Visual representation by educational infographic (static-moving-interactive) and its effect on learning some Offensive skills and cognitive achievement in handball

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Abstract :

This research aims to the visual representation of the educational infographic (static-moving-interactive) and its effect on learning some Offensive skills and cognitive achievement in handball, and the researcher used the experimental curriculum using experimental design with the pre and post measurements for three experimental groups where The basic research sample included the number of (54) students divided into three experimental groups of each (18) students of the First Division of the Faculty of Physical Education for boys Benha University for the academic year 2017/2018 in addition to (12) students as an exploratory sample, The researcher used Adobe Illustrator in the design of static Infographic and Adobe After Effect in the design of moving and interactive Infographic , the most important results indicated that there are differences between the pre and post measurements for the three experimental groups, and that there are differences between the experimental group The first (static Infographic) and the second experimental Group (moving Infographic) for the second experimental group in some educational outputs, and also between the second and third experimental groups (moving/ Interactive) for the third group in some Educational outputs (skills and knowledge) is in progress, and the interactive Infographic has more value than both hard and moving Infographic for educational skills and cognitive outputs, and contains more information

Keywords: Visual representation, static infographic, moving infographic, interactive infographic, offensive skills, cognitive achievement ,handball.

Introduction :

Many innovative modern technologies have emerged that can be found in the education process, especially e-learning, including the emergence of the term Infographic, which means the delivery of information through the image where Infographic contains information and data that is

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provided to the reader by viewing the data Contained in graphic information diagrams and aims to display complex information quickly and clearly and improve understanding and perception using the drawing and improve the ability of the learner's visualization system to see patterns and trends in the data

Infographic technology with its diversified designs works to change the way of thinking about complex data and information and adds a new visual form to the collection and presentation of information or the transmission of data in an attractive

image of the learner and assists the educators of the educational process in Introducing the curriculum in a new and interesting way, so we need to research a new method to apply this technology in the service of the educational process and integrate it into the courses **[1]**. infographic as a visual representation of the presentation of data, information or knowledge and aims to provide complex information in a fast and clear manner and has the ability to improve cognition through the use of graphics to enhance the ability of the optical device for the individual, It blends information Infographic with graphic design to enable visual learning and this communication process helps to provide complex information in a faster and easier-to-understand way**.[2]** The educational Infographic works to simplify complex and large information and make it easy to understand and rely on visual effects in communicating information and speed in the presentation of information and communicating it to the receiver as well as the gravity and suspense in the presentation of the information so we find that the interaction is greater on the sites Social networking with themes that include images, ease of dissemination and diffusion Infographic via social networks **[3].**the educational Infographic is of great importance in the course of the educational course, it provides scientific facts in the form of audiovisual information, provides the learner with the opportunities for comparison and meditation, and provide him with the

means of deductive thinking as well as being essentially Knowledge of those who are unable to conclude from direct reading only, carry the contents of the discourse, clarify its ideas, facilitate understanding and simplify the information **[4].** Handball is one of the collective games that has attracted great attention from many researchers and specialists to provide some technological innovations that serve the game, whether in the field of teaching and training, and most researchers started to address the production of software that helps the operators of the process Educational and training to facilitate their mission to reach the mind of the learner to produce some exercises and exercises to impart information and knowledge without feeling bored and frustrated. Studies on the use of Infographic technique in the educational process such as [5,6,7,8,9] Who recommended that Infographic should be used in the educational process.

By informing the researcher about the latest new and non-traditional technological means used by many colleagues abroad, which provides information that is combined with images and may be static, moving or interactive influenced by the learner found a term referring to the educational Infographic which is suitable for use In all areas, therefore, it was necessary for the researcher to employ modern technology in education to remove the student from the traditional reality in education to other educational environments, which enables the student to interact with them because of the existence of a constant image and a three-dimensional graphics affecting and affected to complete The educational process is best on the one hand ,On the other hand researcher in the field of handball have not addressed the use of the technology Infographic education as a means of learning to know its impact in the teaching and teaching of handball courses, it is a scientific attempt of research and experimentation and hence the problem of research in the attempt to produce static, moving and interactive graphic designs In handball and know its impact on some Offensive

skills and cognitive achievement in handball

Aim: This research aims at the visual representation of educational infographic (static-moving-interactive) and its effect on some Offensive skills and cognitive achievement in handball.

Research Hypotheses

1. There are statistically significant differences between the averages of the pre and post measurements of the first experimental group (static Infographic) in favor of post measurement in some Offensive skills and cognitive achievement in handball
2. There are statistically significant differences between the averages of the pre and post measurements of the second experimental group (moving Infographic) in favor of post measurement in some Offensive skills and cognitive achievement in handball
3. There are statistically significant differences between the averages of the pre and post measurements of the third experimental group (interactive Infographic) in favor of post measurement in some Offensive skills and cognitive achievement in handball
4. 4. There are statistically significant differences in post measurements among the three experimental groups in some Offensive skills and cognitive achievement in handball

Research procedures:-

Research Methodology: The researcher uses the experimental method using the experimental design of the pre and post measurement to three experimental groups

Sample : The research community was chosen from the students of the First Division of the Faculty of Physical Education , Benha University , which is (615) students, then the researcher selected (54) students, divided into three experimental groups of each group (18) students plus a number (12) students as exploratory sample

homogeneity of the sample:

Table (1)
Mean, standard deviation, and skewness Of the research sample
n=66

variables			Test unit	Mean	SD	Median	Skewness
Growth variables		Age	Year	١٨.٧	٠.٣١	١٩	٠.١٠-
		Length	Cm	١٦٩.١	١.٥٢	١٦٩	٠.١٩
		Weight	kg	٦٩.٤٥	٢.٤٦	٦٩	٠.١٧-
IQ			Deg	٦١.٩٢	٣.٦٦	٦٢	٠.١٠-
Physical variables	Muscular strength		kg	٣٨.٠٣	٢.٥٢	٣٨	٠.٢٧-
	The characteristic power of speed for arms		meter	١٨.٨٠	١.٨٣	١٩	٠.١١-
	The characteristic power of speed for legs		Cm	٣٧.٢٥	٣.٠٩	٣٨	٠.٤٤-
	Transitional speed		Sec	٤.٥٤	٠.٢٢	٤.٥٦	٠.٢٠
	Flexibility		Cm	٩.٦٦	١.٨٥	١٠	٠.٣٥-
	Agility		Sec	٢٥.٤٨	٠.٨٦	٢٦.١٦	٠.٦١-
	accuracy		Deg	١٥.٠٩	٠.٩٨	١٥	٠.٤٨-
	Compatibility		Deg	١٤.٥	١.٦٢	١٥	٠.٥٠-
	Speed of performance		Sec	١٤.٨٨	٠.٦٧	١٥.٠٩	٠.٠٥٨-
Offensive skills	Dribbling the ball in a squiggly line 30 m		Sec	١٢.٧٢	٠.٧٣	١٢.٥٣	٠.٠٢٧
	pass and receipt on the wall for 30 seconds.		num	١٦.٣٣	١.٠٥	١٦	٠.٠٦٨-
	Receipt of the movement		Deg	١١.١٣	١.٣٦	١١	٠.٢١-
	Jump shots		Deg	٢٣.٨٣	١.٥٣	٢٤	٠.٠٧٩-
Cognitive achievement			Deg	٢٤.٥٧	١.٧٥	٢٤.٥	٠.٤٣

Table (1) shows that skewness of the research sample confined to transactions between (+3, -3), which indicates the homogeneity of the sample

Parity Search Sample

1: The equivalence of experimental research sample in growth variables and physical variables

Table (2)
Variance between the pre measurements of the three experimental groups in infographic in growth variables, intelligence and physical variables N=54

variables	tests	Variance Source	Total Squares	Degrees of freedom	Squares Averages	F value	Significance level
Growth variables	Age	Between	٠.٠٦٥	٢	٠.٠٠٥	٠.٢٩	no significant
		Within	٥.٦٩	٥١	٠.١٨		
		sum	٥.٧٥	٥٣			
	Length	Between	**٠.٤٨**	٢	**٠.٢٤**	٠.٠٩٣	no significant
		Within	١٣٢.٣٣	٥١	٢.٥٩		
		sum	١٣٢.٨١	٥٣			
	weight	Between	٣.٠٠	٢	١.٥٠	٠.٢٧٣	no significant
		Within	٢٨٠.٣٣	٥١	٥.٤٩		
		sum	٢٨٣.٣٣	٥٣			
IQ		Between	١١.٣٧	٢	٥.٦٨	٠.٤٣	no significant
		Within	٦٦٨.٥٥	٥١	١٣.١٠		
		sum	٦٧٩.٩٢	٥٣			
Physical variables	Muscular strength	Between	٣١.٢٥	٢	١٥.٦٣	٢.٣٣	no significant
		Within	٣٤٠.٨٣	٥١	٦.٦٨		
		sum	٣٧٢.٠٩	٥٣			
	The characteristic power of speed for	Between	١.٣٣	٢	٠.٦٦	٠.١٩	no significant
		Within	١٧٦.٠٠	٥١	٣.٤٥		
		sum	١٧٧.٣٣	٥٣			
	The characteristic power of speed for	Between	٢.١١	٢	١.٠٥	٠.٠٩	no significant
		Within	٥٦٠.٧٢	٥١	١٠.٩٩		
		sum	٥٦٢.٨٣	٥٣			
	Transitional speed	Between	٠.٠٨	٢	٠.٠٤	٠.٨٤	no significant
		Within	٢.٥٤	٥١	٠.٠٥		
		sum	٢.٦٢	٥٣			
	Flexibility	Between	١١.٣٧	٢	٥.٦٨	١.٦٤	no significant
		Within	١٧٥.٨٣	٥١	٣.٤٤		
		sum	١٨٧.٢٠	٥٣			
	Agility	Between	٠.٦٠	٢	٠.٣٠	٠.٣٨	no

Follow Table (2)

Variance between the pre measurements of the three experimental groups in infographic in growth variables, intelligence and physical variables N=54

Variables	tests	Variance Source	Total Squares	Degrees of freedom	Squares Averages	F value	Significance level
		Within	٣٩.٦٦	٥١	٠.٧٧		
		sum	٤٠.٢٦	٥٣			
	accuracy	Between	٢.٧٠	٢	١.٣٥	١.٣٧	no significant
		Within	٥٠.٢٧	٥١	٠.٩٨		
		sum	٥٢.٩٧	٥٣			
	Compatibility	Between	٣.١١	٢	١.٥٥	٠.٥٦	no significant
		Within	١٤٠.٢٢	٥١	٢.٧٤		
		sum	١٤٣.٣٣	٥٣			
	Speed of performance	Between	٠.٠٧٩	٢	٠.٠٤٠	٠.٠٧٤	no significant
		Within	٢٧.٣٦	٥١	٠.٥٣		
		sum	٢٧.٤٤	٥٣			

(F) table value on (2 , 51) and 0.05 = 3.18

Table (2) illustrates no significant differences Statistic at a level of 0.05 among the three groups.

2- Equivalency of experimental research in offensive skills and cognitive achievement.

Table (3)

Variance between the pre measurements of the three experimental groups in in Offensive skills and cognitive achievement N=54

variables	Tests	Variance Source	Total Squares	Degrees of freedom	Squares Averages	F value	Significance level
Offensive Skills	Dribbling the ball in a squiggly line 30 m	Between groups	١.١٧	٢	٠.٥٨	١.٠٤	no significant
		Within groups	٢٨.٧٨	٥١	٠.٥٦		
		sum	٢٩.٩٥	٥٣			
	pass and receipt on the wall for 30 seconds.	Between groups	**١.٠٣**	٢	**٠.٥١**	٠.٤١٦	no significant
		Within groupS	٦٣.٥٥	٥١	١.٢٤		
		sum	٦٤.٥٨	٥٣			

Follow Table (3)
Variance between the pre measurements of the three experimental groups in in Offensive skills and cognitive achievement N=54

Variables	Tests	Variance Source	Total Squares	Degrees of freedom	Squares Averages	F value	Significance level
	Receipt of the movement	Between groups	٤.٧٧	٢	٢.٣٨	١.٤٠	no significant
		Within groups	٨٦.٥٥	٥١	١.٦٩		
		sum	٩١.٣٣	٥٣			
	Jump shots	Between groups	٦.٣٣	٢	٣.١٦	١.٣١	no significant
		Within groups	١٢٣.٠٠	٥١	٢.٤١		
		sum	١٢٩.٣٣	٥٣			
Cognitive achievement	The first axis History	Between groups	١.٣٧	٢	٠.٦٨	١.٠٠	no significant
		Within groups	٣٤.٧٧	٥١	٠.٦٨		
		sum	٣٦.١٤	٥٣			
	The second axis skillful	Between groups	١.٣٧	٢	٠.٦٨	٠.٥٤	no significant
		Within groups	٦٤.٢٧	٥١	١.٢٦		
		sum	٦٥.٦٤	٥٣			
	The third axis Legal / Rules	Between groups	٣.٤٤	٢	١.٧٢	١.٩٠	no significant
		Within groups	٤٦.٠٥	٥١	٠.٩٠		
		sum	٤٩.٥٠	٥٣			
	Cognitive level	Between groups	٣.١١	٢	١.٥٥	٠.٥٤	no significant
		Within groups	١٤٤.٨٨	٥١	٢.٨٤		
		sum	١٤٨.٠٠	٥٣			

(F) table value on (2 , 51) and 0.05 = 3.18

Table (3) illustrates no significant differences Statistic at a level of 0.05 among the three groups.

Data collection tools and equipment

(Restameter/medical balance/stopwatch/measuring tape/computer/hand ball/handball pitch/ ropes/ rubber tapes/ benches/ partitions/ medical balls/colored collars/ cones/ flags/ colored bars/handball divider/wooden crates/stick/basket for balls collection)

reference survey :

The researcher carried out a reference survey of the special physical fitness of handball to references [10, 11, 12, 13, 14, 15, 16, 17,18,19,20,21]

Tests :

- Tests of growth variables: Attach (1) - IQ test : Attach (2)
- Physical fitness tests : Attach (3) - offensive Skills Tests :Attach (4)
- Cognitive test [22]: Attach (5)

validity and stability of physical tests, offensive skills and cognitive testing: Attach (6)

Tutorial using Infographic (static-moving-interactive) Attach (7)

The researcher took a look at many e-learning design models and then the researcher extracted a model that includes the stages and steps required for the design and production processes where the design process revolves around five major stages: (**Analysis/ Design/ Development/ Implementation /Evaluation)**

Software application to design infographics

- Tacticalpad [23]
- Adobe illustrator
- Adobe After Effect
- Piktochart

Basic study :

The researcher conducted the basic experiment on the experimental research sample from 3/3/2018 to 11/4/2018 for a period of (6) weeks by the number of (2) weekly educational unit for each group of the three groups, at the time (90) minutes of the educational unit, and the educational units differ only in the part Application where the researcher used static Infographic to the first experimental group and moving Infographic to the

second and interactive to the third .

Statistics :-

-Percentage/average/standard deviation / median / skewness /T.Test / Person correlation coefficient / Analysis of variance / test of the lowest mental difference LSD.

Results and Discussion

Table(4)

The difference between the two pre and post measurements to the first experimental group (static Infographic) in Some Offensive skills and cognitive achievement in handball N=18

variables		Pre-Test		Post Test		Mean Difference	(t.Test)
		Mean	SD	Mean	SD		
Offensive skills	Dribbling	١٢.٥٤	٠.٩٢	١٢.٠٠	٠.٣٢	٠.٥٤	*٢.٢٦
	pass and receipt on the wall for 30 seconds.	١٦.٥٥	١.٣	١٨.٠٥	١.١٠	١.٥	*٦.٨٩
	Receipt of the movement	١٠.٨٣	١.٢٠	١٣.٢٢	٠.٨٧	٢.٣٩	*٧.٨٥
	Jump	٢٣.٤٤	١.٤٣	٣٠.٠٥	١.٤٣	٦.٦١	*١٥.٤١
Cognitive Test	The first axis History	٥.٣٨	٠.٨٤	١١.٠٥	١.٢١	٥.٦٧	*١٤.٦١
	The second axis skillful	١٢.١١	١.٣٦	١٥.٣٣	١.٢٨	٣.٢٢	*٩.٠١
	The third axis	٧.٥٠	١.١٥	١٣.٠٥	٠.٧٢	٥.٥٥	*١٧.٦١
Cognitive achievement		٢٥.٠٠	١.٩٤	٣٩.٤٤	١.٨٢	١٤.٤٤	*٢١.٣٢

(t) Table value on 0.05, 17 = 2.17

The results of table (4) show that there are statistically significant differences between the averages of pre and post measurements of the first experimental group (static Infographic) in Some Offensive skills and cognitive achievement in handball in favor of post measurement, which indicates that the static Infographic has a positive effect on the level of skill performance of the first experimental group students. **T**he **researcher** points out that

the constant information representation has led to the expansion of the minds of the human mind, since the brain manipulation of the information illustrated by the static infographic is easier than the treatment of texts, which need longer time to be easily understood. **Lankow, J.ritchie, J., & Crooks, R (2012)** refers to the importance of the static design of the data and information to the images and drawings that can be understood easily, where that it is more in the learner's place to the highest grades, in addition to the writing of the material written to Easy to do with drawings, symbols and pictures [4]

Table (5)

The difference between the two pre and post measurements to the second experimental group (moving Infographic) in Some Offensive skills and cognitive achievement in handball N=18

variables		Pre-Test		Post Test		Mean Difference	(t.Test)
		Mean	SD	Mean	SD		
Offensive skills	Dribbling the ball in a squiggly line 30 m	١٢.٩٠	٠.٦٧	١٢.١٣	٠.٣٢	٠.٧٧	*٣.٨٤
	pass and receipt on the wall for 30 seconds.	١٦.٢٢	١.٠٠	٢٠.٩٤	١.٤٧	٤.٧٢	*١٣.٤٦
	Receipt of the movement	١١.٢٧	١.٤٨	١٥.٥٠	١.٢٠	٤.٢٣	*١١.٥١
	Jump shots	٢٣.٩٤	١.٥١	٣٤.٠٥	١.٧٩	١٠.١١	*٢٥.٠٦
Cognitive Test	The first axis History	٥.١٦	٠.٧٨	١١.١٦	٠.٩٢	٦.٠٠	*٢٣.٤٦
	The second axis skillful	١٥.٥٠	٠.٩٢	١٧.٠٥	١.١٦	١.٥٥	*١٢.٥٣
	The third axis legal/Rules	٦.٨٨	٠.٨٣	١٥.٤٤	١.١٤	٨.٥٦	*٢٤.١٣
Cognitive achievement		٢٤.٥٥	١.٢٩	٤٣.٦٦	١.٨٤	١٩.١١	*٣٦.٩٦

(t) Table value on 0.05, 17 = 2.17

The results of table (5) show that there are statistically significant differences between the averages of the pre and post

measurements of the second experimental group (moving Infographic)) in Some Offensive skills and cognitive achievement in handball in favor of post measurement which the researcher indicates that the moving Infographic is used in subjects that You need to illustrate a certain movement such as the skill performance variables of dribbling, passing, receiving and shotting to know the way and art of performing properly, which saves time in the learning process, and this type is blended with sound effects, whether music or some audio comments of the most important parts of the skill, which affects In the educational process. **Mohamed Shawky Shaltut (2016)** shows that moving Infographic is the design of data, clarifications and information is a complete animated design where this type requires a lot of creativity and the choice of expressive movements that help in take him out in an interesting and enjoyable way and also have a complete scenario for final output and this The most widely used and prevalent species [24]. **Dunlap, Lowenthal (2016)** confirms that individuals learn and remember more efficiently and effectively through the use of text, visuals, symbols and shapes and the infographic is a technology that works to deliver complex and dense information content in a way that supports cognitive processing and facilitates its retrieval in the future [25] . The researcher concurs with what **Mohamed Salem Darwish (2016)** and attributes the reason of the experimental group's progress in the percentages of progress on the use of the experimental group of the Infographic Technology program, which helped to arouse the interest of the students and motivate them to exert effort in learning and not feeling bored [6]. **Krum, Randy (2013)** Confirms that learning occurs better through images and not just text we learn and remember better through images rather than through written or spoken words [26]

Table (6)
The difference between the two pre and post measurements to the third experimental group (interactive Infographic) in Some Offensive skills and cognitive achievement in handball N=18

variables		Pre-Test		Post Test		Mean Difference	(t.Test)
		Mean	SD	Mean	SD		
Offensive skills	Dribbling the ball in a squiggly line 30 m	١٢.٧٨	٠.٦١	١١.٠٨	٠.٣٧	١.٧	*٩.٥٠
	pass and receipt on the wall for 30	١٦.٣٣	٠.٩٧	٢١.٣٣	١.١٣	٥.٠٠	*١٢.١٢
	Receipt of the	١١.٥٥	١.١٩	١٦.٩٤	٠.٨٠	٥.٣٩	*١٤.٤٩
	Jump shots	٢٤.٢٧	١.٤٨	٣٤.٣٣	١.٨٧	١٠.٠٦	*٢١.٨٢
Cognitive Test	The first axis	٥.٠٠	٠.٨٤	١١.٢٢	٠.٩٤	٦.٢٢	*٢٢.٦٤
	The second axis	١٢.٣٣	١.٠٢	١٩.٧٧	١.٥١	٧.٤٤	*١٧.٠٣
	The third axis	٧.١١	٠.٨٣	١٦.٥٠	١.٠٤	٩.٣٩	*٣٨.٤١
Cognitive achievement		٢٤.٤٤	١.٧٥	٤٧.٥٠	١.٩٤	٢٣.٠٦	*٤١.٣٩

(t) Table value on 0.05, 17 = 2.17

The results of table (6) show that there are statistically significant differences between the averages of the pre and post measurements of the third experimental Group (Interactive Infographic) in Some Offensive skills and cognitive achievement in handball in favor of post measurement, which the researcher indicates that the interactive Infographic led to user interaction With the data and information and with the educational content of the infographic itself, the design may appear in the external format on 50% of the information and through the

tools of interaction on the design may show more information, any visible and invisible information that appears only by forcing the user to interact with the design The interactive visually representative indirectly is the objective of the interactive Infographic and thus the educational level rises. **Krafte, G (2012)** indicates that the introduction of the interaction factor into the data representation has changed the communication of the user with the design as the interactive Infographic allows users to teach themselves instead of being pushed to the information provided to them as a single block and this method has proven to change user interaction with Information and how information is designed during implementation [27]. These previous results are consistent with what has been pointed out by the studies [8,9] where agreed that technology, and units familiar with the use Infographic technology help to improve the level of skill and cognitive performance of learners

Table (7)

Analysis variant between post measurements for the third experimental groups (static-moving-interactive) in some Offensive skills and cognitive achievement in handball n1=n2=n3=18

variables	Tests	Variance Source	Total Squares	Degrees of freedom	Squares Averages	F value	Significance level
Offensive Skillful performance	Dribbling the ball in a squiggly line 30 m	Between groups	١١.٨١	٢	٥.٩٠	*٥٠.٤٠	Significant
		Within groups	٥.٩٧	٥١	٠.١١٧		
		sum	١٧.٧٩	٥٣			
	pass and receipt on the wall for 30 seconds.	Between groups	١١٥.٤٤	٢	**٥٧.٧٢**	*٣٦.٨٤	Significant
		Within groups	٧٩.٨٨	٥١	١.٥٦		
		sum	١٩٥.٣٢	٥٣			
	Receipt of the movement	Between groups	١٢٦.٧٧	٢	٦٣.٣٨	*٦٦.٥٨	Significant

Follow Table (7)
Analysis variant between post measurements for the third experimental groups (static-moving-interactive) in some Offensive skills and cognitive achievement in handball n1=n2=n3=18

variables	Tests	Variance Source	Total Squares	Degrees of freedom	Squares Averages	F value	Significance level
		Within groups	٤٨.٥٥	٥١	٠.٩٥		
		sum	١٧٥.٣٣	٥٣			
	Jump shots	Between groups	٢٠٦.٢٥	٢	١٠٣.١٣	*٣٥.٠٩	Significant
		Within groups	١٤٩.٨٨	٥١	٢.٩٣		
		sum	٣٥٦.١٤	٥٣			
Cognitive test	The first axis History	Between groups	٠.٢٥	٢	٠.١٣	٠.١٢	Non-Significant
		Within groups	٥٤.٥٥	٥١	١.٠٧		
		sum	٥٤.٨٠	٥٣			
	The second axis skillful	Between groups	١٨٠.٧٧	٢	٩٠.٣٨	*٥١.١٨	Significant
		Within groups	٩٠.٠٥	٥١	١.٧٦		
		sum	٢٧٠.٨٣	٥٣			
	The third axis Legal / Rules	Between groups	١١٢.١١	٢	٥٦.٠٥	*٥٧.٣٠	Significant
		Within groups	٤٩.٨٨	٥١	٠.٩٧		
		sum	١٦٢.٠٠	٥٣			
	Cognitive achievement	Between groups	٥٤٨.٤٨	٢	٢٩٢.٢٤	*٨٣.٢٩	Significant
		Within groups	١٧٨.٩٤	٥١	٣.٥٠		
		sum	٧٦٣.٤٢	٥٣			

(F) Value on (2 , 51) , 0.05 = 3.18

Table (8)
The least significant differences between the three experimental groups (static-moving-interactive) for post measurements in some Offensive skills and cognitive achievement in handball by L.S.D

variables	tests	measure	mean	Differences between averages for the three experimental groups		
				static	moving	interactive
Offensive Skillful performance	Dribbling the ball in a squiggly line 30 m	static	١٢.٠٠		٠.١٢٣	*٠.٩٢٤
		moving	١٢.١٣			*١.٠٤
		interactive	١١.٠٨			
	pass and receipt on the wall for 30 seconds.	static	١٨.٠٥		*٢.٨٨	*٣.٢٧
		moving	٢٠.٩٤			٠.٣٨
		interactive	٢١.٣٣			
	Receipt of the movement	static	١٣.٢٢		*٢.٢٧	*٣.٧٢
		moving	١٥.٥٠			*١.٤٤
		interactive	١٦.٩٤			
	Jump shots	static	٣٠.٠٥		*٤.٠٠	*٤.٢٧
		moving	٣٤.٠٥			٠.٢٧٧
		interactive	٣٤.٣٣			
Cognitive test	The first axis History	static	١١.٠٥		٠.١١	٠.١٦
		moving	١١.١٦			٠.٠٥
		interactive	١١.٢٢			
	The second axis skillful	static	١٥.٣٣		*١.٧٢	*٤.٤٤
		moving	١٧.٠٥			*٢.٧٢
		interactive	١٩.٧٧			
	The third axis Legal / Rules	static	١٣.٠٥		*٢.٣٨	*٣.٤٤
		moving	١٥.٤٤			*١.٠٥
		interactive	١٦.٥٠			
	Cognitive achievement	**static**	٣٩.٤٤		*٤.٢٢	*٨.٠٥
		moving	٤٣.٦٦			*٣.٨٣
		interactive	٤٧.٥٠			

Table (7) shows that the calculated (f) value is limited to (0.12:83.29) Most of these values were greater than their tabular value at a level of 0.05, indicating statistically significant differences between the three experimental groups in the post measurements that used the visual representation of the information Infographic (static-moving-interactive) in) in Some Offensive skills and cognitive achievement in handball, the researcher conducted a test of the lowest mental difference (LSD) to know the amount and direction of the differences and illustrated by the table (8). Table (8) indicates that there are statistically significant differences in the measurements between the first experimental group (static Infographic) and the second experimental Group (moving Infographic) in Some Offensive skills (passing and receiving/receiving from Movement/ shotting) in favor of the second experimental Group (moving Infographic), as there are no differences between them in a variable (dribbling). **T**he same table also indicates that there are statistically significant differences in the measurements between the first experimental group (static Infographic) and the second experimental Group (moving Infographic) in the cognitive achievement in handball of each of the axes (skill / legal)in favor of the second experimental Group , and there are no differences between them in the historical axis of cognitive testing. **A**s shown in table (8), there are statistically significant differences in the measurements between the first experimental group (static Infographic) and the third experimental group (interactive Infographic) in Some Offensive skills such as (dribbling-passing/receiving with movement / shotting) in favor of the third experimental Group (interactive Infographic), and the existence of differences between the two groups also in the) in cognitive achievement in handball of each of the axes (skill/legal) only for the benefit of the third experimental Group (Interactive Infographic), and there are no differences between them in the historical axis of cognitive testing . **T**his

is consistent with the recommendation of the study [7] that the primary benefit of an interactive Infographic based on game stimuli lies in its ability to arouse interest and interactivity and the need to find other ways of user interaction with other designs and linking Infographic to environments Educational as virtual and augmented reality. **B**oth studies [28,29] indicate that following the appropriate educational model in Infographic design has a significant impact in absorbing a great deal of concepts and reaching knowledge of the learner well, demonstrating effectiveness and efficiency for infographics in teaching in particular and in the educational process in general.

Conclusions: -

1. Differences between the pre and post measurements of the three experimental groups (static-moving-interactive) in favor of the post measurement in some offensive skills and cognitive achievement in handball .

2. The existence of statistically significant differences between the first experimental group (static Infographic) and the second experimental Group (moving Infographic) in some offensive skills and cognitive achievement in favor of the second experimental Group.

3. The existence of statistically significant differences between the first experimental group (static Infographic) and the third experimental group (interactive Infographic) in some offensive skills and cognitive achievement for the third experimental Group (interactive Infographic) .

4. The existence of statistically significant differences between the second experimental group (moving Infographic) and the third experimental group (interactive Infographic) in some offensive skills and cognitive test for the third experimental Group (interactive Infographic) .

5. The interactive Infographic achieved a greater value than both the static and moving Infographic of offensive skills and cognitive achievement, and contained more information in small areas.

Recommendation: -

1. The need to use the visual representation of infographic information in the educational

process because of its positive impact on educational outputs.
2-the need to blend the visual representation with Informer learner in virtual reality.
3-The need to focus on the learning process to take advantage of modern and advanced technologies that serve the educational process.
4-Further research into the embodiment of infographic information and link it to augmented and mixed realities.

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