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Effective Use of Educational Games in the Development of Some Thinking Skills of Kindergarten Children

Bulquees I. Daghistani
Department of Early Childhood Education, Faculty of Education, King Saud University, Riyadh, Saudi Arabia

ABSTRACT

This research aims to identify the effectiveness of educational games in the development of some of the thinking skills in kindergarten children, the skills include; understanding forms and numbers, classification, comparison, interpretation and application. The internationally research methodology of analytical descriptive method was used in the building of tools of the study and experimental method, to study the effectiveness of educational games in the development of thinking skills in children of research sample. The study was designed in two groups, the first is experimental, and the other is control. The researcher set up the search tools by preparing a questionnaire to determine the thinking skills and sub-elements, which should be developed in kindergarten children, in order to test the thinking skills of kindergarten children, as well as for the preparation of educational games that develop thinking skills. The results revealed that there were significant differences between the mean scores for each of the children of the experimental group and check group (control) in the level of their performance on the test thinking skills applied at the posterior stage, in the side of children of the experimental group. There were significant differences between the mean scores of the children of the experimental group in the level of their performance on the test of thinking skills, applied prior and posterior stages, and the performance of these children in the posterior stage.

Key words: Educational games, thinking skills, kindergarten, xprogram

INTRODUCTION

Playing acts as a functional entry to the world of childhood, and intermediary educationally important contributor in the formation of the child's personality and construction of all aspects of motility, social, mental and cognitive. Through different playing activities, child recognizes the shapes, colors and sizes and stands on what distinguishes the things that surrounding him and what brings their relationships and functions and their significancey of importance, and this enriches his mental knowledge with different forms of information about the world around him (Al-Ali, 2002).

Given the importance of thinking in human life, the modern educational trends have focused on re-consideration of the educational programs and curricula at all levels of education, and preparation of learners so enabling many opportunities to the learner to practice different thinking skills, which help him to pursue the modern scientific developments, starting from kindergarten stage (Dinkelman, 2000).

It has therefore, the development of thinking skills in children became one of the main objectives of the global trends in the preparation of kindergarten programs which occupied the priority of nations for learners, and that is because of its critical role in activating the mind of the child and raising his cognitive abilities. Because of thinking skills are important skills in the child's life, so the educational literatures emphasize on the usefulness of using playing in the recruitment of these skills in a funny and enjoyable way (El-Nashef, 1996).

Educational games can contribute to the development of thinking skills in kindergarten, where it has many advantages, (Elgendy and Abdel-Sabour, 2001; Qenawy, 1995) of these advantages; (1) They are used as think pathetic in the hall of the kindergarten, in which they create healthy climate for talking and discussion to motivate children's interest and their desire to learn, (2) They contribute to scientific knowledge in terms of language and its patterns and usage, (3) They gave meanings to the content of the new educational material by correlating components of the meanings of facts and generalizations, that previously learned, with the facts and concepts which are introduced to the child, (4) They reduce the gap between experiences and stored information of the learner's knowledge environment and the information to be learned in order to be able to receive new information and (5) Setting up and consolidation new knowledge and information to build upon the later learning.

In the light of the foregoing, education scientists in the field of curriculum, and psychology have agreed in several conferences, that the society cannot be scientifically developed unless its members have different thinking skills that help them to promote their society, also scientists emphasized that the education process for thinking is the most important educational outcomes under the today's variables.

The results of many studies and previous researches emphasize on the effectiveness of games in the education of the child such as the study of Abdel Ghany (1996), Goldholer *et al.* (1997), Khalil (2000), Work (2002) and Sami (2005), which focused on the development of experiences and concepts of the child-and thus develop the skills of his thinking - and the use of modern educational methods that enable children to interact with their environment and discover the elements of the structure and composition of knowledge to help them copping with the age of knowledge.

Results of some studies also focused on the needy to the diversity of methods and approaches of modern teaching for the development of thinking skills in children who lack to these ways as a result of the use of memorization and indoctrination-which is often used-which does not provide performances, practices and exercises applied in practical life, (Patton, 1997; Barta and Schaelling, 1998; Kroscum and Andrews, 1998 and Carmichael and Hayes, 2001). Therefore, the current research is a trial to use the educational games to develop thinking skills of kindergarten children. The field observation of the researcher reflected a number of facts which emphasizes the problem.

The teacher used traditional methods in the education of the child, which may form incorrect mentality pictures of these children, as well as, by examining the books of assessments of preschool the researcher noted that no change or development of the content of these books, which supposed to contribute to the development of thinking skills, which are inconsistent with the views of the specialists in the kindergarten child. Yet as highlighted by the results of studies and scientific researches, and confirmed by the recommendations of the conferences. They all referred to the needy for the development of thinking skills in children.

The apparent lack of thinking skills in kindergarten children is due to that practicing activities inside the preschool is based on memorization and indoctrination and these traditional methods

does not provide particular importance to the thinking skills, as well as the use of modern methods has not been given sufficient attention. To face this problem the present research attempts to answer the next main question; What is the effective use of educational games in the development of some of the thinking skills of kindergarten children?. Accordingly, the following sub-questions are emerged from this question; (1) what is the thinking skills should be developed in the kindergarten? (2) what educational games suitable for the development of certain thinking skills to kindergarten children? and (3) what is the effective use of educational games in the development of some of the thinking skills of kindergarten children?

Educational games are identified as the practice of children's performance that appears in the mental, motion and social development, effectively, in kindergarten (Shehata, 1996). Also, educational games is identified as certain practices that provide for the child to allow him to participate according to his abilities and characteristics of growth, saturation his inclinations and needs, and his willingness to learn (Khalil, 1997). The researcher procedurally identified the educational games as the advanced planned way and well educationally prepared, so take into account the characteristics and capabilities of kindergartners, based on the activity and the exploitation of child's senses to gain experience and learning, and is intended in this research the development of thinking skills to the child and induce him to search and explore.

In addition, the researcher procedurally identified the thinking skills in this research as a set of behaviors performed by a child as a result of his regular practicing of many educational games based on the intended training, which help to understand things, and to recognize numbers, classification, comparison, interpretation, and application.

The present research dealt with the theoretical framework of this research through two axes; the first is the thinking skills, which include the nature of thinking skills, the importance of their development, and how it could be developed in the child. The second is the educational games, which include; characteristics of educational games that develop thinking skills, the importance of using educational games in the development of thinking skills and the role of the teacher in the development of thinking skills.

With respect to the first axis, thinking skills are necessary skills to adapt the child in his environment. It is identified as a set of behaviors that indicate the ability to recovering, observing, classification, interpretation, application, summarization and criticism of the data and information; in preparation for its use in making decisions and solving problems (Lindon, 2005). Human thinking is based on the use of symbols that reflect the interior mental processes, either by direct expression, or by symbolic expression, and the basic thinking material is the meanings, concepts, and perceptions (El-Sherbiny and Sadik, 2002). The thinking of the child could be evidenced through the exercise of certain mental activities, of which, the brain exposed to the stimulation by one or more of the five senses: hearing, sight, touch, smell and taste (Jerwan, 1999; Qenawy, 1995). Therefore, the researcher believes that stimulation of the senses of children and working on their development is an important thing that helps the child to acquire the thinking skills that play a vital role in the success of children and their adaptation to their natural, physical and social environment.

Skill is known as the complex activity requires intended period of training and regular practicing and experience, so done in an appropriate manner, and usually. This activity has a useful function (Abu Hatab and Sadik, 1998). The skill also known as sequential movements acquired through continuous training, which, if acquired and learned becomes a habit rooted in the child's behavior, where the child do it without thinking of its steps or stages (Bahadur, 1997).

This was previously described in the literature (Qenawy, 1995; Qatami, 2000; El-Nashef, 1996; Brown, 1998; Qatami, 2003).

The importance of developing thinking skills in kindergarten children are (a) helps in understanding the world better, and increase their awareness of events, materials and things around them, (b) carefully increases the observation, research, dissemination, and to adapt to events and variables as well as to face the problems of life both within and outside the kindergarten, (c) helps in raising the efficiency of the thinking capacity of children through the exercise of certain skills such as observation, classification, and interpretation and so on and (d) helps in creating a predictive knowledge of the events by producing and coordinating relations between the simple things, and this is done internally in the mind of the child and is reflected in the interaction with things and his prediction.

Training for the development of thinking skills requires the children to play an active role beyond the limits of sitting and receiving knowledge passively, through using new methods suitable for the development of these skills. Herein, the role of educational games appears to build knowledge, which comes as a reflection of the ideas of Constructivist Theory and made learning includes the hard work of the learner in the formation and building schemes employed in the cognitive understanding, giving meaning and significance to the knowledge. Since the learner is the one who creates knowledge-based information because of effort and active participation from his side.

According to the Constructivist Theory, Zayton and Zayton (2003) agreed on the following basis in the development of thinking skills of the child:

- Building knowledge and not transfer: The child neither receive knowledge nor receive it in a negative way, but built through his activity and active participation in both teaching and learning processes.
- Prior knowledge affect learning new experience: where the previous experience of the child is the starting point to learn new knowledge.
- Learning takes place through tasks and real situations: learning should occur through supplying the child with problems or situations related to real-life dependent on reality, and have meaning to him.
- Learning takes place in a collaborative environment: the child's interaction with peers and exchanging knowledge with them leads to the growth and modification in the structure of knowledge to him.

The aforementioned points were confirmed by the results of Tilley and Willard (1996) which provided a guide for the teacher to use when teaching for developing the skills of interpretation associated with the cause and effect, this guide included the simple activities, and the used ways, and training of children by the step by step, so that the young become scientists and inventors. The majority of these activities focused on the description, e.g., how to make a cake, ice cream, and the use of toothpaste - in each activity the children follows specified steps, and remember the reasons, and come to concrete results, and these activities give them good opportunities for understanding and use of reason or the cause and linked to the final results. The study found the possibility of acquiring the skills of many others through these simple activities such as observation, cooperation, expectation, mixing, blending, and arithmetic, conclusion and logical thinking. According to the above, the researcher explains that the development of thinking skills of the child requires training

to learn how to observe, and to do the installation and building of knowledge, not merely be the recipients. This depending on the role of the teacher in the development of those skills.

With respect to the second axis, the use of educational games are a favorite and effective way in the presentation of scientific ideas, where learners acquire scientific knowledge meaningfully, in which, integration of all aspects of cognitive learning, performance and emotion (Harlen, 2000). The specialists refer to the close relationship between gaming and the acquisition of thinking skills; where the child participation in activities helps to stimulate and raise mental abilities through repeated training or practicing, which depends on the learner's ability to use knowledge in the performance, as the knowledge is an integral part of performance (Zayton, 2001).

Educational games are a fertile area for developing thinking skills as it works on attention of abilities of the child and his needs and inclinations, and trying to develop and satisfy him by allowing the opportunities to the child for dynamic interaction through the exercise of many of the activities, through using his senses to become aware of things and relations; that makes games have positive impact on building scientific knowledge of the child through the many sources of knowledge, which represents the input of the cognitive process that based on perceptions (Qenawy, 1995; Abbas, 2006).

It is known that education in its early stages is better and stronger in the minds of children through interaction and self-activity, and handling of objects present in the environment. Because of the child in the age of 4-6 years has a unique feature that requires special characteristics in the games that will be directed to the development of thinking skills. The criteria that should be taken into account in the preparation and implementation of educational games to be of value and utility in the development of thinking skills for children can be determined as follows (Lang *et al.,* 1994; Abbas, 2006):

a) Starting with simple experiences, children learn best through experiences that are familiar to them
b) Educational games should be in the skill level of children's knowledge
c) Educational games should be dynamic and related to his attention, and raise his interest
d) Made by simple language and understood by the child
e) Linked to the child's needs, inclinations and the desire to discover the world around him

In addition to the above, educational games provided for children in kindergarten should be closely linked to the reality of his life, should also give him opportunities to identify concrete examples easily perceptible from the surrounding environment, where it connects between the senses and mind and between the movement and thinking, through direct experience and interaction with real objects and tools (El-Nashef, 1993). When preparing the games that used in the development of thinking skills, the following should be taken into account:

- Gradient in the presentation of skills from skill to another according to the priority
- Gradient from perceived levels of learning to the more absolute levels
- Gradient and the transition from the first step until the final step

The schoolmistress of kindergarten have an important role in the development of thinking skills of the child, where she is responsible for planning the educational situations that require planning for integrated experience, planning for daily games, and the formulation of behavioral objectives

in accordance with scientific standards that depending upon the final goals, and identify activities and pedagogical techniques appropriate for each activity and identify ways and methods of education appropriate for both the group and individual, and then selecting the methods, ways and means of various assessment, and studying the levels of children and their abilities (Gad, 2005). The schoolmistress should know that learning the skill needs an analysis called analysis of skill or analysis of the successive steps. In this type of analysis, the content consists mainly of a series of steps or sub-skills that should be performed in specific sequence in order to achieve the desired objective (Curtis, 1998).

It is important for the schoolmistress to move from skill to another during the presentation of areas of knowledge for children, and to integrate and combine thinking skills in innovative ways, using methods and a variety of multiplayer games and taking into account individual differences among children (El-Nashef, 2003). The schoolmistress can also plan skills thinking games that help a gradual transition from the world of perceptions to the world showing the symbols of things and actions and from think that built on intuition and guesswork to think built on real operations. (El-Nashef, 2003). In addition, the schoolmistress regulates the environment for the practicing of educational games that allow either to children to practice thinking skills individually or through working in small or large groups (Qenawy, 1995). On the base of the above, the researcher points out that the teacher should take into account the following when using educational games to develop thinking skills of the child:

- Determination of the objectives of each activity
- Suitability of educational games for the objectives set for the development of thinking skills
- Taking into account the individual differences among children
- Taking into account the multiplicity of the senses used by the child, leading to better learning, where the senses become sensory receptors

Several previous studies had been done of which, the study of Abdel Ghany (1996) targeted to design program for linguistic playing to improve some cognitive development aspects of children's language, the study limited to address the skills of listening and linguistic expression. The results showed that there were significant differences between the mean scores of children of experimental group and control group in the language development (listening and linguistic expression) after implementing the program, in the side of experimental group. This study also indicated the importance of gaming in the development of language skills to the preparing for reading.

The study of Goldholer *et al.* (1997) targeted discover the tools, and games used in the kindergarten, which encourages the child to learn reading and writing, through identifying the teachers of kindergarten for their beliefs about learning to read and write, as well as information on the activities and exercises that help them to do so. The playing activities included dramatic playing activities, games to develop curiosity through a series of comic books issued different voices, and picture cards of animals, transportation, plant, and all associated with the child's environment. The study confirmed the importance of diversity in the use of aids tools in each activity, and showed the effectiveness of the games that help to learn reading and writing.

Patton (1997) conducted a study aimed at clarifying that children need to be more utilitarian thinking skills in dealing with various life situations. Learning this behavior contribute to enable them to live with the society of the future such as, numbers recognition skills, and dealing with symbols associated with awareness of shapes, estimation, and unregulated measurement, and that

by providing in various educational activities. These activities use the raw materials available in the child's environment.

Kroscum and Andrews (1998) showed that giving pre-school children the opportunity to apply their existing knowledge about the characteristics of animals facilitates learning classification groups depending on the specific qualities or characteristics.

Barta and Schaelling (1998) emphasized that the development of thinking skills involves the good use of numbers ordering and patterns by children, and that would require putting meaningful numbers in the context through the activities provided in the kindergarten program.

The study of Khalil (2000) aimed to define the effectiveness of learning by playing in the first grade of primary students using the tutorial-apprenticeship, which depends on the game. The study included 68 male and female pupils and was divided into two groups, the first is the control and the second is the experimental, each consisting of 34 male and female pupils. Results of the study have proved the effectiveness of playing in increasing the level of knowledge acquisition for learning reading and mathematics to the experimental group.

The study of Carmichael and Hayes (2001) concluded that the prior knowledge affects significantly in understanding the classification in children, and the results showed the effectiveness of prior knowledge of the child in the acquisition of concepts and their integration with each other.

While the study of Work (2002) aimed to prepare a guide to learn the child reading, writing and science through playing, and this guide focused on the development of the of teachers' experiences to how to teach children through activities based on the use of cubes, through rearrange the events of photographed story, also through the activities of matching cards, and through compile the thing and its shadow, also the guide gave proposals on the involvement of parents in children's education.

The study of Sami (2005) aimed to know the effectiveness of playing in acquisition of kindergarten children a group of sporting skills. The research sample included a group of 128 male and female of kindergarten children between the ages of 5-6 years in day care centers of Damascus. The most important findings of the study were; there was significant difference between the mean scores of the experimental group and control group in mathematical skills after the test and in favor of the experimental group. The results showed the importance of play and its role in giving children many skills and different experiences.

All the previous studies stressed on the importance of starting the development of thinking skills since the kindergarten. Some previous studies and researches depended on games in the child's education, and the areas of using of games varied, e.g., the study of Sami (2005) used games in the development of a set of math skills, whereas the study of Work (2002) used the games to teach science. The studies have shown that the educational games suitable for the child's education depends on the use of means and color images, as well as raw materials available in the child's environment. Finally, thinking skills can be developed by practice and training, the more training the more growth and improvement of skills.

The previous studies can aid in this research by; Determination of the thinking skills that will be addressed in this research, preparation of research tools in the form of questionnaire (a list of thinking skills) and test of thinking skills, and selection of experimental design appropriate for the nature of the present search, selection of appropriate statistical techniques, and in interpreting the results of research and discussion.

Based on previous, the current research aims to (1) identify the thinking skills which should be developed in the kindergarten children to be able to cope with modern scientific developments,

(2) determine the availability of such skills in kindergarten children and (3) determine the effectiveness of educational games in the development of thinking skills of kindergarten children.

MATERIALS AND METHODS

The research was restricted to the following limitations:

- Research is restricted to thinking skills appropriate for kindergarten children, namely; perception of things, understanding numbers, classification, comparison, interpretation and application
- The current study sample was limited to a random sample of children from 2nd level of kindergarten. The total individuals in the sample is 38 boys and girls of control group and 35 boys and girls of the experimental group, bringing the number of children in the research sample seventy-three children
- According to these limitations, questionnaire to determine the thinking skills that can be developed in the kindergarten children was prepared by the researcher (Table 1). The test of thinking skills for kindergarten children was also, prepared by the researcher

Table 1: Questionnaire to determine the thinking skills that can be developed in the kindergarten children

	The possibility of the development in children		
Thinking skills and sub-skills	High	Medium	Low
The skill of forms understanding includes the following sub-skills:			
• The ability to know the elements of things for the noticeable position			
• The ability to know the distinguishing characteristics of the object, according to a specific standard			
• The ability to know the status of things in the space			
• The ability to know the relationship of the whole to the part			
The skill of numbers understanding includes the following sub-skills:			
• Ability to establish homology			
• The ability to do patterns			
• The ability to arrange things			
• The ability to link between the number and its meaning			
The classification skill includes the following sub-skills:			
• The ability to group the parts of objects into categories according to the specific characteristic			
• The ability to group the parts of things into categories according to the two properties			
The comparison skill includes the following sub-skills:			
• The ability to make comparisons between objects and in accordance with the specific standard			
• The ability to balance between the uses of things			
The skill of interpretation includes the following sub-skills:			
• The ability to understand forms and schemes			
• The ability to know the significance of the symbolism of things			
• The ability to link cause and effect			
The application skill includes the following sub-skills:			
• The ability to know the right steps to do something			
• The ability to give application value of symbols			

Research hypothesis:

- There are statistically significant differences between the mean scores for each of the children of the experimental group and control group children in the level of their performance on the test of thinking skills applied in the posterior stage, in the side of the children of the experimental group
- There are statistically significant differences between mean scores of all children in the experimental group in the level of performance of the thinking skills test before and after application, for the performance of these children after application

Field procedure of the research: The verification of these hypotheses, urged the researcher to perform specific procedures to answer the questions of the research; with regard to answering the first question of the current research, "what are the thinking skills should be developed in the kindergarten children?"

- The researcher prepared a list of thinking skills which should be developed in the kindergarten by the aid of:
  a) Theoretical study of thinking skills
  b) Research and previous studies of Arab and Foreign, which dealt with thinking skills
  c) The opinions of experts and professionals in the field of curriculum and teaching methods and kindergartens

- The menu consisted of six main skills of thinking skills, they are; the perception of objects, recognition of numbers, classification, comparison, interpretation, and application. Under each of which, number of sub-skills skills

After the preparation of the preliminary list of thinking skills, it was displayed in the form of a questionnaire on the reviewers in the field of curriculum and teaching methods and kindergarten children to express their opinions in the following:

a) To what extent the sub-skills correlated with the main skill
b) The accuracy of statements In terms of expression of components of the sub-skills
c) The importance of thinking skills and their development

- The questionnaire was modified in the light of the reviewers' views to be ready in its final form and thus the numbers of sub-skills, which fall under the main axes are seventeen sub-skills.

Determination of the previous thinking skills and the skills contained in the subsidiary in the present research has answered the first question of the research problem.

Concerning the second question of the present research, "what are the educational games suitable for the development of certain thinking skills of kindergarten children?". The researcher set up educational games that develop thinking skills in kindergarten children according to the following steps:

a) Theoretical study of thinking skills and how it could be developed
b) Theoretical study of educational games: properties of games that develop thinking skills and the role of the teacher in the development of thinking skills
c) The previous Arab and foreign studies dealing with both educational games and thinking skills

Educational games that are related to the development of thinking skills, the educational materials necessary for the implementation of those games and learning environment that allow for ease implementation of activities were prepared. The games have been prepared based on the following parameters:

- Educational games are not linked to the content of particular academic years
- Gradient in the educational games from easier to harder
- Games that develop thinking skills have been displayed on a group of reviewers in the field of curriculum and teaching methods, and the area of kindergarten, to express their opinion on the appropriateness of those games for the objective set for it. Some of the reviewers suggested their opinions on some of the skills included in the educational games and suggested ways to implement some of the games, and replacement of some of the pictures with others, the researcher has made all the suggestions. So, the educational games become in its final form which suitable for the implementation on the tested sample of children

Regarding to the third question of the present research, "what is the effective use of educational games in the development of some of the thinking skills of kindergarten children?". The researcher set up a photographer test of thinking skills and followed the following steps for the preparation of this test:

Defining the goal of the test: This test is intended to measure the ability of 2_{nd} level kindergarten children (5-6 years) to acquire the thinking skills involved in the educational games.

Setting the vocabulary of the test: The vocabulary of the test has been developed in accordance with the following steps:

a) Due to lack of children ability at this stage to read and write the pattern of "objective test" was used which is based on the imaged vocabulary; that characterized with the high rates of validity and reliability, and ease of evaluation, and the diversity and the large number of this kind of question gives a recipe comprehensive enough to measure a large part of the aspects in a relatively short time
b) The researcher in the formulation of the items of the test rely on the use of images, and when choosing the image, the following were taken into account:
- "Linked to the measurement of the sub-thinking skills
- "Clear and appropriate to the level of the child, to be easy for him to understand

Test instructions: The number of test items is 17. The degree of each question was determined, where every correct answer is given one degree from the total test scores, and zero for the wrong answer. The overall final score for the test is 17 degree according to the number of the items covered by the test.

Validity of the test:

Approving of the reviewer: The test has been shown on a group of reviewers to make sure of its validity as an instrument of measurement in this study, and they expressed their opinion on the correlation of vocabulary of the test with sub- thinking skills for each axis of the test, and the correctively of drafting instructions on each card, also, the appropriateness of the questions to the level of kindergartner child, as well as the success of the attached images to express the question. The percentage of agreement of the reviewers on all components of the test was more than 90%.

The uniformity of the procedure: The interior homogeneity was calculated to test the internal thinking skills by calculating the correlation coefficients between the scores obtained by children in each exploratory group for each axis of the test and the total score. Table 2 shows the correlation coefficients between the degree of exploratory sample in each axis and the total score for the test.

Table 2 shows that the value of correlation coefficient of each axis is high and function at the level of 0.01, indicating that the test has a high degree of internal consistency, and thus the test become valid for the application in its final form.

Stability of the test: After carrying out corrections proposed by the reviewers the test was applied on a sample of 30 children who are not from the original search sample. The researcher used the method of re-application in the calculation of the constant of test achievements, where the test was applied on exploratory sample, and then re-applied again with an interval of two weeks. Estimation of Pearson correlation coefficient between scores of the first application and second application revealed that the constant coefficient (0.79) is a value of the function at 0.01, indicating that the photographed test is characterized with high degree of stability, so the test will be valid for use as an instrument to measure thinking skills of kindergarten children.

After preparation, processing and verification of all the validity and reliability of the study tool, she applied thinking skills test individually priori, i.e., before the proceeding in the procedure of the study on the children (sample) in both experimental and control groups in order to know whether there was statistically significant differences between the children of experimental and control groups, in the level of children's acquisition of thinking skills? Or that the children of these two groups are equal in all these aspects.

Application of the test at the prior stage: The test of thinking skills was prior applied on the children of research samples (control/experimental groups) to see how much the equality of the two groups at the beginning of the experiment, where average degree of each group was calculated on the tools of the study and standard deviation of these scores, as well as the T value to indicate whether the differences is significant or not.

Data in Table 3 show the equivalence between the scores of children in both control and experimental. The value of T (1.06) is not significant at any accepted level of statistical analysis, and thus makes sure that there is no statistically significant differences between the mean scores of children of the two groups, the control and experimental, in the pre-test of thinking skills, and this shows the equality of the two groups.

Application of thinking skills games: The researcher applied educational games in order to develop thinking skills of children of experimental group (Kindergarten of Kids Club, Riyadh,

Table 2: The values of correlation coefficients between the degree of exploratory sample in each of axes and the total score of thinking skills, and the level of significance

Thinking Skills	Correlation coefficients	Significance level
Recognizing objects	0.65	0.01
Recognizing numbers	0.56	0.01
Categories	0.52	0.01
Comparison	0.62	0.01
Discussion	0.58	0.01
Application	0.62	0.01

Table 3: Significant differences between the mean scores of children in the control and experimental groups to test the thinking skills applied in prior stage

Group	n	m	p	D.F.	T-value	Significance level
Control	38	5.58	1.13	71	1.06	Not significant
Experimental	35	5.89	1.35			

Saudi Arabia from 2008-2010), while the children of control group studied the program prepared by the Ministry of Education.

Application of the test at the posterior stage: After the completion of the application of thinking skills games on the children of the experimental group, the posterior application of the thinking skills test of children sample (control and experimental groups) was applied, the average degree of each children's groups was calculated to determine the final level of each group, and whether there was statistically significant differences, both between children of control and experimental groups or inside the group of the same children, before and after the procedures of the educational games.

RESULTS AND DISCUSSION

The following are the results of the application of thinking skills test on a sample of children and the analysis and interpretation of these results in light of the research hypotheses, to answer the third question, "what is the effectiveness of educational games in the development of thinking skills in kindergarten children?", where the researcher validated the following hypotheses:

The first hypothesis: To verify the first hypothesis, which is "statistically significant differences between the mean scores for each of the children of the experimental group and control group children in the level of their performance on the test of thinking skills applied in the posterior stage, in the side of the children of the experimental group". The T value between the mean scores of children of these two groups was calculated, where n1 = 38 and n2 = 35, and the results were as illustrated in Table 4.

Data in Table 4 show that the calculated T value is 15.3, this is statistically significant at the level of 0.01. This is an advanced level of the statistically accepted levels, and confirms the existence of significant differences between the mean scores of children of control and experimental groups to test the thinking skills at posterior stage of test in the side of the children of the experimental group, which exercised the educational games that dealt with thinking skills. This also, clearly show the obvious decline in average levels of children of the control group, which received the regular program of kindergarten in the traditional manner as usual, where the percentage of the average

Table 4: Significant differences between the mean scores of children in the control and experimental groups and the T value to test the thinking skills applied in the posterior stage

Group	n	m	P	D.F.	T-value	Significance level
Control	38	5.71	1.14	71	15.3	0.01
Experimental	35	10.46	1.5			

in posterior stage of test (5.71) is small when compared to average score of experimental group, where the ratio was 10:46 with a difference of 4.75 between the mean scores of children of both groups for the children of the experimental group.

These findings are In accordance with the results of Patton (1997), Kroscum and Andrews (1998), Barta and Schaelling (1998) and Carmichael and Hayes (2001). The results of each of these studies indicated to the superiority of children of the experimental group than the control group and also, a growth in the children thinking through the practicing of the different activities that are specially prepared to the skills that were involved in each of the studies of thinking skills.

It could be said that the results of the experimental group children were better than the results of the control group in the acquisition of thinking skills, which indicates the effectiveness of educational games in achieving its objectives, which may be due to:

a) The method of showing the content of games, which takes into account the diversity, inclusiveness and integration of sub-skills. As well as taking into account the logical and psychological organization, where the included information had meaning and importance for the child, and fit his mental, as well as the properties of the growth phase, which passes by and meet the needs and develop his ability, where, the educational games satisfy the desire inherent of children in this age which is the tendency to play. Giving the learning during the implementation of educational games an atmosphere of joy and make the educational experience of children going through happiness
b) Dividing the children into small groups, helped to involve all children in educational games, which allowed for children (sample) the opportunity to cooperate and participate in the different games, -this has led in turn, to their positive and fruitful interaction and contributed to the high level of their performance.

Thus the first hypothesis is accepted, which was "The presence of statistical significant differences between the mean scores for each of the children of the experimental and control groups in the level of their performance on the test of thinking skills when applied in the posterior stage, in the side of the children of the experimental group.

The second hypothesis: To verify the second hypothesis, which is "statistically significant differences between the mean scores of children in the experimental group in the level of their performance of the test of thinking skills in the prior and posterior stages, in the side of these children in the posterior stage of the test. The researcher calculated the T value between the mean scores of thinking skills test for children (prior stage and posterior stage), where n = 35, and the results were as illustrated in Table 5.

The results of Table 5 show that the value of calculated T is 12.45. This value is statistically significant at the level of 0.01 and this is an advanced level of the accepted statistical levels, and confirms the existence of significant differences between the mean scores of the children of this

Table 5: Significant differences between the mean scores of experimental group of children and the value of T when testing the thinking skills in the prior and posterior stages

Group	n	m	p	D.F.	T-value	Significance level	Effect size
Prior stage	35	5.89	1.35	34	12.45	0.01	0.82
Posterior stage	35	10.56	1.5				

group in test of thinking skills; prior stage and posterior stage for the benefit of the average scores of the posterior stage of test, this is after the practicing games of thinking skills, as evidenced by the presence of a large size of the impact of the games where it reached 0.82, indicating the great effectiveness of educational games.

This finding in accordance with the results of Goldholer *et al.* (1997), Khalil (2000), Sami (2005) and Work (2002) which showed differences in the content of their respective programs, which reflected on the marked increase in degrees of children in the experimental group of the posterior stage. By the extrapolation of these results, it could be reached to the success of educational games to improve the understanding, thinking and stimulate children assimilation; where that thinking can be improved and enhanced when the learners are active in obtaining knowledge by themselves. It is also clear the success of educational games that were used to achieve the desired objectives by development of thinking skills of the children of the experimental group whom their efficiency is high, which indicated by the marked increase in their score than those of pre-application stage.

In light of this, the second hypothesis is accepted in the current research, where there are significant differences between the mean scores of children in the experimental group with respect to the level of their performance on the test of thinking skills when applied in both prior and posterior stages, in the side of the performance of children in the posterior stage.

Recommendations: The present research can contribute in providing a list of thinking skills that can be taken into account in the preparation of kindergarten programs as well as providing indicative parameter models of educational games that are useful while teaching in the development of thinking skills of kindergartners. In the light of exploration of the researcher during the implementation of the current research, and in the light of the findings the following are recommended:

- Re-considering in planning of the kindergarten curriculum so that to focus on its content on the development of different thinking skills
- Preparing a guide for kindergarten teacher includes suitable educational games for kindergarten children, showing to the teacher how to use it in the development of various social skills, sports, language, life, etc.

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