

## **impact of a program based on the Visual-Spatial Approach using enhanced reality technology on visual thinking and some basic skills in tennis**

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### **Introduction:**

Our modern world is witnessing successive and unprecedented developments in educational technologies that have contributed to radical changes that have made education a more inspiring, exciting, and effective process than in the past. (14)

Visual-Spatial Approach is one of the educational approaches that emphasize the role of visual representation in providing information and dealing with ideas. Educators believe that it is one of the best ways to help learners to learn how to learn and how to think. This approach relies on visualization and imagination. forming Mental Images, through a set of strategies, that employ the spatial visual abilities of learners, using multiple visual media. (16)

Visual thinking is one type of thinking that arises as a result of stimulating the mind

with visual stimuli. Consequently, one or more relationships help to solve a problem or approach a solution (9:32). Visual thinking is related to the right hemisphere of the brain, where it is responsible for total cognition, the ability to synthesize and visual learning, and connects the forms of visual and verbal communication in ideas (9:32) (12).

The term augmented reality refers to the possibility of integrating virtual information with the real world. It adds digital multimedia content such as images, video, or 3D objects to enhance user awareness and understanding. For a work to be augmented reality, it must have three qualities: a combination of reality and fiction. - Interact with reality and imagination

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simultaneously. - Real-world observation using 3D images.

Augmented reality (AR) differs from virtual reality (VR) in the fact that virtual reality isolates the learner from real world .While Augmented reality integrates with real reality through support, enhancement, development and not a replacement. (3), (5), (6), (7), (8), (10), (11), (18)

Several studies have demonstrated the effectiveness of the spatial visual approach in the achievement of various subjects such as Barakat Ahmed El Sayed (2006)(4) and Woolner (2008)(17) which proved the effectiveness of the spatial visual approach compared to the verbal method of learning mathematics for university students.

Several studies have also demonstrated the effectiveness of augmented reality in undergraduate learning such as Shelton & Hedley (2002)(15), which aimed to identify the impact of augmented reality technology on the teaching of geospatial-solar concepts to university students specialized in geography, Ivanov & Ivanova (2002)(8), which aimed to improve the teaching

and learning of computer graphic material using augmented reality technology, and Chen's study (2013)(6), which aimed to reveal the effect of augmented reality technology and its ability to facilitate chemistry learning for undergraduates. However, as far as the researcher is aware, none of the previous studies have examined the impact of a spatial visual approach using augmented reality technology on visual thinking and some basic tennis skills.

Through the work of the researcher teaching the tennis curriculum of the third year specializing in racket games where the game of tennis is taught in full during one semester only (12) lectures including teaching basic and advanced strikes and principles of play plans, individual and doubles play in addition to international tennis and arbitration law, which is a real challenge for students and teachers to deliver this amount of information because of the limited time and massive numbers

Since learning tennis mixes performance skills and mental performance, the

activation of the various sensory tools is necessary to achieve effective learning. Through the use of augmented reality technology and a variety of multimedia that includes sounds, graphics, text, animation and video clips within the framework of the spatial visual approach, where the student is given the opportunity to lead the learning itself and search through layers of information added to the existing reality In front of her new information and thus learning is richer, more interactive and dynamic and takes into account the individual differences between students, which increases their motivation towards learning and the development of higher-order thinking and visual thinking, which led the researcher to do this study to assess The impact of a spatial visual approach program using augmented reality technology on visual thinking and some basic tennis skills.

The objective of the research is to find out the effect of a program based on the spatial visual input using the enhanced reality technology on visual thinking and some basic

skills (The forehand stroke, the backhand stroke, straight serve) in tennis.

**- Research hypotheses:**

- There are statistically significant differences between the pre and post measurements of the control group in visual thinking and some of the basic skills in tennis under research in favor of post measurement of the students of the third division tennis specialization in the Faculty of Physical Education for Girls Zagazig University.
- There are statistically significant differences between the pre and post measurements of the experimental group in visual thinking and some of the basic skills in tennis under research for the post measurement of the students of the third division tennis specialization in the Faculty of Physical Education for Girls Zagazig University.
- There are statistically significant differences between the two post measurements of the control and experimental groups in visual thinking and some of the basic skills in tennis under research in favor of post measurement of the experimental group of students

of the third division of tennis specialization at the Faculty of Physical Education for Girls Zagazig University.

### **Research Methodology:**

Experimental Method of pre-post Measurements for two groups, one experimental and the other is a control group.

#### **research community:**

Represented in the students of the third division tennis specialization at the Faculty of Physical Education for Girls - Zagazig University for the academic year 2016/2017, consisting of (44) students.

#### **The research sample:**

Two groups, one experimental and the other is a control group, each consisting of (13) students chosen by deliberate random method.

The researcher calculated the individuals distribution moderation of the research sample where values of torsion coefficients ranged from (), between ( $\pm 3$ ) indicating that the research sample falls under the average curve in all the variables under consideration.

The researcher also found parity between the two groups (experimental - control), to ensure the equivalence of the

two groups in all the variables under consideration.

Data collection tools and means:

#### **Skillful tests:**

- 1- The forehand stroke accuracy test.
2. The forehand stroke force test.
- 3- The backhand stroke accuracy test.
- 4- The backhand stroke force test.
5. Serve accuracy test.
6. The power of serve performance Test. (13)

#### **Tennis Visual Thinking Test: Test goal:**

cognitive aspect levels measurement of some basic tennis skills (serve - forehand stroke- backhand stroke) (according to Bloom's classification), intersecting with the measurement of visual thinking skills (visual discrimination, spatial relations Perception, information interpretation, information analysis, meaning deduction).

#### **Educational program:**

It aims to use the enhanced reality technology through the spatial visual input in developing visual thinking skills and learning some basic skills in tennis.

**Pre measurements:**

The researcher conducted the pre measurements in the period from Monday 10/10/2016 to Thursday, 13/10/2016 for the members of the experimental and control groups in visual thinking and some basic skills in tennis (serve - forehand stroke - ground strike).

**Application of the educational program:**

The educational program was implemented using the enhanced reality technology on the experimental group in the period from Monday 17/10/2016 until Thursday 8/12/2016, and was distributed to (8)Weeks (8) units were

**Review and discussion the results:**

completed, one unit per week, while instruction was given to the control group in the order learning method.

**Post measurements:**

Post measurements were conducted for both research groups (control-experimental) after the completion of the implementation of the educational program during the period from Sunday 11/12/2016 to Wednesday 14/12/2016 in the same order and conditions of the pre measurements.

**Statistical Methods:**

- Arithmetic mean - Standard deviation - Medium - Torsion coefficient - Simple correlation coefficient - " T" test.

**Table (1)**

**The significance of the differences between the pre and the post measurements of the control and experimental groups In visual thinking and some basic tennis skills N1 = N3 = 13**

Variable	Measurement Unit	Control group				Experimental Group					
		pre measurement		Post Measurement		pre measurement		Post Measurement		"T"Value	
Visual thinking	Degree	7.99	2.65	12.22	2.34	4.145	7.69	2.43	22.23		2.12
The forehand stroke accuracy test.	Degree	1.21	2.71	3.22	0.86	-2.449	1.02	3.31	5.75	1.06	-4.714
The forehand stroke force test.	Degree	1.36	2.21	3.42	1.21	-2.832	1.11	2.62	5.55	0.67	-5.687
The backhand stroke accuracy test.	Degree	0.906	2.7	3.02	1.32	-2.437	1.54	2.92	5.21	0.92	-4.153
The backhand stroke force test.	Degree	0.947	2.32	3.02	1.11	-2.792	0.986	2.76	5.09	1.01	-4.837
Serve accuracy test.	Degree	1.57	3.41	3.85	1.03	-2.217	1.31	3.87	6.05	1.04	-4.097
the power of serve performance Test	Degree	1.87	3.8	4.97	1.07	-2.720	2.29	4.71	6.96	1.79	-3.211

The value of the table "T" at level 0.05 and free degrees 25 = 2.060 \* significant at the level of 0.05

Table (1) shows statistically significant differences at the level of 0.05 between the pre and the post measurements of the control and experimental groups in visual thinking and the level of performance of some basic skills (straight serve - forehand stroke - backhand stroke ) in tennis in favor of the post measurement.

-The researcher attributes this improvement to the traditional program, which relies on the method of explanation and model, where the teacher provides students with a practical demonstration of the skill of the subject studied and is committed to providing graduated exercises from easy to difficult and simple to the compound with repeated practice of students, which allows correcting errors and positively affects skill performance. This finding is consistent with what Aboul Naga Ezzedine (2001) pointed out in terms of the importance of the role of the teacher as the main factor in the educational system and who has the key to success, reform and development (2: 12).

**Thus, validating the first research, which states:**

"There are statistically significant differences between the pre and post measurement of the control group in visual thinking and some basic skills in tennis."

The researcher believes that the use of the program based on the entrance of spatial visual augmented reality technology provided an interesting and fun way to learn, where the program included three-dimensional presentations that helped students to imagine in a good way. The program contributed to the formation of positive attitudes towards learning in general, and towards the basic tennis skills in question in particular. The program helped to stimulate the students' motivation to learn, raise their mental abilities and develop their visual thinking skills.

This finding is consistent with those of Shelton & Hedley (2002) (10), Ivanov & Ivanov (2002) (8), Anderson (2014) (3), Chen (2013)(6), Yen (2013) (18), Chang (2013) (5), Chen (2006) (7) in terms of the positive impact of augmented reality technology on student

learning for different stages and subjects .

**Thus, the validity of the second research, which states:** "There are statistically significant differences between the pre- and post-measurements of the

experimental group in visual thinking and some basic skills in tennis to validate the post-measurement of the third year students specialize tennis at the Faculty of Physical Education Girls Zagazig University."

**Table (2)**  
**Significance of differences between the two dimensions of the control and experimental group in visual thinking and some basic skills in tennis N1 = N2 =13**

Variable	Measurement Unit	Control group post measurement		Experimental group Post Measurement		"T"Value	Improvement ratio %
		S	P	S	P		
Visual thinking	Degree	١٢.٢٢	٢.٣٤	٢٢.٢٣	٢.١٢	١٠.٩٨٢-	٨١.٩١٥
The forehand stroke accuracy test.	Degree	٣.٢٢	٠.٨٦	٥.٧٥	١.٠٦	٦.٤٢١-	٧٨.٥٧١
The forehand stroke force test.	Degree	٣.٤٢	١.٢١	٥.٥٥	٠.٦٧	٥.٣٣٥-	٦٢.٢٨١
The backhand stroke accuracy test.	Degree	٣.٠٢	١.٣٢	٥.٢١	٠.٩٢	٤.٧١٥-	٧٢.٥١٧
The backhand stroke force test.	Degree	٣.٠٢	١.١١	٥.٠٩	١.٠١	٤.٧٧٨-	٦٨.٥٤٣
Serve accuracy test.	Degree	٣.٨٥	١.٠٣	٦.٠٥	١.٠٤	٥.٢٠٧-	٥٧.١٤٣
The power of serve performance Test	Degree	٤.٩٧	١.٠٧	٦.٩٦	١.٧٩	٣.٣٠٦-	٤٠.٠٤٠

The value of the table "T" at the level of 0.05 and free degrees 24 = 2.064 \* significant at the level of 0.05

Table (2) shows statistically significant differences at the level of 0.05 between the two post measurements of the experimental and control groups in all the research variables in favor of the experimental group.

The researcher attributes these differences to the educational program based on the visual spatial entrance using the augmented reality technology based on the sense of sight, which will attract the attention of students and develop visual thinking skills. Madiha Muhammad (2004) also emphasizes that relying on visual-based techniques can develop visual thinking skills, as they consist primarily of visual forms (9:32).

This result is consistent with the results of the studies of Majdi Akl (2014) (10), Maha Al-Husseini (2014) (11), and Ahmed Abu Zayed (2013) (1) in terms of the positive impact of augmented reality technology and other technologies on the development of visual thinking skills. For female students.

**Thus, the validity of the third research hypothesis,**

**which states:** "There are statistically significant differences between the two post measurements of the control and experimental group in visual thinking and some basic skills in tennis. In favor of The post measurement of the experimental group of the third year students specializing in tennis at the Faculty of Physical Education Girls Zagazig University.

**Results:**

1- The use of a program based on the spatial visual input using the enhanced reality technology has a statistically significant positive effect at the level of 0.05 on the performance level of some basic skills (The forehand stroke – the backhand stroke - straight serve) in the tennis students of the third division tennis specialization at the Faculty of Physical Education for Girls Zagazig University.

2- Increasing the effectiveness of a program based on visual spatial input using the technology of the enhanced reality learning by orders method to positively affect the level of performance of some basic skills (The forehand



stroke - the backhand stroke - straight serve) in tennis students third division tennis specialization Faculty of Physical Education Girls Zagazig University.

#### **Recommendations:**

1- The necessity of using the visual spatial input using the technology of enhanced reality as one of the modern teaching methods to learn and master some of the basic skills (The forehand stroke - the backhand stroke - straight serve) in tennis students of the third division tennis specialization at the Faculty of Physical Education for Girls Zagazig University.

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