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The impact of a physical activities program on imparting spatial concepts and visual-kinematic synergy to pre-school children

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Summary :

The research aims to develop a program using physical activities to provide spatial concepts and visual-kinematic synergy to pre-school children.

The basic research sample was randomly selected from children in the Orman Private School in Fayoum counting to 40 children aged (4-6) years, representing (37.5%) of the original complex. The sample was divided into two subsamples, one is experimental and the other is a control, each one consisted of (20) children, and the researcher used the experimental approach, with an experimental design for two samples, using pre- and post-measurements due to its suitability to the nature of the research. A survey sample of (20) male and female children from the original complex and out of the basic research samples was chosen as well.

The results of the research were that there were statistically significant differences in the post-measurements between the experimental sample and the control sample, and these differences were in favor of the experimental sample in all variables under study. The most important recommendations crystallizes in the importance of benefiting from physical activities in teaching spatial concepts and visual-kinematic synergy and how to make them a fundamental focus in teaching pre-school children.

Key words:

Physical activities, spatial concepts, visual-kinematic synergy, pre-school child.

اثر برنامج أنشطة حركية علي إكساب المفاهيم المكانية والتازر البصري الحركي لطفل ما قبل المدرسة

المستخلص:

يهدف البحث الي وضع برنامج باستخدام الانشطة الحركية لإكساب المفاهيم المكانية والتازر البصري الحركي لطفل ما قبل المدرسة

تم اختيار عينة البحث الأساسية بالطريقة العشوائية من الأطفال في مدرسة الأورمان الخاصة بالفيوم، وبلغ عددها ٤٠ طفلا من (٤ – ٦) سنوات بنسبة (٣٧.٥%) من حجم المجتمع الأصلي، وتم تقسيم العينة الي مجموعتين إحداهما ضابطة والأخرى تجريبية تتكون كل منها من (٢٠) طفل وطفلة، واستخدمت الباحثة المنهج التجريبي، ذو التصميم التجريبي للمجموعتين احداهما تجريبية والأخرى ضابطة وذلك باستخدام القياسات القبلية والبعدية وذلك لمناسبته لطبيعة البحث , وتم اختيار عينة البحث (الاستطلاعية) علي عينة قوامها (٢٠) طفل وطفلة من المجتمع الأصلي للبحث وخارج عينة البحث الأساسية. وكانت نتائج البحث توجد فروق دالة إحصائيا في القياسات البعدية بين المجموعة التجريبية والمجموعة الضابطة وهذه الفروق لصالح المجموعة التجريبية في كل المتغيرات قيد البحث ، اهم التوصيات أهمية الاستفادة من الانشطة الحركية في تدريس مهارات الحس المكاني وجعلها محور اساسي في تعليم اطفال ما قبل المدرسة.

الكلمات المفتاحية :

الانشطة الحركية ، المفاهيم المكانية , التازر البصري الحركي ، طفل ما قبل المدرسة .

The impact of a physical activities program on imparting spatial concepts and visual-kinematic synergy to pre-school children

Research Introduction:

The childhood stage is considered to be an important educational stage in the educational ladder, through which the first qualities of the child's personality are formed, and his trends and tendencies are determined, also the initial foundations of the concepts that evolve with the development of his life are formed as well, therefor early childhood is the optimal age to learn and acquire various skills and concepts, it is defined as a period of identification,

exploration and experimentation in which the child enjoys repeating any new action in which he can master and succeed, Therefore, those around the child have to train him to acquire sensory, physical, social and Discriminative skills to help him rely on himself in the future, enabling him to benefit from his own abilities and to make the best use of his self-energies and this is can be achieved only by enriching the environment with various stimuli that develop his senses and invest his various abilities.(13: 147)

Movement is considered to be one of the main motives for the growth of the child, as a child learns through movement. Since physical activities are one of the favorite activities of the pre-school child, as it satisfies his love for the movement that characterizes the child at that stage 3: 26, Shinke Liano and Linda have confirmed that physical activities can play an important role in inducing the child to learn. (18: 15)

Several educational scholars have stressed the importance of movement as they stressed that physical activities should be subjective, and the importance of activities in the development of various concepts and skills as well.(12: 109)

Spatial concepts relate to the space in which things/people are /move through, and these concepts are concerned with the space in which things or people are, such as running towards the teacher, standing in front of the chair, putting things on the table, and placing the basket behind the door,…etc
Children always tell about spatial concepts through their own physical movement, activities and natural closeness to others .Their education during childhood is largely based on their physical activities.(3: 149)

Through the growth of a child and the discovery of what around, things begin to become clear in front of him, forms aren't always fixed in child's eyes, but always seems different .a box form changes if opened, a child's ability to realize the closed form is a prerequisite for his perception of inside and outside concepts of a object or thing as a closed form has two spaces (inside and outside) separated by the boundaries of the object.(11: 40)

Piaget believes that the child acquires images of places and spatial relationships using his activities through the stages of his age development, first, initial concepts consists of sensory perceptions , he sees a relationship

between the effort of recognizing spatial forms and the child's ability to form a mental image of them, then sensory activities consists through explorations and be unorganized and inaccurate, for this Piaget believes that the child's spatial perceptions are topological perceptions as the actions done on things and the child's ability to build and move things in different positions are what develop more advanced and coherent spatial and geometric relationships.
(20: 102)

So a child can be taught the skills of spatial concepts by providing physical activities in the physical education class, these activities include some commands or exercises like: make a child raise his left hand, or put his right hand on his head, or puts the ball inside the net or stand behind each other.(5: 89)

The Visual-Kinematic Synergy is considered to be the ability of an individual to integrate between vision and movement of the body or some of its parts, also can be defined as the ability of synchronization between visual information and movements of body parts, and this skill is necessary in the physical education Class as it means the extent of compatibility between the eye and the hand, that is, the ability to perform activities that require the integration of visual and kinetic skills with one goal.

The visual- Kinematic synergy is an activity characterized by a kind of consistency controlled by different parts and senses of the body, especially the sense of sight, and the visual- Kinematic synergy is of two types, a type related to the visual- Kinematic synergy in which a child uses his favorite hand or leg, and the second type of bilateral visual Kinematic synergy, in which a child uses both legs or hands together or alternatively when performing a physical performance.(4: 111)

The researcher believes that the visual-kinetic synergy is the child's ability to imitate and perform physical activities and movements that require the integration of visual skills and movement skills for one goal appropriately for his chronological age.

And the pre-school teacher design for appropriate ways based on the diversification of activities and clarification of relationships between things or

linked them to their verbal meaning and various fields facilitate the process of understanding concept of place and dimensions for a child.

Research problem:

Since the researcher works as a physical education teacher for children, she noticed the lack of direct and quick response of children to the commands and formations of the lesson, and a lack of surrounding awareness as well. and this falls under the condition of their lack of spatial concepts, which is never abandoned in the physical education class, as the researcher assigned children some activities that require the use of fine muscles such as connecting two points in a straight line and shooting towards distant goals using the foot to perform some sports and their response represented a lack of visual-Kinematic synergy.

The main research problem lies in the lack of studies and research associated with those skills in kinetic education for pre-school children in the field of physical education and kindergarten, it must be focused on, as the definitions are considered to be necessary for the child to employ them in the interpretation and understanding of the world around him, spatial concepts must be provided for pre-school children in an interesting and loving way that meets his kinetic needs and commensurate with his age characteristics, abilities and possibilities without being bound by the prevailing stereotypical methods, And the use of physical activities that embody and simplify those concepts that help them apply it in their practical lives and appear in their behaviors and still in their mind for the rest of life.

Hence, the use of physical activities may help to form spatial concepts for children and develop their visual- Kinematic synergy through the conduct of the concept and acquire it practically and effectively.

Hence, the problem of the current study crystallized in the following question:

What is the impact of using physical activities to acquire spatial concepts and visual-kinematic synergy to a pre-school child?

Search goal:

The research aims to design a physical activity program to acquire spatial concepts and visual-kinematic synergy for pre-school children.

Research hypotheses:

• There are statistically significant differences between the control and experimental samples in pre- and post-measurements in favor of the post-measurements.

• There are statistically significant differences between the control sample and the experimental sample in the post-measurements of spatial concepts and visual-kinematic synergy.

Research terms:

- Physical activities

An important activity practiced by a child, which contributes to the formation of his personality and personal characteristics in all aspects. It is an important educational mediator that works on his education and development, also satisfies his needs, and is a basic preface to the child's development in the mental, physical, social, moral, and linguistic aspects. This is due to the fact that physical activities provide a fertile environment that helps in the child's growth and stimulates His motivation, and encourages him to actively interact with the educational subjects.(9: 226)

Spatial concepts

It is an intuitive feeling of the surrounding environment and what it contains. It expresses the relationships of things to each other in the space surrounding the child through the understanding of a relationship and its inverse relationship, such as "above - below", "up - down", "left - right", "previous - next". (10: 40)

Visual-kinematic synergy

The individual's ability to combine vision with movements of the body or some of its parts, also can be defined as the ability of synchronization between visual information and movements of body parts. This skill is necessary for all academic fields and even in different life situations.(1: 270)

Research procedures:

Research Methodology:

The researcher used the experimental methodology by designing two samples, one is experimental and the other is a control, following the pre- and post-measurement for both samples.

Research complex and sample:

The research complex includes all pre-school children in Orman School affiliated with the East Fayoum Administration in Fayoum Governorate for the academic year 2022/2023 AD, counting to 160 children. The basic research sample was chosen in a random intentional way, and it counts 40 male and female children, at a rate of (37,5%) of the original complex, the sample was divided into two subsamples, one is experimental and the other is a control, each one consisted of (20) children. Scientific procedures for the research tools were also conducted on a survey sample of (20) male and female children from the original complex and out of the basic research sample.

Table (1)
Characterization of the research complex and samples.
Numerical description of the research samples of children
n = 60

notes	Percentage	N	Sample	
Basic sample =66.5%	33.3%	20	Experimental sample	1
	33.3%	20	Control sample	2
	33.3%	20	Survey sample	3
	100%	60	Total	

Table (1) shows the numerical description of the basic research sample, which consists of (40) male and female children, including (20) children as an experimental sample, and (20) children as a control sample.
This is in addition to the survey research sample consisting of (20) children, with total sample size of (60) children.

Homogeneity of the research sample and variables adjusting:

To ensure that the research falls under the moderate curve, the researcher conducted homogeneity among the research samples in some selected variables (height, weight, age, IQ), which could affect the results of the study.

Table (2)
Arithmetic mean, standard deviation, and torsion coefficient of descriptive variables (for sample homogeneity)

n=60

torsion coefficient	standard deviation	Arithmetic mean	Unit of measurement	Variables
0,428	0,50715	5,2150	year	Age
0,520	2,90490	19,8500	cm	Length
-0,30	4,08240	116,7250	kg	Weight
0,012	4,46460	32,6250	marks	IQ

Table (2) shows the arithmetic mean, standard deviation, and torsion coefficient of sample homogeneity and IQ for the research samples (experimental and control). The value of the torsion coefficients ranged between (-0.30, + 0.520), that is, it was limited to (± 3, - 3), which indicates the Moderation of the complex.

Table (3)
The arithmetic mean, standard deviation, and torsion coefficient of the variables under study in the pre-measurement

n=20

torsion coefficient	**standard deviation**	**Arithmetic mean**	**Unit of measurement**	**variables**
-0,545	**1,46213**	**5,6250**	**marks**	**Spatial concepts**
0,251	**1,25678**	**3,6000**	**marks**	**Visual-kinematic synergy**

Table (3) shows the arithmetic mean, standard deviation, and torsion coefficient of the variables of total research sample members, as these values were limited to (± 3, - 3) in the pre-measurement under study, which indicates the Moderation of the complex.

Table (4)
The arithmetic mean, standard deviation, and torsion coefficient of the descriptive variables of each sample

n=20

torsion coefficient	standard deviation	arithmetic mean	Unit of measurement	**variables**	**samples**
0,462	**0,4984**	**5,2000**	Year	age	**Experimental sample n=20**
0.300	**2,9924**	**20,9250**	Kg	weight	
0,178	**3,8289**	**116,8500**	Cm	length	
-0,147	**4,4777**	**32,9500**	Marks	IQ	
0,422	**0,5282**	**5,2300**	Year	age	**Control sample N=20**
0,605	**2,4359**	**18,7750**	Kg	weight	
-0,606	**4,4177**	**116,6000**	Cm	length	
0,172	**4,5434**	**32,300**	Marks	IQ	

Table (4) shows that the arithmetic mean values of the sample converged in measuring the descriptive variables.

Table (5)
The arithmetic mean, standard deviation, and torsion coefficient of the variables in the pre-measurement of each sample

n=20

torsion coefficient	standard deviation	arithmetic mean	**Spatial sense skills**	**samples**
-0,404	1,2763	5,9500	Spatial concepts	**experimental**
0,062	1,2183	3,7000	Visual-kinematic synergy	
0,462	1,5928	5,3000	Spatial concepts	**control**
0,460	1,3179	3,5000	Visual-kinematic synergy	

Table (5) shows that the arithmetic mean values of the sample's responses to the variables under study varied in the pre-measurement.

Equivalence of the experimental and control research samples

The researcher conducted equivalence for the experimental and control samples in the growth variables (height, age, and weight), IQ, and the variables of spatial concepts and visual-kinematic synergy under study.

Table (6)
The significance of the differences between the experimental and control samples in the descriptive variables under study: "Equivalence of the two samples"

n=20

significance	T	σ	x̄	samples	variables
0,854	**0,185**	**0,4984**	**5,2000**	Experimental	**age**
		0,5283	**5,2300**	Control	
0,117	**1,49**	**2,9924**	**20,9250**	Experimental	**weight**
		2,4359	**18,7750**	Control	
0,940	**0,191**	**3,8289**	**116,8500**	Experimental	**length**
		4,4177	**116,6000**	Control	
0,651	**0,191**	**4,4777**	**32,9500**	Experimental	**IQ**
		4,5434	**32,3000**	Control	

***Significance is smaller than 0.05**

Table (6) shows that there are no statistically significant differences, at a significant level of 0.05, between the experimental and control samples in the descriptive variables, which indicates the extent of equivalence between them before implementing the program.

Table (7)
The significance of the differences between the two samples in the variables under study in the pre-measurement
"Equivalence of the two samples"

n=40

significance	T	Σ	x̄	samples	variables
0,163	**1,42**	**1,2763**	**5,9500**	Experimental	Spatial concepts
		1,5928	**5,3000**	Control	
0,621	**0,498**	**1,2183**	**3,7000**	Experimental	Visual-kinematic synergy
		1,3179	**3,5000**	Control	

***Significance is smaller than 0.05**

Table (7) shows that there are no statistically significant differences, at a significant level of .05, between the experimental and control samples in the pre-measurement of the variables under study, which indicates the extent of equivalence between them before implementing the program.

Data collection methods and tools:

The researcher used several methods to acquire data, including:

1- Weight measurement: It was determined in kilograms using a calibrated medical scale.

2- Length measurement: It was determined in centimeters using a restameter.

3- Measuring chronological age: It was determined by years and obtained from school records.

4- Intelligence quotient: using the Illustrated Intelligence Test by Ahmed Zaki Saleh.

5- Illustrated scale of spatial sense skills for pre-school children, "prepared by the researcher."

A- The measurement objective:

The measurement objective is determined based on the main research objective, by identifying spatial concepts and visual-kinematic synergy for preschool children.

Practical objectives of spatial concepts

1. To become familiar with the concepts of front and back.
2. To distinguish between the concepts of front and back.
3. To compare the concepts of front and back.
4. To recognize the concepts of above and below.
5. To distinguish between the concepts of above and below.
6. To compare the concepts of above and below.
7. To become familiar with the concepts of right and left.
8. To distinguish between the concepts of right and left.
9. To compare the concepts of right and left.

Practical objectives of visual-kinematic synergy

1. To follow the colored shapes.
2. To follow the shape and connect the lines between its parts.
3. To connect the lines between the passages in the presence of auxiliary lines (straight - curved - acute).

4. To connect the lines between the corridors in the absence of auxiliary lines.
5. To connect shapes according to the models provided.

B- Evaluation preparing steps:

1- The researcher identified the most important concepts to measure spatial concepts and visual-kinematic synergy by reviewing previous research and studies (19), (16) (14), (17), (8).

2- The researcher took into account the special controls for preparing the statements, which are that they be consistent with the mental and intellectual development of the children in the sample, that they should be clear and not complex, and that they be consistent with the concepts they express.

3- The proposed evaluation was presented to the experts specialized in the field of curricula and methods of teaching physical education and the field of kindergarten, amounting to (12) experts, to verify the suitability of these topics for this age stage.

Instructions of the spatial concepts and visual-kinematic synergy illustrated evaluation:

1-to be applied individually to each child.

2- Taking into account the child's health and psychological condition before application.

3- Creating an atmosphere of joy and familiarity between the researcher and the child before beginning the evaluation, and encouraging him to answer without interfering in his answer to the evaluation items.

4- Giving children sufficient time to answer the questions according to the time specified for the evaluation.

Correction key of the spatial concepts and visual-kinematic synergy illustrated evaluation:

- Score (1) in case of a correct answer.
- Score (zero) in case of a wrong answer or no answer.

Application of the spatial concepts and visual-kinematic synergy illustrated evaluation:

The evaluation is applied individually, as the researcher reads each item of the evaluation carefully to the child and gives the child an opportunity to answer.

Correction method of the spatial concepts and visual-kinematic synergy illustrated evaluation:

The total score for the evaluation is (2) points distributed over five topological concepts.

The child gets a score of one if he gives a correct answer, and a score of zero if he gives an incorrect answer.

Survey study:

The survey study was applied to a sample of (20) girls, representing the research complex, and out of the original research sample, in the period from Sunday 2/12/2023 AD to Thursday 2/16/2023 AD, for the purpose of investigating the scientific coefficients of the evaluation (honesty and persistence).

The appropriateness of applying the physical activities program units parts was confirmed, and the time specified for each part of the program units as well, the appropriateness of the exercises and physical activities of the program were confirmed also, the identification of security and safety factors during the application of the program units, and the identification of the difficulties that may face the application of the program units. The results of these observations resulted in: the validity and reliability of the illustrated evaluation and its validity as a consistent means of measuring spatial concepts and visual-kinematic synergy for sample members.

Calculation of scientific coefficients for the illustrated evaluation

First: Calculation of the difficulty and Discrimination coefficients:

Table (8)
Difficulty and Discrimination coefficients of illustrated evaluation axes of spatial concepts and visual-kinematic synergy

n=20

visual-kinematic synergy		spatial concepts		
DI	DR	DI	DR	
0,69	0,48	0,85	0,45	1
0,91	0,50	0,68	0,35	2
0,72	0,66	0,90	0,47	3
0,95	0,37	0,74	0,51	4
0,67	0,49	0,81	0,60	5
*0,42	*0,11	0,86	0,49	6

*0,82	*0,19	0,67	0,56	7
0,90	0,57	0,76	0,67	8
0,67	0,38	0,94	0,59	9
0,57	0,60	*0,50	0,20	10
		0,67	0,43	11
		0,77	0,52	12
		0,80	0,58	13

DR: Difficulty coefficient (accepts a coefficient ranging between (0.23 - 0.67))

DI: Discrimination coefficient (accepts the coefficient that achieves (0.67 or more))

***: indicates rejected statements**

It is evident from Table (8) that:

All statements of the spatial concepts and visual-kinematic synergy evaluation were accepted, except for (3) unacceptable statements with the difficulty and discrimination factors.

Table (9)

The correlation between the score of each statement and the axis to which it belongs

n=20

visual-kinematic synergy	spatial concepts
*0,604	*0,600
*0,723	*0,542
*0,493	*0,452
*0,578	*0,722
*0,516	*0,623
*0,597	*0,492
*0,453	*0,568
*0,649	*0,483
	*0,488
	*0,840
	*0,720
	*0,569

Tabular "R" value = (0.444)

It is clear from Table (9) that: -

There is a statistically significant correlation between the score of each statement and the axis to which it relates.

Table (10)
Cronbach's alpha values to calculate the stability of the axes of the illustrated evaluation

n=20

Total alpha	Alpha	axes	م
0,873	0,708	spatial concepts	١
	0,575	visual-kinematic synergy	2

It is clear from Table (10) that:

Cronbach's alpha values for the axes of the illustrated evaluation are all acceptable, which indicates the validity of the evaluation for application.
The results revealed the validity, reliability of the test as a consistent means of measuring the level of spatial concepts and visual-kinematic synergy for the sample members. They also demonstrated the suitability of the proposed program for the sample members.

Suggested physical activity program:
Program developing Steps:-

Before developing the program, it was necessary to define the objective of the program and the principles that must be followed when developing the program, which are:

Fundamentals of developing the program:
1- The program is appropriate for the developmental characteristics of the age stage of the children under study.
2- The content of the program must be consistent with the time specified for it and its objective.
3- The program must follow a positive consolidation method with children for performing desirable behavior.
4- Taking into account the individual differences among children.
5- The physical activities should be exciting and interesting.
6- Availability of security and safety personnel.

The overall objective of the program

The program aims to develop spatial sense skills for pre-school children

Program design steps:

The researcher reviewed a group of scientific references, studies, and previous research related to children in the pre-school stage, and she prepared a form to survey the opinions of the experts in the field of methods of teaching physical education and the field of kindergarten, in order to learn about the content of the program, the total time of the program, the number of units, and the total time of the unit. The number of times per week to practice, and the time to implement the main part of the unit.

The program was conducted for pre-school children by identifying and selecting physical activities aimed at providing children with spatial concepts and visual-kinetic synergy (expert opinion survey form).

Program time frame:

The time frame of the program, the number of units, the number of lessons in each unit, the time for each part of the lesson, and the number of application times per week were determined by the experts.

The duration of the program is two months, the number of units is (8), each unit includes 3 lessons, the number of lessons is 24 lessons, and the total time of the lesson is (35) minutes. The number of application times is three times a week.

Statistical processing:

The researcher used the following appropriate statistical processors to achieve the objectives of the study:

- Descriptive statistics.
- Coefficient of ease and discrimination.
- The significance of the differences (T).
- Improvement rate.

The results:-

Table (11)

The significance of the differences between the pre-measurement and the post-measurement among the experimental samples in the variables under study

n=20

significance	t	the post-measurement		pre-measurement		Spatial sense variables	م
		ع	م	ع	م		
0,00	***13,55**	**0,88**	**11,05**	**1,28**	**5,95**	**spatial concepts**	**1**
0,00	***12,11**	**0,92**	**7,00**	**1,21**	**3,07**	**visual-kinematic synergy**	**2**

*The significance is less than 0.05

It is clear from Table "11" that there are statistically significant differences at a significant level of .05 between the pre-measurements and the post-measurements for the members of the experimental research sample in the variables under study, and these differences are in favor of the post-measurements.

Table (12)

The significance of the differences between the pre-measurement and the post-measurement among the control sample in the variables under study

n=20

significance	t	the post-measurement		pre-measurement		variables	م
		ع	م	ع	م		
0,00	*6,33	1,39	6,50	1,59	5,30	**spatial concepts**	١
0,00	*4,66	0,80	4,30	1,31	3,50	**visual-kinematic synergy**	٣

*The significance is less than 0.05

It is clear from Table "12" that there are statistically significant differences at a significant level of .05 between the pre-measurements and the post-measurements of the members of the control research sample in the variables under study, and these differences are in favor of the post-measurements.

Table (13)
The significance of the differences between the post-measurements of the experimental and control samples in the variables under study
n1 = n2 = 20

significance	T value	control n=20		Experimental n=20		variables	م
		ع	م	ع	م		
0,00	*12,30	1,39	6,50	0,88	11,05	**spatial concepts**	١
0,00	*8,91	0,80	4,30	0,91	7,00	**visual-kinematic synergy**	2

*The significance is less than 0.05

It is clear from Table "13" that there are statistically significant differences at a significant level of .05 between the two post-measurements of the experimental sample and the control sample in the variables under study. These differences are in favor of the post-measurement of the experimental sample, and this is due to the effect of the suggested program.

Results Discussion:

It is clear from Table (11) regarding the significance of the differences between the pre-measurement and the post-measurement among the experimental sample in the variables of spatial concepts and visual-kinematic synergy (under study), that the calculated (t) value is significant in all skills, as the calculated (t) value was greater than the tabular (T) value in these skills. This is consistent with the study of Sahar Muhammad Abdel Hamid (2015 AD) (14), Zakaria Jaber (2011 AD) (19), Marwa Hilal Bakr (2004 AD) (8), and Samia Judah (2010 AD) (16).

It is clear from Table (12) regarding the significance of the differences between the pre-measurement and the post-measurement among the control sample in the variables of spatial concepts and visual-kinematic synergy (under research) that the calculated (t) test value is significant in all skills, as the calculated (t) value was in these skills greater than tabular (T) value.

In light of the above, the researcher believes that the application of the traditional training program by the children of the control sample has had a positive impact on the development of spatial concepts and visual-kinematic synergy levels (under research), and that the proposed physical activities program has led to the improvement and development of spatial concepts and

visual-kinematic synergy (under research) for The children of the experimental sample to a greater extent than the traditional program.

Through presenting, discussing, and interpreting the results of the first hypothesis, it becomes clear that it has been achieved procedurally.

It is clear from Table (13) that there are statistically significant differences at a significant level of 05. And between the two post-measurements for both the experimental sample and the control sample in the variables of spatial concepts and visual-kinematic synergy under study, the value of the calculated "t" test is significant in all skills, as it was in the Spatial concepts skills (12.30*), and visual-kinematic synergy (8.91*).

The researcher attributes the results she reached to the experimental group's regularity in implementing the proposed physical activities program because of its positive impact on pre-school children in acquiring spatial concepts and visual-kinematic synergy.

Therefore, the researcher attributes this result to the fact that the physical activities program has led to the development of spatial concepts and visual-kinematic synergy for pre-school children, and this is consistent with what was shown by the results of the study of Samar Abdel Aziz Muhammad (2011 AD) (15), Shaima Maghawri (2019 AD).) (17),. Which indicated the need for children to acquire concepts related to spatial awareness.

Many studies have indicated the necessity of teaching spatial concepts and visual-kinematic synergy, as El-Sherbiny's study (2018) recommended the necessity of diversifying the activities provided to pre-school children to equip them with spatial concepts.

In light of the above, the researcher believes that the proposed physical activities program has a clear positive effect in developing, improving, and developing spatial concepts and visual-kinematic synergy (under research) among the children of the experimental sample to a greater extent than the traditional program

Through presenting, discussing and interpreting the results of the second hypothesis, it becomes clear that it has been achieved procedurally.

Conclusions and recommendations

First, the research conclusions:

Based on what the research results showed and in light of the research objectives and within the limits of the research sample, the methodology used, and the data acquisition tools, the researcher reached the following conclusions:

1- The proposed physical activities program has a positive effect on the acquisition and development of spatial concepts, visual-kinematic synergy. for pre-school children aged (4-6) years.

2- The proposed physical activity program performed in developing spatial concepts and visual-kinematic synergy among the children of the experimental sample compared to the traditional training program for the control sample.

3- There are statistically significant differences in the post-measurements between the experimental sample and the control sample, and these differences are in favor of the experimental group in all variables under study.

Secondly, the recommendations:

In light of the results of the study, the researcher presents a number of recommendations that can contribute to applying the use of physical activities in developing spatial concepts and visual- kinematic synergy for pre-school **children, which are as follows: -**

1- The importance of benefiting from physical activities in teaching spatial concepts and visual-kinematic synergy and how to make them a fundamental focus in teaching pre-school children.

2- Proceed more research and studies on the effectiveness of physical activity programs on developing spatial concepts and visual-kinematic synergy in other academic stages.

3- Holding training programs and courses for physical education teachers to familiarize them with how to prompt children in various physical activities by training them on how to plan learning and attitudinal goals - identifying sports and activities appropriate to the concepts - how to choose tools - how to evaluate children's performance.

4- Increasing parents' awareness of the importance of physical programs for the child's health and safety by holding seminars to learn about the best ways

to develop the child's abilities in terms of mental, educational and psychological aspects through physical activities.

5- Diversity in activities that present concepts and skills to children so that they fulfil children's interests, inclinations and abilities and are of a creative and innovative nature and provide different tools with exciting colors that are consistent with the characteristics of this age stage and away from traditional methods.

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