

Effectiveness of the proposed training program on attention and working memory for children with special needs in Saudi Arabia

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Abstract: This study aims at revealing the effectiveness of a program of the art of paper forming activities, Origami, for the development of attention and working memory in a sample of children with Attention Deficit Hyperactivity Disorder in the Kingdom of Saudi Arabia. The sample consisted of (25) students with Attention Deficit Hyperactivity Disorder. The study used Diagnostic and Statistical Manual Scale (DSM-IV-TR[®]) for attention deficit and hyperactivity and a test of scientific concepts photographer to assess working memory. Results indicated a high level of the sample's attention deficit in the pre application 77%, and a low level of the sample's attention deficit in the post application 55.5%. Conclusion: The T. Test value is a significant value of (9.17) in (0.05 level) which indicates the effectiveness of the suggested program in decreasing attention deficit hyperactivity. This indicates the effectiveness of the suggested program in sample performance on the scientific concepts Test, and working memory. Recommendations: employing origami activities as one of cheap technology to reduce attention deficit and hyperactivity disorder of children with special needs. Research objectives: 1- Preparing an Origami activities program for developing the attention and the working memory capacity for a sample of elementary students with Attention Deficit Hyperactivity Disorder in Jeddah. 2- Determining the effectiveness of the suggested program of forming Origami activities, for developing the attention for a sample of elementary students with Attention Deficit Hyperactivity Disorder in Jeddah. 3- Determining the effectiveness of the suggested program of forming Origami activities, for developing the working memory capacity for a sample of students with Attention Deficit Hyperactivity Disorder in Jeddah.

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Keywords: Origami, Attention deficit, working memory

1. Introduction:

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common disorders in childhood stage, and it is estimated that the prevalence rate among children who are of school age ranges between 4-7% (Psychiatry of American Society, 2000). ADHD spreads in public education among males than females by 3-1 (DuPaul & Stoner, 2004).

The problem of attention deficit accompanied with hyper movement has got a great interest of some researchers in the field of special education that they have concluded their recommendations to redouble efforts applied for preparation of educational, training programs to increase the integration of special needs in education, and through the use of development strategies for attention and operating memory capacity they have, which have a positive impact in improving their interaction patterns and self-reliance in a positive way. (Black, 2006).

In Saudi Arabia, a survey in Dammam was done on a sample of (1287) male students in elementary stage. The results indicated that the prevalence rate of attention deficit hyperactivity disorder is (16.4%) and

the prevalence rate of attention deficit only was (3.16%), (AL Hamed *et al.*, 2008).

Because of the increasing interest to improve that category chances in learning and assessing them by using functional strategies in Saudi Arabia, the study researchers reviewed the literature and found some studies which pointed at the importance of Origami activities for children with special needs as follows:

Lipnick (2012) indicated that Origami is an appropriate intervention, not only in pediatric settings, but in virtually any setting. He indicated that origami can serve as a means of improving hand and finger strength, fine motor dexterity, visual spatial skills, and directionality, as well as of facilitating use of higher-level thinking functions such as memory, sequencing, and following directions. It engages multiple senses and can be adapted to a variety of disabilities and settings.

Moreover, (Varsha, 2013) viewed that origami is extremely beneficial to both children and adults. It helps increase concentration, develops logic and discipline among children. It helps adults fight common ailments such as stress and hypertension.

Origami is also used to teach concepts of chemistry, physics, architecture and mathematics. It is also used in teaching people with mental disability.

Study Problem:

Research problem is identified in main question: What is the effectiveness of the proposed training Origami program on developing the attention and working memory capacity for children, with Attention Deficit Hyperactivity Disorder in Jeddah in the Kingdom of Saudi Arabia?

The following sub-questions were branched as follows:

1- What is the Origami activities program for the development of attention and working memory in a sample of children with Attention Deficit Hyperactivity Disorder?

2- What is the effectiveness of Origami activities program for the development of attention in a sample of children with Attention Deficit Hyperactivity Disorder?

3- What is the effectiveness of Origami activities for the development of working memory in a sample of children with Attention Deficit Hyperactivity Disorder in Jeddah?

Search Terms:

1- Origami activities: are activities for the formation of a technical paper use paper as a raw material, and its sequential steps to reach the implementation of the product.

2-Attention: This refers to the ability to follow instructions, and understand the details, and keep track of the stages, to get the job done in the time.

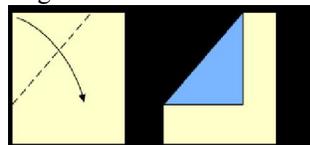
3- hyperactive: a neurological disorder, caused by an imbalance in brain structure and function, and has a clear impact on behavior, thoughts and emotions. (Dupaul, & Barkley, 2000).

4-Working Memory: is the system that actively holds multiple pieces of transitory information in the mind, where they can be manipulated. Working memory is generally used synonymously with short term memory, (Baddeley, 1992).

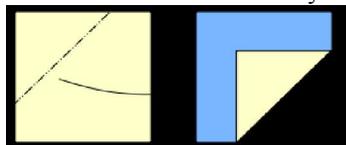
Literature Search:

Current research includes the following

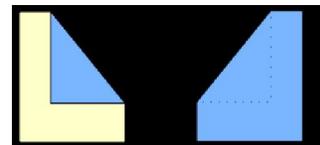
(1)The theoretical framework and studies about origami:



Valley fold



the mountain Fold



Line Girmiry Folding

B) Origami bases:

In origami, there is a series of several bases that many models are created with. In general, "base" refers to any folded paper that immediately precedes final

(2)The theoretical framework and studies for Attention-Deficit Hyperactivity Disorder:

(3)The theoretical framework and studies for working memory and information processing:

4-Stages of formation and handling information:

(1)The theoretical framework and studies about origami:

Origami is a complicated, accurate, interesting and entertaining art, yet it is not expensive. It is used to make a variety of forms and no wonder that the ancient Japanese respected it and children around the world from all ages love it and is now looked upon as a kind of creative and sophisticated art. Origami is the Japanese word for paper folding. ORI means to fold and KAMI means paper. Together, they form the word, "origami." There are traditional Japanese models and origami mobile toys such as animals as well as flowers and practical origami for home such as the models used in the decoration. Each section starts with small projects, and then is developed to be models to test skills (Fei& Sujan, 2013).

Origami involves the creation of paper forms entirely by folding. Animals, birds, fish, geometric shapes, puppets, toys and masks are among the models that even very young children can learn to make in just one sitting (Araki, 2002).

A) Basic folds:

There are two main types of origami symbols lines and arrows. The arrows show how the paper is bent or moved. Lines show various types of edges (Robinson, 2004), (Lang, 1988)

A thick line shows the edge of the paper.

A dashed line shows a valley fold. The paper is folded in front of itself.

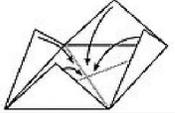
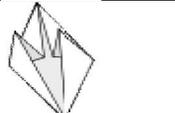
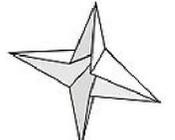
A dashed and dotted line shows a mountain folds (there may be one or two dots per dash depending on the author).The paper is folded behind itself, this is normally done by turning the paper over, folding a valley fold and then turning the paper back over again.

A thin line shows where a previous fold has creased the paper.

A dotted line shows a previous fold that is hidden behind other paper, or sometimes shows a fold that is not yet made.

Symbols for basic folds:

folding and shaping of the model-to-be. The ones listed below are generally accepted as the traditional origami bases. (Engel,1989).

A blintz base is made by folding the corners of a square into the center. The resulting square can then be used as the starting point for any base or can be blintzed again. The resulting base will then have more points available for folding.	
The kite base is merely two valley folds that bring two adjacent edges of the square together to lie on the square's diagonal.	
The fish base consists of two radial folds against a diagonal reference crease on each of two opposite corners. The flaps that result on the other two corners are carefully folded downwards in the same direction. In other words, it consists of two side-by-side rabbit ears.	
The water bomb base consists of two perpendicular valley folds down the diagonals of the square and two perpendicular mountain folds down the center of the square. This crease pattern is then compressed to form the water bomb base, which is an isosceles-right triangle with four isosceles-right triangular flaps. The water bomb base is an inside-out preliminary fold.	
The frog base starts with a water bomb base or preliminary fold. All four flaps are squash-folded (the result is the same in either case), and then the corners are petal folded upward.	

C) Origami in Education and Therapy:

Bair (2003) indicated that Origami can be used to achieve academic aims. In mathematics, Origami provides a motivating environment in which a child extends his geometric experiences and skills of spatial visualization. Origami indicates the fact that mathematics can involve exploration. When a student folds a piece of paper in the half and opens it again, he realizes the nature of one half. When he opens the paper fold each edge to the middle line, he gains the nature of one quarter. The student enjoys mathematics when it is combined with Origami because it seems like a game to unfold a model and identify the revealed triangle, rectangle, and other shapes. Origami based on symbols helps in the development of the concept of sequencing and writing a story, where there is a beginning, middle and an end.

In this learning activity, there is a continuous interaction of the thinking process and action. Children watch how each fold leads to another advanced one and how they all create a lifelike object. They use their creativity to form a new one. Origami is a method of "action research". Origami presents a multisensory hand on approach to the children, which is useful to children with learning difficulties. The child speaks, listens, sees, observes, touches and does. When a child learns a new model he has an opportunity to improve many cognitive skills in an enjoyable way. Some of these skills include: ability to follow directions, visual sequential memory, eye- hand coordination, fine motor skills and spatial perception. The child also develops thinking skills. Origami also improves patience, concentration and attention. (Parmer, 2006)

Lipnick, (2012) indicated that Origami is an appropriate intervention, not only in pediatric settings, but in virtually any setting. It can serve as a means of

improving hand and finger strength, fine motor dexterity, visual spatial skills, and directionality, as well as of facilitating use of higher-level thinking functions such as memory, sequencing, and following directions. Origami engages multiple senses and can be adapted to a variety of disabilities and settings. Origami activities can be easily graded without increasing the complexity of the model by simply decreasing the size of the paper squares used.

Origami is extremely beneficial to both children and adults. It helps increase concentration, develops logic and imbibes discipline among children. It helps adults fight common ailments such as stress and hypertension. Origami is also used to teach concepts of chemistry, physics, architecture and mathematics. It is also used in teaching people with mental disability (Varsha, 2013).

The good thing about Origami is that one doesn't need to be naturally gifted to be creative with it and that anyone can learn it. Recently, Origami has been used by therapists and teachers in many settings. Educators have found that Origami is an activity that suits into multidisciplinary programs (Shalev, 2013).

Therapists have discovered that origami has a good effect on their patients, and they indicate that they use it as therapeutic and diagnostic. Origami makes use of the advantages of being attractive and instructive. It meets the inventive, constructive and creative abilities of children. Friedrich Froebel (1782 – 1852) is a German educator and he is the founder of the kindergarten, who dedicated his life to the exploration of the learning process of young children. He realized that playing a game for child is a useful instructional tool and Origami has the characteristics of a game. It is an enjoyable activity that follows some rules, and it includes emotions and entertainments. To the child,

the transformation of a sheet of paper into a three dimensional form, using two hands only, seems almost like magic. (Shalev, 2013)

D) Origami as a Therapeutic Tool:

Art therapy can play an important role in special education because many students with disabilities need special instructional treatment (Sze et al, 2004) Students with disabilities are encouraged to use unique art media to express themselves creatively and, so that they may learn more about their own abilities. People all over the world face various mental issues and origami is a very helpful therapeutic tool for many of them. It is used to help people who have problems like being withdrawn and lack of attention. (Prestia, 2003)

Origami is a great way to help people who have attention disorders and people who have problems in following directions or listening carefully. It has also been used to help people who need to strengthen their fingers and hands (Sze, 2004)

Shalev (2013) indicated in his Theragami that In 1914, Charles Sydney Gibbes was a teacher in UK, he was teaching a young boy who was withdrawn all the time. The boy never spoke and as a way to learn him something he began to try to make hat from a paper. The boy failed first but they made a paper box together and after that they made boxes and hats, the boy began to speak. This is an example of origami used as a therapeutic tool. In 2004, Julie Medhurst, in UK, was working with children who were suffering from many difficulties ranging from ADHD, Cerebral Palsy, and Emotional Difficulties to Dyslexia using origami. Through the time she noticed changes in the children's behavior. They have something of normal lifestyle and a cessation, in many degrees, of their symptoms. Concentration and attention to details needed to create origami is helpful to children who are suffering from attention deficit disorders such as ADHD and ADD. Because they pay attention to something like a fold and this helps them focus better on normal activates and over time they tend to show a very positive gradual change. Origami also helps to improve language development because certain folds have to be done in certain order.

E) Origami has big benefits as a teaching tool for the teaching of the disabled:

Tsuboi (2009) said in his article that origami has many benefits for the brain. The PhD thesis: "Asymmetry internes aspheric function of the brain in a dynamic activity hands of children aged 7-11 years in the training of origami" observed a group of seven children from the age of 7 to 11 years in intensive training of Origami for a week. The researchers found that Origami activity stimulated interaction between the right and left sides of the brain, and the development of verbal and nonverbal intelligence to children. Origami has been taught in schools in Japan to children at a very

young age. They also found that the motor activity of using both hands developed figurative thinking and imagination. Origami has also been known to benefit children with Attention Deficit Hyperactive Disorder and emotional problems because it challenges the mind to create and remember sequences. It engages the brain to help train it to focus. Origami can also benefit the older people who are physically handicapped, or anyone else who has the desire to keep his mind sharp and his fingers nimble. (Tsuboi, 2009).

Origami is a common therapeutic tool in Japan to help children who suffer from attention deficit and hyperactivity disorder. The multiple benefits of Origami can meet the needs of these children with disabilities such as focus and attention deficit and hyperactivity disorder AAD / HD. Origami is the perfect tool to help individuals who are suffering from lack of attention because they concentrate on the activity. With continued play, origami activates knowledge and education. Origami helps the child to get rid of anxiety through the process of play. The exercise of origami develops the feeling of competence and achievement which helps the child build trust. In the United States, origami acquires popularity as a therapeutic tool for children with attention deficit. Origami exercise also increases remembering and strengthens memory. Participation in paper folding, requires individuals to keep and remember the sequence of folding techniques in order to reach a special form. Engaging in paper folding stimulates the brain cognitive skills (Mehломakulu, 2012).

Shalev (2013) indicated in his article "Origami in Education and Therapy" that children who suffer from learning disabilities often cannot wait to get the results of what they do. They feel frustrated and anxious when they work on a project that requires a long time to be completed, and they want to see results immediately. Origami helps to solve this problem because the child doesn't wait as they do not use glue or paints that need to be dried like in other craft activities.

Hinders (2014) stated that because origami involves transforming a flat sheet of paper into a 3D object, it helps children develop the foundation they need to better understand Science, Technology, Engineering, and Math (STEM) education in high school and in college. This is important because STEM careers are expected to be among the best paying and fastest growing occupations in the next decade or two. Origami also teaches children about patience, persistence, and creativity. They learn that making mistakes is part of the process of mastering a new skill. Sometimes, a mistakes in origami can even lead to happy discoveries. For example, an origami cat can become an origami fox just by varying a few of the folds. Seeing this artistic component of origami helps children learn that science and math don't have to be

"dry" or "boring" school subjects. Because origami involves transforming a flat sheet of paper into a 3D object, it helps children develop the foundation they need to better understand Science, Technology, Engineering, and Math (STEM) education in high school and in college.

<http://origami.about.com/od/Origami-For-Kids/a/Origami-In-Education.htm>

F) Effects of origami construction on children with disabilities for students with Autism:

It guides oral language for students with Speech and Language Impairments and improves motor skills for students with Physical and Health Disabilities. Origami also increases spatial reasoning for students with visual impairments and provides a 100% visual presentation to students with hearing impairments. It improves memory and organization skills for students with Traumatic Brain Injuries and improves cognitive processing for students with mild Mental Retardation. It also increases positive learning experience for students with low self-esteem (Sze, 2004).

Origami learning has a positive effect on the development of students' cognitive. In folding paper into origami, a child always plays an active role. Origami is cognitively challenging and is relevant to the child experience and interests (DeBono, 1991).

Origami has great success in improving attention and concentration for students with Attention Deficit Disorder, direct and sequential teaching for students with Learning Disabilities and also it reduces stress and anger for students with Emotional and Behavioral Disorders. It also provides structure and logical steps (Swanson, 1999).

Learning to fold paper into origami needs only practice: trying to simplify the steps for children is certainly a positive way to strengthen their motivation. The teacher needs to be prepared to fold the model enough to know its backwards and which fields are difficult. For a difficult move, a teacher may have to prepare several explanations. It may take three times to teach the model (Sze & Yu, 2004) which needs relieving boredom for students who are gifted (Gardner, 1993). And the study conducted by (Sze, 2004) who indicated that origami construction is consistent with many learning theorists. Students feel their experiences of making their own understanding through their own "mental models". Origami construction is a process in which we adjust mental and physical models to create new ones. (Sze, 2004) prepared a model for origami which represents six types of constructive learning: (1) hands-on learning, (2) explicit instruction, (3) higher order thinking, (4) multimodal instruction, (5) social learning, and (6) self-management strategies.

1. Hands-on Learning

Prestia (2003) stated that many students with special needs have neurological, biological and sensory difficulties which affect how they learn and respond to classroom environments. Strategies like origami exercises enable the student to visualize the creative process in terms of process and outcome in a short time, with a tactile demonstration that is easily achieved. For example, when the student finishes a plane model, he can unfold it to show the lines. Origami exercises are very useful for the five senses, multiple intelligence areas, and cooperative learning, and it enriches all areas of learning including social studies, language arts, mathematics, and science.

2. Explicit Instruction.

Swanson (1999) indicated that direct instruction creates positive outcomes for students with disabilities. Origami is presented with direct instruction. When the students study paper folding in order to make an object out of paper, they are asked to follow a specific instruction. The steps are expressed by the teacher in a specific sequence. The teacher makes sure that all students have completed the present step before they proceed to the next. Direct Instruction allows the teacher to plan instruction to create an effective learning environment, and to modify instruction to accommodate different learning styles.

3. Higher Order Thinking.

a) Concept Mapping: According to elaboration theory, instruction should be organized in increasing order of complexity for optimal learning. (Reigeluth, 1987) states that instruction will be more effective if it follows an elaboration strategy.

b) Problem Solving: According to the lateral thinking theory, the point of thinking is that many problems require a different perspective to be solved successfully. In order to get a different perspective on a problem, one may try to break the elements up and recombine them in a different way (DeBono, 1991). At the same time Gestalt theory applies to all aspects of human learning based upon the laws of organization, closure, proximity and similarity (Ellis, 1938). Origami instruction means that teachers reflect for example on mathematical concepts and skills through considering the creation, pedagogy modeling, equity, diversity, and history-cultural considerations. Teachers become acquainted with the pedagogy and geometry concepts involved in using Origami in the classroom. Students through paper folding, learn to examine, transform, apply, represent, and communicate while helping develop a sense of spatial relationships (Phibb, 1991)

4. Multimodal Instruction

The theory of multiple intelligences (Gardner, 1993) proposes a major transformation in the way our schools are run. It suggests that teachers be trained to present their lessons in a wide variety of ways using music, cooperative learning, art activities, role play,

multimedia, field trips, inner reflection, and much more. Origami combines different intelligences. It is a verbal activity (listening and reading directions), a visual activity (model), as well as a kinesthetic activity (hands-on). According to dual coding theory (Paivio, 1971), recall and recognition are enhanced by presenting information through both visual and verbal forms. This will be useful for students with attention deficit disorders and visual and hearing impairments. These types of activities stimulate more parts of the brain than just transmission format. The exercise also requires hand-to-eye coordination. For difficult folds, a teacher may have to prepare several precise explanations. The steps provoke the students to think about the next step, to be intuitive, and to try to picture the final results. The students usually work in groups of two or more, searching for understanding, solutions, meanings, or creating a product.

5. Social Learning

The teacher should create a pleasant atmosphere by sharing amusing stories with the students while they are making a move in origami. When he does that, at least restricted environment for children is enabled. Children with disabilities often lack the daily interaction, social, behavioral, study, self-management, academic, and life skills needed to operate in the regular environment. Origami helps students to be creative and build their confidence as they share their successes with others.

6. Self-Management Strategies:

The teacher encourages the students to observe his or her demonstration of a move before they attempt it. The social learning theory emphasizes the importance of observing and modeling the behaviors, attitudes and emotional reactions of others as a learning process. The highest level of observational learning is achieved by first organizing and rehearsing the modeled behavior symbolically (folding) and then enacting it overtly.

(2)The theoretical framework and studies for Attention-Deficit Hyperactivity Disorder:

Attention deficit accompanied by hyperactivity is a common problem among people with special needs. Study of (Swanson & Berminger, 1995) compared normal pupils to pupils with learning difficulties in performance on tasks of working memory and short-term memory. The total study sample was 206 male and female pupils. The results indicated that the performance of verbal working memory in students with learning difficulties was lower than the ordinary students i.e. students with learning disabilities have deficiencies in working memory and short-term memory.

Study of (Isaki & Plante, 1997) which aimed to examine the differences between people with learning disabilities and ordinary people in working memory,

short-term memory and the memory of sentences. The sample consisted of 30 students where the study found a statistical significant difference at the level of 05, in the performance of short-term memory and working memory of ordinary people. The study also noted that the verbal working memory is one of the difficulties faced by people with learning difficulties compared with ordinary people.

Barkley (1998) study indicates that the attention deficit and hyperactivity disorder appear clearly during the first years of school. The study shows that these children show many academic and behavioral problems, because of the nature and requirements of the stage that are inconsistent with the characteristics of the disorder in terms of the ability to sit down for a certain period and the completion of the duties, focus, attention and follow-up instructions and directions in new educational methods.

The study of (Siegal & Rayan, 1998) examined differences between students with learning difficulties and those with attention deficit disorder and ordinary students' performance on working memory tasks. The sample consisted of 183 pupils between the ages of (7-13) years. The study results indicated that students with learning and reading difficulties and children with Attention-Deficit/Hyperactivity Disorder suffered from poor performance on tasks to measure working memory, and children with learning and mathematical difficulties suffered from poor performance for the task of number than sentences overlap.

The study of (Kamel, 2001) examined the impact of attention deficit disorder on the activity of verbal working memory in a sample of primary school pupils. The Sample consisted of 225 pupils in fourth and fifth primary grades. The results indicated that attention deficit disorder affected negatively the working memory system in students with attention deficit disorder.

In a study of (Rfwaltess, 2008), which aimed to design a program for the effectiveness of behavioral program based on self-control through the use of strategic reinforcement and responding cost to reduce the behavior of hyperactivity in children with learning difficulties. The sample which consisted of 130 children with learning difficulties suffering from attention deficit accompanied by hyperactivity was divided into two groups: experimental group and control group. There was a focus on the positive behavior of children such as interaction, and following the instructions and completing the task. Results indicated a statistically significant effect attributable to the effectiveness of the program based on positive behavior reinforcement of each category.

Monastr (2007) also explained that children with attention deficit and hyperactivity disorder showed a wide range of functional problems and many programs

of social skills have been designed for children with ADHD to face such aspects of functional disability. There is an evidence that these children can learn the basic skills enhanced through practice.

General education teachers should know enough about the level of cognitive disorder and attention deficit hyperactivity in order to be able to do what is required of them to diagnose students and provide educational intervention. Many researchers play a prominent role in improving the academic and social life of students with attention deficit and hyperactivity disorder (Hong, 2008).

The purpose of (Albertin, 2011) study is to get a new style for the diagnosis of attention deficit disorder. It developed a conditioned reflex method for the diagnosis of attention deficit and hyperactivity disorder using an automated apparatus. It contained a radial maze with a hidden search object which works as a reward. Successful task solution depended on the subject's attention to the spatial locations of sensory signals indicating the location of the search object in the maze. This method increases the accuracy of the diagnosis of attention deficit and hyperactivity disorder in pre-school and school age children and decreases the test duration (Albertin, 2011).

(3)The theoretical framework and studies for working memory and information processing:

Working memory and information processing emerged within the range of recent cognitive psychology trends associated with the development of information theory led by "Hunt " in 1964. The basic idea is assuming there is a similarity between the cognitive processes exercised by people to learn the concept and those carried out by the computer in information processing. Where proponents of the theory see that learning the concept is similar to a series of successive and rapid decision-making. In spite of that many psychologists believe that learning is a process of correlation, but it does not have a full agreement among them about the nature of this process. The difference between them is evident in these two major trends; the behavioral trend (correlation between stimulus and response M.R) and the cognitive trend (correlation between stimuli M. M.).

The concept of information processing:

The direction of Information Processing is one of the most important trends in contemporary cognitive psychology, which considers the human as a thinker, a researcher and innovative for the information. The information processing is "a series of successive operations that occur inside the mind of the individual since the mission and provide information until the release of the response (Hassanein, 1991)

Sharkawy (1992) said that information processing is " a set of procedures that are called stages of mental

training and mental approach to the information, which are crystallized by several processes causing cognitive construction of the human being, and that occurs since the introduction of stimulus until the advent of the response.

(Abu-Hatab & Sadeq, 1994) said that "The behavior can be analyzed into series of stages and processes which end by the final response to the screened as a product of these processes, and the individual compound of the processing of information."

Some of the basic concepts in the direction of information processing:

Encoding or encryption processes: the first processes that the learner practices after being aware of the information that comes or is exposed to him in different positions.

Sharkawy, (1992) sees that the term of Encoding is "a process of transformation and changing of the form of information from its natural state as presented to the individual to the codes such symbols, shapes, pictures or letters so that these codes mean a special connection with this information ". Memory codes are as follows:

a- Visual code: information element is represented in memory by its visual shape signifying.

b- Audio decoding: information element is represented in memory by its sound shape signifying.

c- Tactile code: information element is represented in memory by touch feature that distinguishes it.

d- Meaning indication codes: information element is represented in memory by the sense that it shows.

The concept and types of memory:

The process of storing and retrieving information and restoring its original image: The memory is an important factor for cognitive mental processes such as collection, composition and handling information. Memory is classified according to the processes related to the storage of information systems into three categories (Abu-Hatab & Sadeq, 1994):

a- Sensory memory: a memory storing sensory information allows to keep accurate and complete (to some extent as understood by the sensory system) decays or degrades very quickly, typically in the region of (1/5 - 1/2 second). And the movement of the image to the outside world with great and perfect accuracy as being received by the human senses, though most of the information recorded may not be subsequently of value for the individual. As the hearing and sight of them is needed to control the affairs of humans, the scientists have focused their concerns about sensory memory and private aspects into audio and video. They used the term " Iconic memory" for the expression of visual sensory memory, and used the term "Echoic memory" to denote the auditory sensory memory.

The most important characteristics of sensory memory:

a -Retains the details of the information received from the senses for a short period of time ranging from (0.1) to (0.5) seconds.

-It is not an accurate copy perfectly matched to the input of the environment, but it is detailed information which moves to short-term memory.

-Represents temporarily store of information.

-Works in the field of cognitive processing and recognition and retrieval patterns.

b- Short-term memory (STM): a primary memory and the information in the system of short-term memory remains for a few seconds or perhaps a few minutes. Basic features of Short-term memory can be summarized as follows:

-Retaining the information for a period ranging from seconds to a few minutes, a temporary store for information.

-Receiving information through the senses as converted into symbols.

-It has a limited storage capacity that it can keep the number of units between (2: 9),the unit of meaning an average of up to 5 units.

-Memory capacity is determined by the short-term time- specific for the survival impact of verb.

-The growth of short-term memory capacity, thereby increasing the capacity of storing accompanies the growth of mental energy.

-Short-term memory plays an important role in the assembly, thinking and retrieval.

c - Long-term memory (LTM):

There are recordings of permanent and semi-permanent information in it, and it has unlimited storing capacity. There are three types of memory in the timeframe for storage. And this is described as immediate, temporary or permanent storage. The most important basic features of long-term memory storage capacity is that it is permanent and unlimited, and that the information stored by attention requires to be moved from short-term memory to long-term memory.

Stages of formation and handling information:

Sharkawy (1992) explained that the study of information processing in humans is based on the basic assumption that "there is a set of mental procedures crystallized by several processes occurring in building the knowledge of human being, and that occurs between the submission or the appearance of the stimuli and the appearance of the response. Therefore, identifying properties of the stimuli and its meaning is the second stage in the processing information system of the individual. After identifying the stimuli, the individual selects the appropriate response and thus chooses to respond and this is the third phase in the system. There are three basic operations expected to

occur between the stimulus and response: feeling or discovery, identification, and selection response.

It is clear from the foregoing that the process of entering information into long-term memory is done through an iterative process (recitations), which occur in the short-term memory, and the information that is not repeated in the short-term memory neither loses nor interferes in the long-term memory store.

Formal representation for learning path according to the theory of information processing can be represented, as five senses are influenced by stimulus (visual 74-75%, audio 11-12%, smell 3-4%, tactile3-4%, sensory 3-4%) and moving to the sensory memory which include operations (attention, and sense, perception), where it takes (5 seconds), then comes the response, and then stimulus remain in short -term memory for (5) minutes, and moves on to the long – term memory that lasts inside for several years, as shown in (Figure 2) (Motaweh,1998):

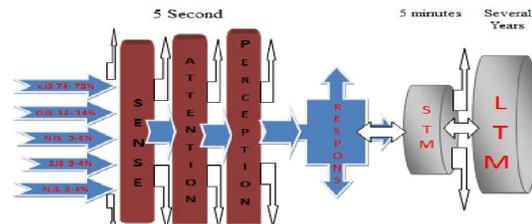


Figure (2): Learning path according to the theory of information processing

Research Hypothesis

1- There is no statistically significant difference (at the level of ≤ 0.05) between the results of the research sample in two applications of tribal and ex-post measure of attention deficit disorder.

2-There is no statistically significant differences (at the level of ≤ 0.05) between the results of the research sample in two applications of tribal and ex-post measure of working memory capacity.

Methodology

The implementation of the research follows the following procedural steps:

1-Information scanning stage, and includes a review of the literature to extract:

a- Theoretical frameworks relevant to the independent variable of Origami program for children with special needs.

b- Theoretical frameworks relevant by the two dependent variables; attention and memory in children with special needs and hyperactivity

2-The process of developing the training program and assessment tools, of attention and memory capacity, which include:

a- Preparing the program and tools in the initial image.

b- Viewing the program and tools to the arbitrators.

c-Pre experimenting to complete the procedures of scientific settings.

3- Field application phase of the training program and assessment tools of attention and memory capacity, and include

a- Surveying to determine the diagnostic sample.

b- Pre applying instruments. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR®) the application of the scale:

- Applying the standard by responding to the paragraphs - a classroom teacher who spent a period in teaching and dealing with students of respondents for not less than six months.

- Including a measure of attention deficit disorder and hyperactivity developer in its Arabic dimensions present is their expression patterns of turbulence: the pattern of attention deficit and excess movement pattern - impulsivity and dual-mode attention deficit and excess movement. The scale consists of (18), paragraph within four estimates represent: rarely, sometimes, often, always.

- Asking the teacher to choose appropriate evaluation of each paragraph of the measure based on his observation of the student's behavior since the beginning of the school year (at least six months), and after filling out personal information about the student, with the need to choose the right appreciation for all paragraphs.

- Arranging paragraphs scale so individual paragraphs reflect the pattern Attention Deficit with matrimonial paragraphs reflecting the pattern of excess movement - impulsivity in accordance with the instructions of the scale in its original form.

- The appearance of each paragraph behavioral present if the discretion of the teacher is often or always while the teacher's choice for estimating is rarely or sometimes which means there is no appearance of behavioral students.

- The student diagnosed as having disorder patterns as follows:

- The emergence of six behavioral symptoms of individual paragraphs means that the student has attention deficit disorder and hyperactivity: Attention Deficit style.

- The emergence of six behavioral symptoms of marital paragraphs means that the student has attention deficit disorder and hyperactivity: excess movement pattern of – impulsivity.

- The emergence of six symptoms of individual paragraphs and six symptoms of marital paragraphs means that the student has: attention deficit disorder and hyperactivity.

c - The application of tools before the training program.

d- The application of origami training program.

e- After applying the program, the researchers applied the tools.

1- The stage of monitoring and analyzing the results including:

- Monitoring the results of the application software and tools.

- A statistical analysis of the results.

- Answering the research questions and validating of the hypotheses.

2-The stage of preparing the final report of research, including:

- Recommendations.

- Future research and propose studies.

- The preparation of the final report and reviewing it.

The study sample:

The study sample: The study sample included (25) pupils in special needs primary school in Jeddah who suffer from learning disability with attention deficit disorder in merger regular school classes.

Research experimental materials and Tools:

For the present study the researchers prepared experimental materials and used the following tools:

1-The experimental material (proposed origami Program):

It is the program of activities for the formation of a technical paper Origami for the development of skilled attention and working memory in a sample of children with special needs in Jeddah (by researchers) through the Program building Steps as follows:

a- Literature Review:

Many of the literatures have been revised in the field of origami activities and their applications for the treatment of behavioral disorder problems, children with attention deficit disorder, and those with hyperactivity. This included: studies, researches, books and programs to help in preparation of a program of paper formations to increase attention and memory capacity in children with special needs.

b- Setting the bases for building the program (scientific bases / educational bases / technical bases) that consisted of:

-scientific concepts of learner environment (living and non-living components) included in the science curriculum.

-Formulation of the concepts in sensory form (visual and auditory) fitting the characteristics of special needs (hearing impaired and attention deficit disorder).

-Employing rules of origami activities for paper formations (Simple Rules / medium difficulty).

-Taking into account the successive stages of processing information (clarification / repetition /

practice / reinforcing) for visual stimuli accompanied by voice to influence in the (sensory memory and its processes: sensation, attention, and cognition), short-term memory, and long-term memory.

-Activating the principles of educational purposeful play for children.

-Diversifying training activities and implementation strategies to take into account individual differences among learners.

-Multiple stages of evaluation before the interaction of learners with the program, and during their interaction, and after they finish.

-Multiplicity of steps to teach the skill (observation, simulation, experimentation, practice, mastery) and repetition.

-Taking into account the principles of cooperative learning among children taking part in the training activities.

2-Diagnostic and Statistical Manual Scale (DSM-IV-TR ®) for attention deficit and hyperactivity (setting: Al-Hamidi).

Including a measure in its third Arab head of dimensions to assess the pattern of attention deficit, hyperactivity pattern (impulsivity), dual-mode attention deficit and hyperactivity. The scale consists of (18) paragraphs within four estimates representing: rarely, sometimes, often, and always.

Implementing the measure by responding to paragraphs - the classroom teacher, who spent a period in teaching and dealing with students of the sample for a period of no less than six months.

Arranging scale items: individual paragraphs to reflect the pattern of attention deficit in paragraphs, and to reflect the pattern of hyperactivity according to the instructions of the scale in its original form.

Pupil is diagnosed as having disorder patterns as follows:

-The emergence of behavioral symptoms in six paragraphs means that the student has attention deficit disorder: Attention Deficit.

-The emergence of behavioral symptoms in six paragraphs means that the student has hyperactivity.

-The emergence of symptoms of six individual paragraphs and six symptoms paragraphs of means that the student has: attention deficit disorder and hyperactivity.

3- Testing of scientific concepts photographer to assess working memory (by research team).

Test non-verbal (image) of scientific concepts of science and mathematics measure of working memory included in the program of technical formations paper (Origami) for elementary students who are suffering from attention deficit disorder, and the limited memory capacity. The test aims to be used to achieve the following objectives:

1 - Pupils know some forms of scientific and mathematical concepts.

2 - Clarifying the relationships between associated things.

3 - Application of what has been learned from the concepts in practical life.

4 - Analysis of scientific concepts.

5 - Linking between concepts.

6 -Diagnosing and therapeutic of some concepts included in the vocabulary test.

The test consists of six questions, each of which follows a number of sub-questions, have been developed to measure the levels of knowledge among group of students with special needs, which are been shown in the tab. (1):

Methods of data collection:

This research was covered in four phases:

1-validity & Reliability of tools:-.Validity & Reliability of the pictorial Test (non-verbal) of scientific concepts of science and mathematics working memory included in the program of technical formations paper (Origami) for elementary students who are suffering from attention deficit and hyperactivity, and limited memory capacity.

2- Diagnostic and Statistical Manual Scale (DSM-IV-TR ®) for attention deficit hyperactivity rated on the environment Gulf preparation(Hamidi, 2008)

Ethical considerations:

Approval was taken from The Ministry of Education and Special Education Administration in Jeddah before starting the research and data were collected after explaining the study aim to parents and teachers who participated in the Data collection.

Data collection:

Data were collected from the Test photographer (non-verbal) of scientific concepts of science and Diagnostic and Statistical Manual Scale (DSM-IV-TR ®) for attention deficit hyperactivity rated on the Gulf environment preparation (Hamidi, 2008) applied to a sample in the first Term of the year 2013.

Statistical analysis:

Data were analyzed using statistical package for social sciences (SPSS). The P-value < 0.05 was used as the cutoff value for statistical significance and estimating T.test to comparing between average score of the sample on the two tools of the research.

Graphic presentation:

Graphs were done for data visualization and using Microsoft Excel.

The Results and Comments:

1-Answering the first question:

The first question was answered by preparing proposed origami program which contains (aims, activities, evaluating tools).

2-Answering the second question and first hypothesis:

By analyzing data and estimating T.test for sample average on pre and post application of (DSM-IV-TR) Scale for attention deficit hyperactivity rated to

answer questions about the study, and to verify the validity of the first hypotheses, the result in table (2):

Tab. (1) specifications Table of scientific conceptual test

No.	Question Number and its branches			Cognitive levels of the questions according to the objectives of the test						
	Question	Items	Number of Responses	Remember	Understanding	Application	Analysis	Composition	Evaluation	
1	First Question	1	1	✓						
		2	1	✓						
		3	1		✓					
		4	1				✓			
		5	1				✓			
		6	1			✓				
		7	1			✓				
		8	1			✓				
		9	1					✓		
		10	1					✓		
		11	1						✓	
		12	1					✓		
		13	1							✓
		14	1							✓
2	Second Question	1	3				✓			
3	Third Question	1	3		✓					
		2			✓					
		3			✓					
4	Forth Question	1	1		✓					
		2	1		✓					
5	Fifth Question	1	1			✓				
6	sixth Question	1	1			✓				
Total		21	25	2	8	7	2	1	2	

Table (2) T-Test for sample average on pre and post application of (DSM-IV-TR) Scale for attention deficit hyperactivity rated

Var.	MEAN	STED	T.Test	D.F	Sign.
Pre appl.	41.52	4.26	9.17	24	0.05*
Post appl.	29.96	4.48			

The results indicated:

- A high level of the sample's attention deficit in the pre application (41.52 from 54) 77%.
- A low level of the sample's attention deficit in the post application (29.96 from 54) 55.5%..
- The post-application showed significant improvement in sample performance.
- The T.test value is (9.17) it is significant value in (0.05 level). This, in turn, indicates the effectiveness of the suggested program in decreasing attention deficit hyperactivity rated for sample, and this is the answer of second question of this research.

-There is significant statistically significant difference (at the level of ≤ 0.05) between the results of the research sample in two applications of tribal and ex-post measure of attention deficit disorder. This result indicates to refuse the first hypothesis.

3- Answering the third question and second hypothesis:

By analyzing data and estimating T.test for sample average on pre and post application of the scientific conception test. The result in table (3):

Table (3): T.test for sample average on pre and post application of scientific concepts Test

Var.	MEAN	STED	T.Test	D.F	Sign.
Pre appl.	17.2	2.48	4	24	5.05*
Post appl.	20	2.44			

The results indicated:

- A medium level of the sample's attention deficit in the pre application (17.2 of 25) 68.8%.

- A high level of the sample's attention deficit in the post application (20 of 25) 80%.

- The post-application showed significant improvement in sample performance.

- The T.test value is (4): it is a significant value in (0.05 level). This, in turn, indicates the effectiveness of the suggested program in sample performance on the scientific concepts Test, and working memory. There is a statistically significant differences (at the level of ≤ 0.05) between the results of the research sample in two applications of tribal and ex-post measure of working memory capacity. This result indicates refusing the second hypothesis.

Recommendations:

1-Employing origami activities as one of cheap technology to reduce attention deficit and hyperactivity disorder of children with special needs.

2-Training students in the Faculty of Education or the Department of Special Education students and teachers of students with special needs on activities including origami.

3- Experimenting the effectiveness of origami activities on developing social relations for students with disabilities.

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