has been limited between (27.500 - 29.000) and it is not significant, and this means that the two groups of study are equivalent in these variables before application the training program.

3. Results

Table 4. Significances differences between pre-test and post-test for experimental group in variables coordination abilities and general skill ability in table tennis

Variables	*M* rank		*z*
Coordination abilities	***post-test***	0.00	-2.714
	pre-test	4.50	
General Skill ability	***post-test***	0.00	-2.546
	pre-test	4.50	

Through the presentation of table (4) it is clear that the value of calculated (*z*) less than the value of tabulated (*z*) at 0.05, which means that the differences between the scores of members of the experimental group in pre-test and post-test in tests that measure the each of coordination abilities and general skill ability in table tennis statistically significant and in favor of the post-test.

Table 5. Significances differences between pre-test and post-test for control group in variables coordination abilities and general skill ability in table tennis

variables	*M* rank		*z*
Coordination abilities	***post-test***	0.00	-2.449
	pre-test	3.50	
General Skill ability	***post-test***	0.00	-2.549
	pre-test	4.50	

Through the presentation of table (5) it is clear that the value of calculated (*z*) less than the value of tabulated (*z*) at 0.05, which means that the differences between the scores of members of the control group in pre-test and post-test in tests that measure the each of coordination abilities and general skill ability in table tennis statistically significant and in favor of the post-test.

Table 6. Significance differences between the experimental group (G1) and the control group (G2) in post-test in the variables of coordination abilities and general skill ability in table tennis

variables	*M* rank		*U*
	G1	G2	
Coordination abilities	11.75	11.13	6.000
General Skill ability	5.25	5.88	11.000

Show from table (6) that the value of (*U*) calculated from Mann-Whitney U test less than the value of tabulated (*U*) at the level 0.05, which indicates the existence statistically differences between the experimental group and control group in post-test in favor of the experimental group in variables of coordination abilities and general skill ability in table tennis.

Table 7. Percentage rates of improvement between the experimental group (G1) and control group (G2) in the variables of coordination abilities and general skill ability in table tennis

variables	*G1*		*Improvement ratio*	*G2*		*Improvement ratio*	*The difference between the percentage of improvement*
	M			*M*			
	Pre-test	*Post-test*		Pre-test	Post-test		
Coordination abilities	2.5	5.37	114.8	2.25	3	33.33	81.47
General Skill ability	29.5	34	15.25	29.12	31	6.45	8.8

Through presentation of table (7) it became clear that the high value of the percentage of improvement in the post-test for both the experimental group (G1) and control group (G2) in both of coordination abilities and general skill ability, where posted the rate of improvement for the experimental group in the coordination abilities (114.8%) and in the general skill ability (15.25%), while posted the rate of improvement for the control group in the coordination abilities (33.33%) and in the general skill ability (6.45%). And the differences between the two groups in the rate of improvement was (81.47%) in the coordination abilities in favor of the experimental group, and in the general skill ability (8.8%) in favor of the experimental group also.

4. Discussion

After viewing the results of the study, the researcher tries to discuss and explanation those results, depending on the results of the statistical analysis of the study data and guided by the results of the related studies and the opinions of scientific specialized references. Through view tables (4) it became clear that there are significant differences between pre-test

and post-test for the experimental group in favor of the post-test in both coordination abilities and general skill ability in table tennis. The researcher is attributed this improvement of the experimental group in those variables to the effectiveness of the proposed training program by the researcher which contains the exercises to develop the special coordination abilities. Where those abilities are working together to develop the level of general coordination necessary to develop a level of achievement where confirms Dick Frank (1999) that the coordination abilities working to fixing motor tracks of skills through neural pathways and this leads to the speed of skill performance, As confirms each of Essam Abdul Khaliq (2005) and Lu, D, J (2000) that the coordination abilities is one of requirements of skill performance, and they see that the coordination abilities does not appear as an individually abilities but they are always associated with each other in order to serve in the end the installation of a motor skills in harmonic form. also the coordination abilities linked to with other athletic achievement conditions represented in the elements of physical fitness, skills, tactical and psychological, and if what has been the development of these elements in an integrated manner this led to achievement of a high level of general motor coordination required to perform different motor skills in harmonic form and characterized with accuracy and motor control. From the foregoing we find that the first hypothesis of this study has been achieved which provides for "There are significant statistical differences between pre-test and post-test for experimental group in the level of coordination abilities and general skill ability for the benefit of post-test."

Through view tables (5) it became clear that there are significant differences between pre-test and post-test for the control group in favor of the post-test in both coordination abilities and general skill ability in table tennis. The researcher is attributed this improvement of the experimental group in those variables to regularity in training as well as the use of typical traditional style adopted with respect to the total time of the program, the number of training units and the time of each training unit, in addition to the temporal distribution of the general and special physical elements, and this corresponded with what indicated by Essam Abdel Khaliq (2005) that the coordination abilities always linked to other achievement conditions such as physical abilities. The researcher attributed the improvement of control group in the general skill ability in table tennis to the impact of proposed training program which consisted of skill drills which led to a high level of technical performance, where indicated Muhammad Allawi (1998) that the change in motor behavior occurs as a result of training and practice. But the researcher believes that the control group did not benefit from the training of special coordination abilities in table tennis has been also used with the experimental group, and thus the compared between the results of the two groups in the post-test in the level of general skill ability in table tennis is the criterion which we measure the extent of benefit of the two groups from the proposed training program by the researcher. From the foregoing we find that the second hypothesis of this study has been achieved which provides for "There are significant statistical differences between pre-test and post-test for control group in the level of coordination abilities and general skill ability for the benefit of post-test."

Through view tables (6) and (7) evidenced presence statistically significant differences between the results of each of experimental group and control group in the post test in the variables of coordination abilities and general skill ability in table tennis in favor of experimental group. The researcher attributed the excellence of the members of experimental group on the members of control group in the level of coordination abilities to application the special program of coordination abilities drills on the experimental group and that have been

developed gradually from easy to difficult where it was starting to perform the simple exercises then with over time it has been applied the complex and more difficult exercises. In this regard refers Muhammad Lutfi (2006) that it can not be expanded the kinetic experiences all at once, but this is done step by step in order to take advantage of the acquired coordination abilities to implement the difficult duties, on the contrary, the control group did not use the exercises which develop the special coordination abilities, which led to the low level of coordination abilities, which reflected negatively on the general skill ability in table tennis, for that were the differences and the ratios of improvement between the two groups in the post-test in those variables in favor of the experimental group. And in this regard confirms Tudor Bompa (2000) that the coordination is a complex motor skill necessary for high performance. Strength, speed, flexibility, and endurance represent the fitness foundation of high performance, and good coordination is necessary for skill acquisition and perfection. A well-coordination child will always acquire a skill quickly and be able to perform it smoothly. Compared with a child who might perform a movement with stiffness and difficulty, a well-coordination young athlete will spend less energy for the same performance. Therefore, good coordination results in more skill effectiveness. In a related context adds all of Hara (1986) and Alsayed Abdul-Maksoud (1986) that the coordination abilities affect on the technical performance, where affect each ability particular impact in the process of construction and installation of skills performance, as there is mutual relations between the coordination abilities and acquisition of motor skills, where each level of them depends on the level of the other and therefore must build the coordination abilities and motor skills within a standardized process. And also see Julius Kasa (2003) that the possession the player for the coordination abilities contributes to the speed, acquisition and mastery of motor skills, and thus reflected this on raise the level of athletic achievement. And therefore, whenever the junior possessed a high level of coordination abilities accompany a high level of his skills performance, and consistent with this opinion both Neumann & Mellinghoff (2001) and Zak & Dude (2003). From the foregoing we find that both of the third and the fourth hypothesis of this study has been achieved which provides each of them respectively for the "There are significant statistical differences between the experimental group and control group in the post-test in the level of coordination abilities and general skill ability for the benefit of experimental group." And " There are differences in the ratio of improvement in the level of special coordination abilities and the level of general skill ability of the experimental group more than the control group."

The researcher finds that age group (under 12 years) one of important age phases which must be paid attention to development the coordination abilities, where there is a willingness on the part of the child to occur a quick response to development the coordination abilities, and so out of physiological evolution of children in that age group. Where agreed many of specialized scientific literature on the existence of a relationship between the development of coordination abilities and biological age, where confirmed all of Starosta, W. and Hirtz, P. (1989) to the importance of put the biological age in mind when starting the development of coordination abilities to the players and have agreed that the pre-puberty is the best period to develop the coordination abilities. And consistent with this opinion all of Essam Helmi (2005) and Muhammad Lutfi (2006) that it must begin to develop coordination abilities at an early age from the age of child and that evolution of the level of coordination abilities for the children at early age is one of the reasons for excellence in skills performance, where these references confirmed that during this age group occurs completion for the growth of the nervous system, thus the child can control and dominate in various kinetic performances.

5. Conclusions

In light of the objective and hypothesis and procedures of the study and based on what resulted in from the results, the researcher reached to the following conclusions:

1. The special coordination abilities for table tennis include each of (1- the motor adaptation and adjustment ability, 2- the ability to differentiate, 3- reaction speed ability, 4- orientation ability, 5- balance ability, 6- coupling ability, 7- the ability to sense the rhythm).
2. Training the special coordination abilities affects positively on the level of general skill ability for table tennis juniors under 12 years old.
3. The proposed training program by the researcher which applied to the members of the experimental group affected positively on development of the coordination abilities and general skill ability in table tennis.
4. The experimental group achieved a clear improvement in the level of coordination abilities as well as in the level of general skill ability in table tennis as a result of implementation of proposed training program by the researcher, which contains exercises to develop a special coordination abilities, where the results showed statistically significant differences between the pre-test and post-test for the experimental group in favor of the post-test.
5. The control group achieved improvement in the level of coordination abilities and the level of general skill ability in table tennis, as a result of their regularity in the training and that the program which was applied to this group is built on scientific bases, where the result showed statistically differences between the pre-test and post-test for the control group in those variables in the benefit of post-test.
6. The experimental group surpassed the control group in post-test in the level of both coordination abilities and general skill ability in table tennis as a result of the positive impact of the proposed training program by the researcher, which contains exercises to develop the special coordination abilities in table tennis, where the results showed statistically significant differences between the experimental group and control group in post-test in favor of experimental group in the level of both coordination abilities and general skill ability in table tennis.

6. Recommendations:

In light of what has been reached from the results and conclusions of this study the researcher recommends the following:

1. Concern for the development of coordination abilities in the early age stages.
2. Inclusion of exercises to develop coordination abilities within contents of training programs for the juniors because of their effective influence in the development of the level of skills performance for the juniors.
3. Utilization of the exercises that included within the proposed training program by the researcher, which specific to development of special coordination abilities for table tennis, because of their positive impact in the raising of the level of skills performance for the table tennis juniors under 12 years old.
4. The necessity of design of test battery to measure the special coordination abilities in table tennis.

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