

## The effect of small games in learning geometric shapes, mathematical numbers, and developing some motor skills among kindergarten children

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**Abstract:** Childhood is considered one of the most important life stages that a person goes through from birth to adulthood, as it is the main pillar for the proper and integrated construction of the child at all skill levels, physical, mental, cognitive, psychological and emotional, as it affects his behavior and personality in all its dimensions, but the interest in developing physical and motor capabilities of Children have become one of the things that modern science pays attention to through the close relationship between them and human development. Therefore, this concern requires an integrated preparation from early childhood until reaching the highest levels and in all mental, psychological, skill, emotional and physical aspects. Thus, the importance of research lies in the use of small games in order to develop basic motor skills and mental and mental capabilities for children aged (5-6) years, where the child can perform movements according to his potential and abilities through freedom of movement and far from the matter in motor performance, which will contribute in the future to increase Develop those capabilities. The study aimed to identify the effect of using small games on developing basic skills and acquiring some mathematical concepts for kindergarten children (5-6). The study sample consisted of (40) children divided into two equal control and experimental groups, they were chosen randomly, where the experimental group underwent a training program for a period of (18) weeks with two training units per week for a period of (45) minutes per unit, and the researchers used the experimental approach by the method of measurement Pre and post for two experimental and control groups due to its suitability for the nature of the study. Pre and post measurements were performed using specially designed tests. The results showed an improvement and a positive effect of the training program in small games on developing basic skills and acquiring some mathematical concepts through the difference between the pre and post measurements of the sample members. In addition to the presence of statistically significant differences between the experimental and control groups in favor of the experimental group.

**Keywords:** Geometric shapes, mathematical numbers and motor skills.

### 1. Introduction

The scientific progress that the world is witnessing at the present time is one of the main reasons for the advancement of human life in its various fields, including the educational and sports fields. However, this progress does not occur except through selecting the best programs and capabilities and applying them with the continuity of programmed scientific planning that seeks to achieve Human goals and then reach this progress.

Childhood is one of the most important life stages that a person goes through from birth until adulthood, as it is the main pillar for a sound and integrated construction of the child at all skill levels, physical, cognitive, psychological and emotional, and it also affects his behavior and personality in all its dimensions. Children have become one of the things that modern science pays attention to through the close relationship between them and human development, so this concern requires an integrated preparation from early childhood until reaching the highest levels and in all mental, psychological, skill, emotional and physical aspects. The educational ideas and theories brought forth by (Rudolf Laban), (Plato) and (Paget) are the best evidence of the importance of physical and motor abilities and their relationship to the motor performance of the human being and their role in developing the motor, emotional and cognitive level of the child.<sup>1</sup>

And since play is one of the areas that help in building the child's personality, by providing him with opportunities to express himself, his abilities and creativity, and it is also a field rich in activities that satisfy the child's urgent need for movement, contemplation, thinking and creativity, which he acquires through his physical, movement, psychological and physiological fitness. Play provides the child with experiences and information automatically, in addition to that physical and kinetic education is a type of general education that seeks to achieve integrated and balanced growth (socially, mentally, psychologically, and physically) through movement activity by using the method of small games, which is one of the methods Kinetic education is used to teach motor activities

from the age of six and above. They are games that are easy to perform and are accompanied by joy, pleasure and honest competition between children.<sup>2</sup>

There are other factors of great importance in the development of physical and movement capabilities such as experience, practice, learning and motivation, especially in childhood, and that the multiplicity of situations and experiences of the child achieves the appropriate achievements of the movement through the early stages of life, which are considered the basis for Motor learning serves in the following stages of the child's life, especially when learning multiple motor activities. The small games are clearly rich in areas of motor learning, and their practice requires learning a lot of the original and derivative situations, as they work to give the individual a lot of neuromuscular compatibility and the ability to comprehend motor and develop the qualities of agility, speed and flexibility (). And that the learning process in most kindergartens, especially learning mathematics, is in an abstract way without representation or participation of all children, or the embodiment of these concepts through some games that give the lesson a kind of excitement and excitement, and thus learning becomes more acceptable while ensuring the active participation of all children. Here came the importance of research by using the method of small games with children to develop the mental and intellectual ability, and thus linking with the development of the physical and kinetic qualities that the child needs at this age with elementary concepts to learn some concepts in mathematics and its symbols.<sup>3</sup>

From this standpoint, the two researchers resorted to using the content of the learning method in small games by preparing games and movement exercises that are included in the main section of the kinetic education lesson for kindergartens that contribute to creating a learning situation through which the child can develop his mental ability and some basic physical classes as well as acquire concepts Elementary mathematics in an easy and fun way that suits the characteristics of this age group and thus increases his mental, kinetic and scientific experiences.

## **2. Research objectives**

1. Designing a learning style in small games to develop mental aptitude and some basic motor skills and acquire basic concepts in mathematics for kindergarten children 5-6 years old.
2. Recognizing the effect of learning style in small games to develop mental ability and some basic motor skills and acquire elementary concepts in mathematics in kindergarten children aged 5-6 years.

## **3. Research hypotheses**

1. There is a positive effect of learning style in small games to develop mental capacity and acquire elementary concepts in mathematics among kindergarten children 5-6 years old.
2. There is a positive effect of learning style in small games to develop some basic motor skills and acquire elementary concepts in mathematics for kindergarten children 5-6 years old.

## **4. Research field**

- The human field: Children of Riyadh (Al-Sanabel Kindergarten) in Al-Hashimiyah District - Babil Governorate, male and female, for the 2018-2019 school year.
- Time range: for the period from 1/10/2018 to 1/15/2019
- Spatial field: The courtyard and hall of Rawdat Al-Sanabel in Al-Hashimiyah district.

## **Search procedures**

The researchers used the experimental approach to design equivalent groups, which is a system for testing or comparing between two or more groups for its suitability with the nature of the research problem to be solved .<sup>4</sup>

## **The research sample**

The sample is a necessity of scientific research, so it must be chosen by choice representing the original community, their number is (48), as a random sample consisting of (20) children representing the experimental group was chosen, while the control group was (20) children, and Table (1) shows the homogeneity of the sample In the age, height and weight variables, Table (2) shows the equivalence in the research variables.

## **5. Sample homogeneity and equivalence**

### **Homogeneity of the research sample**

The two researchers resorted to verifying the homogeneity of the research sample in the extraneous variables related to morphological measurements (height, weight) and intelligence, and Table (1) shows that.

**Table 1.** Shows the variables (height and weight) and coefficient of skewness

Variables	Units	Mean	SD	Median	Skewness
Length	Cm	112.6	2.85	111.8	0.84
weight	Kg	20.50	2.65	19.70	0.90
Intelligence	Degree	22.40	2.64	22.73	0.36

Table (2) shows that the values of the torsion coefficient are confined to (1), which indicates the homogeneity of the individuals of the research sample in these variables, meaning the moderation of their normal distribution.

### Equivalence procedures for the two research groups

One of the important things that researchers should follow is to return the differences to the experimental variable, and on this basis, the control and experimental groups must be equivalent in the research variables, so the researchers follow the following procedures:

- Determining the relevant variables and working to control them as much as possible, namely (basic motor skills and mathematics), and the researchers used statistical means, the mean, standard deviation, and (t-test) for independent samples between the control and experimental groups for the purpose of parity between the control and experimental groups, and as shown in the table (2).

**Table 2.** Shows the mean, standard deviations, the calculated and tabular value (t), and the significant significance of the children of the control and experimental groups for the pre-test

Tests	Units	Experimental group		Control group		(t) calculated	Statistical significance
		Mean	SD	Mean	SD		
Run	Sec.	3.6	0.33	3.70	0.41	0.42	No sig.
Jump	Cm	3.7	0.41	3.8	0.23	1.3	No sig.
Throwing	Meter	3.4	0.35	3.32	0.41	1.02	No sig.
Maths	Degree	36.17	7.56	36.17	8.26	0.12	No sig.

\*The tabulated has a degree of freedom of 38 and a significance level of 0.05 of 2.03.

From Table (2) it was found that there are no significant differences in the pre-tests for these variables and for the control and experimental groups, since all the calculated (t) values are smaller than their tabular value at the degree of freedom (38) and the level of significance 0.05, which is (2.03), which means that the two research groups are equivalent Control and experimental in those variables.

### Means, devices and tools used in the research

1. Arabic references and sources.
2. The Internet (International Information Network).
3. Motor skills tests.
4. Letters, dissertations and research
5. Choose the clubs
6. Auxiliary work team.
7. Medical scale to measure body weight.
8. Electronic calculator.
9. Two (2) electronic stopwatch.
10. A tape measure to measure lengths and distances.
11. (5) tennis balls.
12. (2) ropes and mattresses.

### Field research procedures

#### Mathematics vocabulary and tests

Mathematics vocabulary was determined from the Numerical Experience Curriculum for the pre-school stage (children aged 5-6 years) according to the vocabulary of the comprehensive interactive integrated experience unit

curriculum for kindergarten teachers and applied in all kindergartens in Iraq and these vocabulary included according to the curriculum followed for the first semester as follows :<sup>5</sup>

1. The concept of numbers from 1-10.
2. The concept of geometric shapes (triangle, square, circle, rectangle).

As for the mathematics tests (numerical experience), they are as follows:

#### **The first test / the concept of counting test**

- The aim of the test: to measure the child's ability to:
- Count out loud for numbers 1-10.
- Mental counting (the numerical correspondence between each element and the number indicating it in the numerical chain).

- The tools used: a group of (10) cubes.

- Test procedure instructions:

1. The child is asked to count aloud to numbers (1-10).

2. A group of cubes numbered (1-10) is placed in front of the child and he is asked to do the following in order.

- Scoring: The child is awarded (10 marks) for each correct answer and zero if he answered incorrectly, (the total number of scores is 20 degrees), (the total time of the test is 50 seconds).

#### **Second Test / Geometric Shapes Test<sup>6</sup>**

- Objective of the test: This test aims to measure the child's ability to distinguish between geometric shapes (circle, square, rectangle, triangle).

- Tools used: geometric shapes (circle, square, rectangle, triangle).

- Instructions for conducting the test: The child is asked to recognize the geometric shape by pointing to the shape that represents the teacher's call, so she says point to (circle, square, triangle, rectangle).

- Calculating the scores: The child is awarded (10 marks) for each correct answer and (0) if he answers incorrectly, (the total test score of 40 points) (the total time of the test is 30 seconds).

- The total score for Mathematics tests (70).

#### **Determine the most important motor skills and their tests**

The two researchers relied on the Ohio University scale for basic motor skills tests, which was organized by (Louis & Ersing), and it was Arabicized by Yarub Khayun in (2002 AD) and subjected to truthfulness, stability and objectivity treatments. This scale includes four basic motor skills (running, jumping, throwing These tests are:

#### **First / Running test<sup>7</sup>**

- The purpose of the test: to measure running skill according to the three levels included in the Ohio University scale.

- Tools: 1 buzzer, adhesive tape to determine the starting line and the distance.

- Performance description: The running test was determined by a distance determined by reviewing the scientific sources for the tests, which amounted to (10 m) and continuously to suit the testers. The performance steps must be according to what is shown in the Ohio University scale for the three levels within the scale

- Score calculation: The scores are calculated after seeing the child's running skill from among the constituents and matched with the swing man, as well as the type of step, flight, focal point, arm movement, foot movement and the base of the fulcrum shown within the scale and determine the level at which the movement is located, if it is within the first level, the degree is from (1-4) If it is at the second level, then the score is from (4-7), while the score is from (7-10) if it is within the third level within the scale.

#### **Second: Test the wide jump from a steady state (jump and landing with both feet) ()**

- The purpose of the test: to measure the skill of jumping according to the three levels included in the Ohio University scale.

- Tools: whistle, adhesive tape.

- Performance description: The laboratory (child) stands on a specific line for the purpose of performing the jump, and it depends on the locomotors performance of the laboratory and not the distance, and the performance steps must be identical to what is found within the three levels of the Ohio University scale.

- Calculating the scores: After watching the jumping skill for the children of the correctors, it is matched with the movement of the arms, the movement of the trunk and the knee, as well as the movement of flight and the shape of the whole body as well as the feet shown within the scale and determining the level in which the movement is located. If it is within the first level, the degree is from (1-4), If it is in the second level, then the score is from (4-7), while the score is from (7-10) if it is within the third level within the scale.

**The third test: the throw test with one hand from the top of the shoulder** <sup>8</sup>

- The purpose of the test: to measure the skill of throwing with one hand from the top of the shoulder according to the three levels included in the Ohio University scale.
- Tools: a whistle, a ball larger than the size of a tennis ball, adhesive tape to mark the starting line.
- Performance description: The child stands for the test on a specific line on the ground and holds the ball that was set for performance, and after the whistle sounds (throwing instructions) the child throws the ball with one hand from the top of the shoulder, and the performance steps must be identical to what is in the Ohio University scale and in The three levels within the scale.
- Calculating the scores: After watching the throwing skill of the children of the correctors, it is matched with the movement of the elbow and the arm and the movement of the trunk and the whole body, as well as the movement of the shoulders and feet shown within the scale and determining the level in which the movement is located, if it is within the first level then the degree is from (1-4), but if It is in the second level, so the score is from (4-7), while the score is from (7-10) if it is within the third level within the scale.

**6. Main research procedures**

**Pre-tests**

The two researchers conducted the pre-test for mathematics and basic motor skills tests on the research sample represented by (30) children of Al Nabougah Kindergarten, with (15) for the experimental group and (15) for the control group, and these tests were conducted on (Sunday - Monday, Tuesday) corresponding to 23-24-25 / 10/2018) in the classroom and the outside yard of the kindergarten at (9) in the morning, and all the conditions for the pre-tests have been proven in preparation for their re-entry in the post-tests.

**Applying learning style to small games**

After the researchers completed all the appropriate procedures that preceded the implementation of the program, they supervised the application of the learning method in small games to the members of the experimental group during the period from (10/27/2018 to 1/8/2019), as the program consisted of (18) educational units and A range of (9) weeks and at a rate of (2) two educational units per week, while the time allocated to each educational unit amounted to (30) minutes, as the learning method was applied with small games in the main section of the kinetic education lesson of (20) minutes from the kindergarten teacher and under the supervision of the researchers The educational units were implemented during the days of the period at exactly (10) in the morning, and the researchers adopted the principle of graduation in the small games of the main section, as some various small games were repeated so that the children did not feel bored, as well as in order to give the child sufficient opportunity to learn and master some games in the service of the program .

As for the control group, it continued to implement its own regular curriculum at the rate of (18) educational units over a period of (9) weeks, at (2) two educational units per week, at a rate of (30) minutes per educational unit, as the kindergarten teacher applied the vocabulary of her program on Members of the control group.

**Post tests**

After completing the application of the learning-by-play method for a period of (9) weeks, the two researchers conducted the post tests of basic motor skills and mathematics tests on the members of the experimental and control group on Monday - Tuesday - Wednesday corresponding to (12-13-14 / 1/2019) at 9 am and below the same The circumstances in which the pretesting was conducted.

**Results and discussions**

**Table 3.** Shows the mean, standard deviations, the calculated and tabular (t) value, and the statistical significance of the experimental group in the pre and posttests of basic motor skills and mathematics

Tests	Units	Pretest		Posttest		(t) calculated*	Statistical significance
		Mean	SD	Mean	SD		
Run	Sec.	3.6	0.33	6.5	0.71	3.77	Sig.
Jump	Cm	3.7	0.41	6.6	0.88	2.93	Sig.

Throwing	Meter	3.45	0.35	6.2	0.52	3.57	Sig.
Maths	Degree	36.17	8.26	48.06	9.37	5.50	Sig.

\*The tabulated has a degree of freedom of 19 and a significance level of 0.05 of 2.09

**Table 4.** Shows the mean, standard deviations, the calculated and tabular value (t), and the statistical significance of the control group in the pre and posttests for basic motor skills and mathematics

Tests	Units	Pretest		Posttest		(t) calculated*	Statistical significance
		Mean	SD	Mean	SD		
Run	Sec.	3.70	0.41	5.2	0.63	2.53	Sig.
Jump	Cm	3.8	0.23	5.98	0.68	2.42	Sig.
Throwing	Meter	3.32	0.41	5.21	0.589	2.78	Sig.
Maths	Degree	35.8	7.56	39.6	5.93	2.87	Sig.

\*The tabulated has a degree of freedom of 19 and a significance level of 0.05 of 2.09

**Table 5.** Shows the means, standard deviations, the calculated and tabular value (t), and the statistical significance of the control and experimental groups in the post tests of basic motor skills and mathematics

Tests	Units	Experimental group		Control group		(t) calculated*	Statistical significance
		Mean	SD	Mean	SD		
Run	Sec.	5.2	0.63	6.5	0.71	9.36	Sig.
Jump	Cm	5.98	0.68	6.6	0.88	7.77	Sig.
Throwing	Meter	5.21	0.589	6.2	0.52	9.82	Sig.
Maths	Degree	39.6	5.93	48.06	9.37	3.09	Sig.

\*The tabulated has a degree of freedom of 38 and a significance level of 0.05 of 2.05.

By discussing the results of the research that were presented and analyzed in Tables (3, 4, 5) for the pre and posttests and for the control and experimental groups, as well as for the posttests between the two research groups, there were significant differences in the development of motor skills and the acquisition of some mathematics concepts for the two groups. This is evident through The mean difference for the two tests, which indicates that the use of small games and the kinetic education curriculum in small games has an impact on the development of motor skills and the acquisition of some mathematical concepts for the experimental group only.

In the tests of jumping, running and throwing, the researchers attribute the reason for this development to the two research groups that children of this stage tend to practice physical activities that meet their motives and desires and that they sense themselves, so we find that one of the most important conditions for motor learning is the presence of motivation to learn as it is a state of tension resulting from basic needs Motivates an individual or child to practice and learn a skill. ”<sup>10</sup>The development of the skill of running for the experimental group is due to the fact that the curriculum for small games contains the skill of running and playing with complete freedom and movement from one place to another, as well as the factor of suspense, encouragement and temptation, and the practice of the principle of reward and rewards so that children feel comfortable and reassured, as well as children love games that are characterized by running. The two researchers were able to employ this through small games that carry honest competition and this is what leads to motor development, "the child's motor development comes through giving the child sufficient mobility as well as freedom of movement while providing the surrounding

environment. Matches his desires and convictions, and at that point we have introduced the normal development of the child.<sup>11</sup>

As for the jump skill of the experimental group, the small games contain jumping games from one place to another and the jump on numbers and geometric shapes that help the child remember and memorize them well, in addition to the presentation and good explanation of this skill with correcting errors, and this is what the researchers agree with. Providing environmental factors in which the child finds the appropriate amount of motor stimuli, as well as providing the necessary opportunities to carry out various motor responses due to the positive effects they have on developing the motor and physical development of children of this stage.<sup>12</sup> In addition, "the growth of basic motor skills expels a child at this stage at a remarkable speed, so he can race, jump, throw and kick the ball, and that his motor apparatus works in balance, and he desperately wants to integrate into any movement activity, especially activities that require visual muscular compatibility (the legs with the eye)."<sup>13</sup>

As for the skill of throwing, the development of the two groups is highly due to the fact that children love the game of throwing, standing and aiming towards certain goals. It is worth noting that the ability of children to learn quickly through fun and simple games as (Children strongly desire to integrate into any activity, especially those that require muscle movement. Large).<sup>14</sup> The use of balls of different size and favorite colors helps the love of the game as well as the factor of suspense, excitement, encouragement and rewards all help in developing their motor skills. Likewise, small games have a role in the ability to move, run, run, move and throw things from one place to another. They are among the activities that are characterized by the character of movement and competition as they meet the needs of children in satisfying their desires as well as achieving fair competition between them, as the researchers were able to employ this through games Small games that carry in their folds honest competition and this is what leads to motor development. Small games are characterized by jumping, idolatry, throwing and jogging games that help to strengthen the arms and legs and their good behavior and neuromuscular compatibility.<sup>15</sup>

The child's motor development comes through giving the child sufficient mobility as well as freedom of movement while providing the environment that matches his desires and convictions, and then we have provided the child's natural development.<sup>16</sup> The researchers attribute to the development of mental capacity in mathematics testing during learning with small games through mental and sports activities and games, that small games have an effective effect on developing their mental and mental capacity, Play is an important educational tool that contributes to the development of various mental abilities, as it allows the individual to develop thinking, perception, perception, remembering and so on other mental processes as well as strengthening his various vital organs and acquiring multiple motor abilities and skills.<sup>17</sup> Likewise, the child loves games, especially those that have the nature of movement and can be taught through play, fun atmosphere, competition, encouragement and positive reinforcement, all of which led to that development,<sup>18</sup> "the use of toys in guiding and teaching Children are a necessity imposed by cognitive development in the verbal expression of feelings and ideas, just as play is the natural medium for expression and communication for them."<sup>18</sup> As confirmed by Gardner's studies conducted on a group of kindergartens, which used play as the basis for the method of learning and reached Play is important for their cognitive and skill development and for all salaries of their personality."<sup>19</sup>

Playing small games has an important role in developing the child's basic motor skills, in improving nerve and muscle compatibility, and in the growth and stability of his motor skills. In addition, the growth of basic motor skills is expelled in a child at this stage at a remarkable speed, so he sees him racing, jumping, throwing and kicking the ball, and his motor system is working. It is all in balance, and it is highly desirable to engage in any movement activity, especially activities that require significant muscle movement. "Games, especially mobility, are one of the best things for a kindergarten child, as we see him not settle for a decision in the kindergarten halls or squares, so he moves his hands and feet with pleasure, then runs and jumps in vitality and tries to exploit all Something in the environment to satisfy his need for movement",<sup>20</sup> and thus we have achieved another goal of the research goals and hypotheses that the researchers developed, and that the style of learning with small games has achieved its objectives in developing the basic kinematic forms of pre-kindergarten children.

## **7. Conclusions**

1. The use of small games that are characterized by the character of fun and pleasure, positively and significantly affect the effectiveness of students' performance, which led to the development of physical and motor abilities under study.
2. The results achieved by the tests proved the validity of the educational units in the kinetic education lesson prepared by the researchers through their development in terms of movement and intellect.
3. There is a preference for the learning method with small games that was applied to the children of the experimental group in all research variables on the approach followed by the kindergarten teacher and through the differences between the mean in all the research variables for the control and experimental groups.

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