Effect of visual and audio educational games on visual memory of children

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Abstract: The aim of this study is to investigate the effect of visual and audio educational games on the visual memory of children. In this area, the researcher has chosen his study by selecting an experiment group and a control group including 40 ones from statistical population of boy children in the age of 3 to 6 years in district 3 of Ahvaz using random sampling method. The method of study has been semi-experimental with post test-pretest designs with experiment and control groups. To investigate the effect of educational games on the visual memory improvement, researcher-built test has been prepared by the researcher. Face validity of researcher-built test has been confirmed by expert groups (advisor and 6 ones of instructors and kindergarten professional managers) and reliability of the test has been obtained using test-retest method. Data analysis has consisted of the average score of experiment and control groups and inferential statistics has included covariance for analysis and proving the hypothesis. The results have shown increased visual memory improvement in a level of significance of 0.001 compared with control group. And finally, the effectiveness of use of educational games on the visual memory improvement of children has been proven by confirming the hypotheses.

Keywords: Memory, Visual memory, Educational game, Children.

I. Introduction

Nowadays due to business and the problems of urban life, parents usually spend a little time beside their babies and children and are concerned about intelligence of their children. They take their children to the kindergartens of pre-school to be more certain about better education. But the problem is here; to what extent it is worked on the memory and training in the kindergartens and which methods are used. Children spend the first few years of their life in the kindergartens. If parents are aware of the brain growth in early years, they make better decisions about taking care of their children (Jensen, 1981). The results of studies show that children achieve new mental concepts during playing games, especially educational games and obtain more skills. They familiarize with various colors, shapes, and directions and earn valuable experiences. Learnable contents are taken during playing a game without stress. The games help children to know, to understand, to control, and to distinguish between reality and imagination. In a game, children play various roles and find out the role that gives them the most enjoyment (Firouzi, 2000). The game is the main stimulus of learning and personality growth revolution at the time of childhood and it shows the characteristics related to the revolution. Children need to play the games for learning. Many studies conducted in seventh decade and early eighth decade have shown that the game has logical advancement to the child that is related with his/her cognitive, social, and emotional revolution. Piaget (1959) showed that how children obtain experience during playing a game and how they perceive cause and effect relationship. Perception and imagination grow up selves and make concepts. Children need to play games to learn (Seif, 2008). Therefore, attention to this point is important that the game is improver and former of the perception and child memory. Effect of memory on educational improvement and all life affairs are evident. Some children show severe problems when visual and audio techniques are used and they cannot understand the meanings and symbols (Kalhori, 2007). According to this that a great percent of learning in children is achieved through audio and visual ways, if audio and visual perception of a child that is occurred between the age of 3.5 and 7.5 years happen with a delay, some damages will be created in cognitive areas. One of the most important factors of social advancements in human life is learning. School trainings are a part of her/his life that is entirely learning. Human after learning can do a behavior that are not able to do before (Karimi, 2007). If we finally consider “learning appear after changing the behavior” as physical changes, these changes result in cognitive changes. So, training process should be designed and programed in such a way that leads to changes in the brain and can observe its practical outcomes in the behavior. Also, according to this that a physical structure exists in human brain that determines the brain activity performance, the activity of physical structure results in evolution and cognitive process. Any learning that is created after sensory stimulation needs creating mental performances and activities that are happened in the brain (Nazari, 2010). Some children have
problems in audio and visual memory and cannot register sounds or images in their memory. These children require training which help them to recognize sounds of words and to create phonetic and memorizing skills. A person who has a weakness in audio memory has some problems in remembering information that he has heard despite he has a healthy sense of hearing. Some children show their abilities in the field of remembering what they have experienced through their eyes in the past in various forms of remembering alphabets, drawing shapes, and writing them. But sometimes it is observed that some children despite having healthy intelligence and sensory channels have some problems in remembering letters and written symbols. They get in trouble in answering questions related to the story and consecutive events existed in a story. They also get in trouble in memorizing and remembering the instructions (Abdollahi, 2013). In this study, the purpose of visual memory is ability to remember images that a person has seen them previously. In spite of that there is not any problem in visual aspect he/she does not have any problem in remembering and recognition of observed images (Alvarez, Cavanagh, 2008). Visual perception is a process by which visual information are analyzed (Van den Berg et al., 2012) and enable the person to has an exact judgment about the size, color, shape, and spatial relationships of things. A person needs to process visual information to can do daily activities of his/her life well (Brady and Alvarez, 2012). Since the children are at golden ages of targeted educational game, physical structure system of the brain is formed better by creating mental activities and sensory stimulation. And children from the beginning familiarize how to use memory better and obtain significant abilities in learning, remembering, identifying similarities and differences, remembering and relationship among images. The researcher due to the experience in the field of working with students and observing the weakness in their visual and audio memory aims to use the results of this study to improve the audio and visual memory of students at own proper time (3 to 6 years).

II. Research background

Larson et al. (2006) did some experiments on 65 American children and after practical investigations concluded that playing audio and visual games has a great effect on the linking memory of children and this result has had a positive effect on 97% of children (Mozaffari, 2010). Based on studies conducted on Scottish schools (2008), Scottish Education Organization by investigating the effect of memory educational games announced: playing daily memory improvement games can identically tailor learning math in girl and boy students. According to related researchers, investigating the focus and behavioral ways of students will have a positive effect. Researchers implemented the program of playing memory improvement educational games on 600 students in 32 Scottish schools to conduct these studies. A group of student did the games including reading tests, resolving problems, and memory improvement puzzles 20 minutes per day during 9 weeks at the beginning of their own math class. This research group found that score obtained from this group of students will have 50% improvement with respect to the other student groups. A 5 minutes decrease in the time of the test also can deny this ability and obtained scores from this group of students were significantly higher than those of the others. By observing these results, Scottish Education Organization declared that use of memory improvement educational games can eliminate education gap existed among students and provide identical learning level of math for all students (Jafari Zarrin Ghabaeae, 2002). Studies of Harrison and colleagues on 40 Scottish children showed that children who have done various games, were more successful than the others and after a practical investigation they found that doing games had caused spatial memory improvement of children (quoted by Forotan, 2006). Saliz and Danrvs (1981) in a study had been performed about learning coincided with the games showed that memorizing sentences and images in various issues using playing games was much better than the time that children were forced to memorize them (quoted by Varzani, 2010). Humfry (1981) conducted a study about the important issue of use of educational games that shows the use of educational games is effective on the learning and memory improvement, especially the games that create an opportunity for obtaining merit accompanying with learning educational skills and exercising mental abilities (Varzani, 2010). Malarda and Sogihara (1969) did a study on the relationship of educational games with memorizing and concluded that after doing educational games, a significant progress is observed in learning (quoted by Varzani, 2010). Forotan (2006) investigated the effect of educational games on preschool children learning speed on 45 children. The results showed that educational games lead to increase in children learning speed. Nazari (2010) measured raising spatial memory using mental illustration in chemistry. Doing mental illustration exercises resulted in spatial memory improvement and progress in chemistry. Fateghi (2009) did a case study titled “how we can decrease dictation disorders of student by improving visual memory and audio sensitivity?” In this research, weakness in visual and audio memory has been known as the cause of dictation disorders. Dictation disorders of students have been eliminated after doing treatment program in order to improve these two factors. Ahouee (2009) did a research titled “effect of educational games on short-term memory of children” that obtained results showed that educational games has lead to increased short-term memory.

III. Method

The current research was semi-experimental that has been conducted with two groups of control and experiment. This research was of a applied type and its purpose was to increase mental capacity and to improve
visual memory so that measures the effect of educational games on visual memory of children at the age of between 3 to 6. The statistical population of this research was boy children between 3 to 6 years old in district 3 in Ahvaz. The statistical sample includes of 40 boy children between 3 to 6 years old that are selected from all kindergartens in Padadshahr area in Ahvaz in education year of 2014 using a random sampling method. The sampling was performed using the simple random method and based on all kindergartens of district 3 in Ahvaz, two kindergartens were chosen. Then 20 ones were selected from boy children between 3 to 6 years old as control group and 20 ones as experiment group. Data collection tools in this study were researcher-built test in order to improve children memory between 3 to 6 years, images, and picture stories. The test contained 45 pictures. Face validity of researcher-built test has been confirmed by expert groups (advisor and 6 ones of instructors and kindergarten professional managers) and reliability of the test has been obtained using test-retest method. Test-retest coefficient of the tests was 44% to 94%. 40 ones from children between 3 to 6 years in district 3 in Ahvaz were randomly selected, test has been executed, and test scores have been given. The test was done once again after two months, test scores have been given and then results showed that playing educational games have had a positive effect on the visual memory. This research has been implemented in three stages including 1) pretest implementation, 2) training using images, and 3) post test implementation. In first stage, a pretest containing 20 questions in relation with memory capacity was given to two groups before starting the training and then test scores were given. In second stage, training of the experiment group was started by images selected by the researcher and designer. The method of training was this that at first, experiment group parents were asked to participate in educational sessions. In these sessions the way of doing educational games has been given. Then, they were asked to continue this game two days per week for two months. The researcher has been in contact with parents every week and has investigated the execution of the test. In third stage, posttest last for two months. Posttest was repeated using new images for both two groups and grading was done. Posttest data were used to investigate the effect of educational games on the visual memory improvement. Visual memory game consists of some images two to two similar to each other. The images are different in color and adding a small image to them. In first stage of doing the game, one of two images is shown and then the image is omitted and two pictures are shown to the child and in final stage the child is asked to show the image that he/she has seen. Descriptive and inferential statistics was applied to investigate study data. These data were classified and summarized and information was interpreted and covariance was used.

### IV. Findings

#### Table 1. Descriptive properties of visual memory pretest for experiment and control groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Number</th>
<th>Minimum score</th>
<th>Maximum score</th>
<th>Average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual memory</td>
<td>Experiment</td>
<td>20</td>
<td>1</td>
<td>4</td>
<td>3.35</td>
<td>0.933</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>20</td>
<td>1</td>
<td>4</td>
<td>3.30</td>
<td>0.865</td>
</tr>
</tbody>
</table>

According to the results given in Table 1, the average score of visual memory in pretest related to experiment group and control group were 3.35 and 3.30, respectively.

#### Table 2. Descriptive properties of visual memory posttest for experiment and control groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Number</th>
<th>Minimum score</th>
<th>Maximum score</th>
<th>Average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual memory</td>
<td>Experiment</td>
<td>20</td>
<td>2</td>
<td>5</td>
<td>3.70</td>
<td>0.979</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>20</td>
<td>2</td>
<td>4</td>
<td>2.85</td>
<td>0.745</td>
</tr>
</tbody>
</table>

According to the results given in Table 2, the average score of visual memory in posttest related to experiment group and control group were 3.70 and 2.85, respectively.

#### Table 3. Investigating the normality of the distribution of the pretest data related to visual memory for experiment and control groups

<table>
<thead>
<tr>
<th>Visual memory</th>
<th>Maximum final differences</th>
<th>Absolute</th>
<th>0.050</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Positive</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>-0.050</td>
</tr>
<tr>
<td></td>
<td>Kolmogorov-Smirnov Z</td>
<td>0.158</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Level of significance</td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Table 3, the results of Kolmogorov-Smirnov test for pretest data related to visual memory in sample groups, based on the distribution of observed data and normal, a significance difference in distributions is not observed (p>0.05) and normality hypothesis is correct.

**Hypothesis:** doing audio and visual educational games has a positive effect on the visual memory of children.

To investigate this hypothesis, covariance analysis between posttest of visual memory in experiment and control groups was calculated by holding effect of pretests. The results are given in Table 5. Also, Leven test was used in Table 4 to investigate the homogeneity of variances.
According to Table 4, because Leven test is in level of significance of 0.05, the used test had homogeneity between obtained variance.

V. Discussion and conclusion

The results of the current study showed that audio and visual educational games lead to visual memory improvement of children. In a study, Forouzandeh and Mahdiye (2014) also reported that game therapy results in visual memory improvement in children with ADHD. This finding is consistent with the results of the current study. Also, the results of the studies show that more hopeful people have better visual memory (Heidari et al., 2012). The game greatly helps the evolution of children that taking these helps are not possible in a different way. One of the most important sensory channels by which human receives a lot of information and memorizes it is eyesight (Williams M., Woodman G.F., 2012). After information received from this channel was memorized, then it is recalled that it is known as visual memory. The person shows his/her ability in the field of remembering what he has experienced by the eyes in the past, but it is sometimes observed that some children despite having healthy intelligence and sensory channels have some problems in remembering letters and written symbols and shapes. The effect of memory on the educational progress and all life affairs is evident. Some children show severe problems and cannot understand the meanings and symbols when usual audio and visual techniques are used (Kalhori, 2007). Visual memory is a part of sensory memory that keeps an image for a short time (Rahmani, 2012). Since many educational materials are presented in a visual way, it is necessary to obtain more information about the visual memory of children and if there is a problem in visual memory we can seek its cause in educational approaches (Pourafkari, 2004). Some people show a weakness in audio and visual memory. It is very important in clinical diagnosis to determine the damaged aspect and quantity, and to distinguish among personal differences, because based on it the recovery and therapeutic ways can be suggested (Bahrami, 2002). According to this that a high percent of learning in children is achieved through visual ways, if visual perception of a child that is occurred between the age of 3.5 and 7.5 years happen with a delay, some damages will be created in cognitive areas. To compensate these damages, games and some activities must be provided to idiomatically missing rings can be compensated in growth stages (Seif, 1996). To improve visual memory in children we do not need to use tools or complicated exercises. It is only required to use a special game during playing with children all day long and observe visual memory improvement of children over time. Visual memory is better done in form of a game and patiently (Tabrizi, 2010). Memory of a child in producing regular shapes that he/she sees is measured using visual memory test. In this test a child is asked to arrange once again a series of visual stimuli such as things or geometrical shapes after seeing them using his/her memory (Seif Naraghi, 2010). The results of this study aim to promise families to be hopeful about mental prosperity and empowerment of their children with their helps and using proper educational methods and prevent the occurrence of learning disorders at future using audio and visual educational games in order to more learning of children. By the way, the results of this study can be used for Welfare Organization and children educational centers.
References