The role of interactivity in infographic design in raising the awareness against Coronavirus

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Abstract:
Interactivity with digital content is one of the most important developments nowadays, which makes the recipient an effective and influential member in the communication process. The digital content varies between websites and interactive applications, including visual elements like infographic, which is a Simplified illustrations relies on icons, imagery and minimal text to explain information in a briefly visual way, and it has appeared as a form of visual communication in raising awareness against the dangers of Coronavirus, It was observed that these designs didn't follow the proper design criteria and don't have any interactivity, which may lead the recipient abandon getting beneficial from its content, This paper aimed to study the proper design criteria of infographic design and the role of interactivity in its design to enhance awareness against the dangers of Coronavirus, The paper followed the descriptive and analytical approaches to analyze infographic samples, and then applied approach by designing an interactive infographic and measuring the extent of its impact on the recipient in raising the awareness against the dangers of the Coronavirus, The results of the paper revelaed that following the proper design criteria in designing infographic helps to grab the recipient's attention, which increases its effectiveness, and adding an interactivity in infographic design contributes to create a new interactive experience that helps raising the awareness about the dangers of Coronavirus and ways to limit its spread.

Introduction:

Infographic is a powerful tool to communicate visually, according to the Oxford English Dictionary, an infographic is "a visual representation of information or data", It is a new method to visualize data It is also called information visualization or data visualization. It is a simplified usage of visual elements like imagery, charts, and minimal text to give an easy, understandable and memorable visual representation of any kind of information (Siricharoen, 2018, p. 59). Infographics is an effective visual tool to grab the attention and to communicate information quickly and clearly by using engaging, simplified visuals (Smiciklas, 2012).

Infographics are most probably displayed using indoor printed posters in many places like hospitals to give both patients and visitors some instructions to prevent infections or it can be displayed in websites to summarize information in a simplified visual representation. (Siricharoen, 2018, p. 59)

Nowadays there are a variety of infographics to aware people about the dangers of coronavirus and the best ways to prevent it from spread, some of them don't neither apply the appropriate design principles in its design nor get the benefits from utilizing interactivity, this paper will try to answer these questions:

Problem statement:

The problem of this paper can be summarized in the following questions:
1- What are the proper design criteria for designing infographic?
2- What is the role of interactivity in infographic design in raisng the awareness against the dangers of the Coronavirus?

Research aims:

1- Determine the proper design criteria of interactive infographic design.
2- Study the role of interactivity in infographic design to enhance awareness against the dangers of Coronavirus.

Research Hypotheses:

The research assumes the following:
H1- Applying the proper design criteria for interactive infographic design may grab the recipient's attention, and make the displayed information more memorable.
H2- Adding interactivity in infographic design may help creating a new interactive experience toward the recipient which may lead to raise the awareness against the dangers of the Coronavirus.

Research Methodology:

The research followed:

1- Descriptive and analytical approaches to analyze infographic samples to find out their functionalities and how interactivity enhanced them.

2- Applied approach by designing an interactive infographic and measuring the extent of its impact on the recipient in raising the awareness against the dangers of the Coronavirus through a questionnaire form.

Theoretical Framework:

Infographic is a visual representation of information It is defined as a visualization of data or ideas that tries to convey complex information to an audience in a manner that can be easily understood, it's a combination of visual elements like illustrations, charts, icons, and minimal text to visualize and simplified complex information which help to communicate messages effectively (Yuvaraj, 2017, p. 6) .

The process of developing and publishing infographics is called data visualization, information design, or information architecture, the main purpose of infographic design is to visualize information using graphic design elements and principles to transfer a knowledge to the audience to achieve visual learning (Smiciklas, 2012, p. 19), Figure (1).
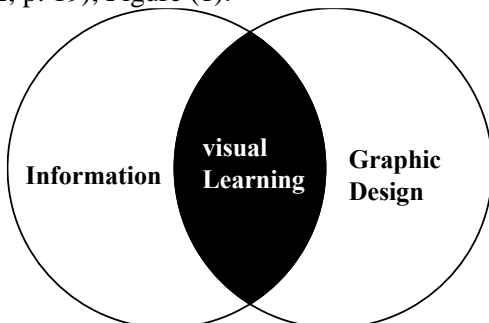

Fig (1) The main purpose of infographic design

Visual Learning

The acronym VARK stands for Visual, Aural, Read/write, and Kinesthetic sensory modalities that are used for learning information .Based on VARK model which one of the most commonly known and quoted models of thinking. It states that when comprehending information, people learn best with one of three types of stimuli:

- **Visual:** People learn by viewing visuals such as charts, maps, and diagrams instead of words.

- **Auditory:** People learn by listening to spoken words.

- **Read/write:** People learn by reading or writing words.

- **Kinesthetic:** People learn through interaction

with the content. (Lankow, 2012, p. 44) Thus, combining visuals with text,sound and interactivity may lead to a powerful and successful infographic that takes complex data and information into easy and understandable visuals. Figure (2).
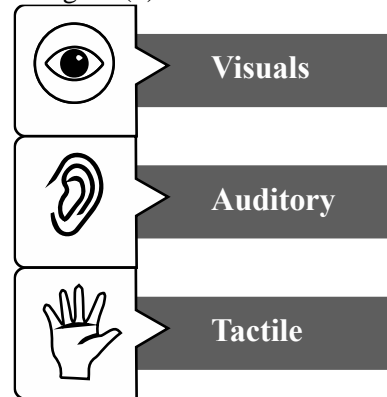

Fig (2) The Three stimuli that people learn best with

Types of infographic: There are a lot of types and different purposes of infographic one of the major purposes nowadays is to aware people with the changers of Coronavirus ,Researcher summarized these types into three main types from user interaction perspective as follows:

Static Infographic:

People use infographics most commonly in static format as a still image that can be printed or published online, It is an effective tool to present rich data in a single image. Recipient can only display the infographic as an image the only interaction with this kind of infographic is to view or read the content. (Lankow, 2012, p. 64) .

As we can see in Figure (3) which is a static infographic designed by the author It is about the ways of transmission Coronavirus and the ways of precaution . Recipient can only interact with the infographic by either seeing the illustrations or reading the instructions.

Fig (3) Static infographic where recipient can only interact by seeing and reading the content.

Motion graphic:

Is a combination between motion media and graphic media .Motion media consists of animation, film and sound whereas graphic media includes illustrations, photography and painting (Shaw, 2016, p. 1) So motion graphic is an animated content that displays some illustrations and text to convey a complex information to the audience by merging animation, sound and graphic design elements, (R. Brian Stone, 2018, p.

7) Recipient can interact with motion graphic by seeing animated content, listening if there is a voiceover, and reading.

As we can see in Figure (4) which are some screen shots from a published motion graphic video that has some instructions of how to protect ourselves from infection with Coronavirus, there are illustrations and minimal text merged with motion and narrative sound which makes it more informative and attractive.

Fig (4) Screenshots from motion graphic video that aims to increase awareness against Coronavirus
https://www.youtube.com/watch?v=DCdxsnRF1Fk&ab_channel=UpToDate

Interactive Infographic : It is a kind of infographic that utilize animation and interactive features like clicking, scrolling, zooming to display information It is particularly useful if you have a huge amounts of data and want to create interactive content that draws the recipient in to encourage further exploration, with this kind of infographics recipients can search for specific data, actively shape the displayed content, and choose which information is accessed and visualized, (Lankow, 2012, p. 82) they can control the way information is displayed to them ,this interaction can trigger the functions with the infographic to display additional content, as can be seen in Figure (5) it is an interactive infographic where recipients learn some information about different types of dogs and most common name for each type , Recipients can change the content by tapping on different icons to display information according to their preferences.
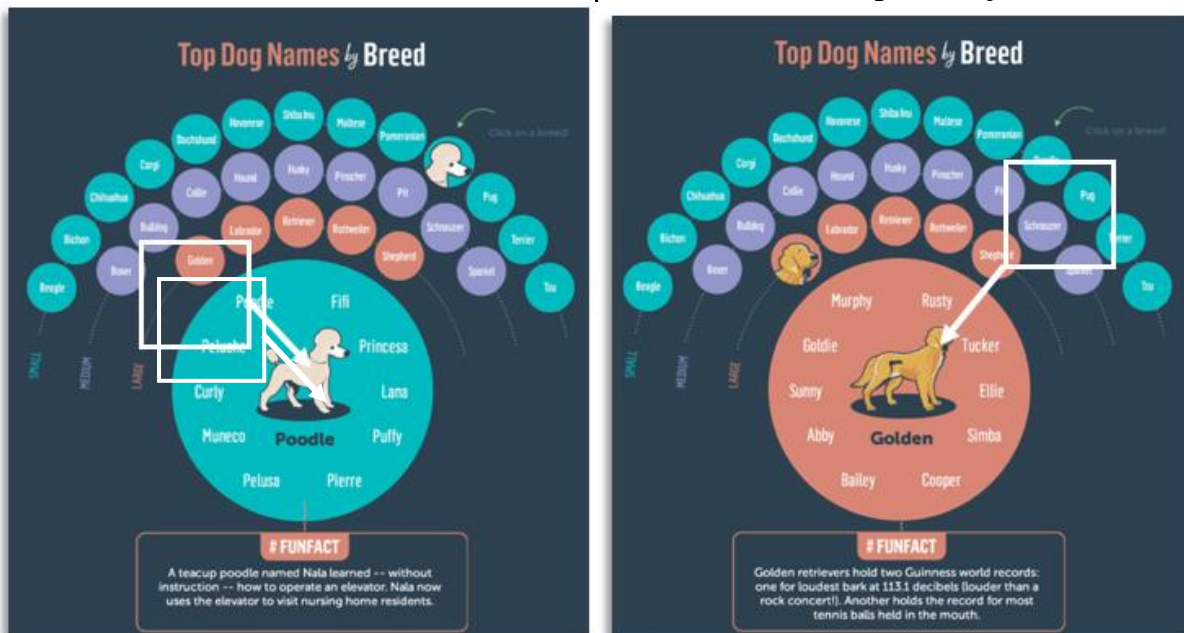
Fig (5) Interactive infographic where recipients can interact by tapping to change the displayed content according to their preferences
https://visme.co/blog/dog-names/

Benefits of using interactivity in infographic design:

By merging infographic desig. with interactive features, Recipients can have a lot of benefits as follows:

- They can be more engaged with the content instead of passively viewing it, and they're more likely to remember the displayed information.

- Dealing with Interactive features in interactive infographics can make the infographic more attractive and effective to the recipients.
- Interactivity with infographic provides a deep dive into the topic to explore an idea in ways a static infographic may not be able to and recipients can control what content to see in infographic according to their preferences.

By interacting with the infographic recipients can be more focused so the displayed information became more memorable and understandable to them. (Dodge, 2021)

Types of Interactivity in infographic design:
There are a lot of approaches of using interactivity in infographic design each approach serve a different content to be displayed effectively these approaches author summarized as shown in Figure (6):
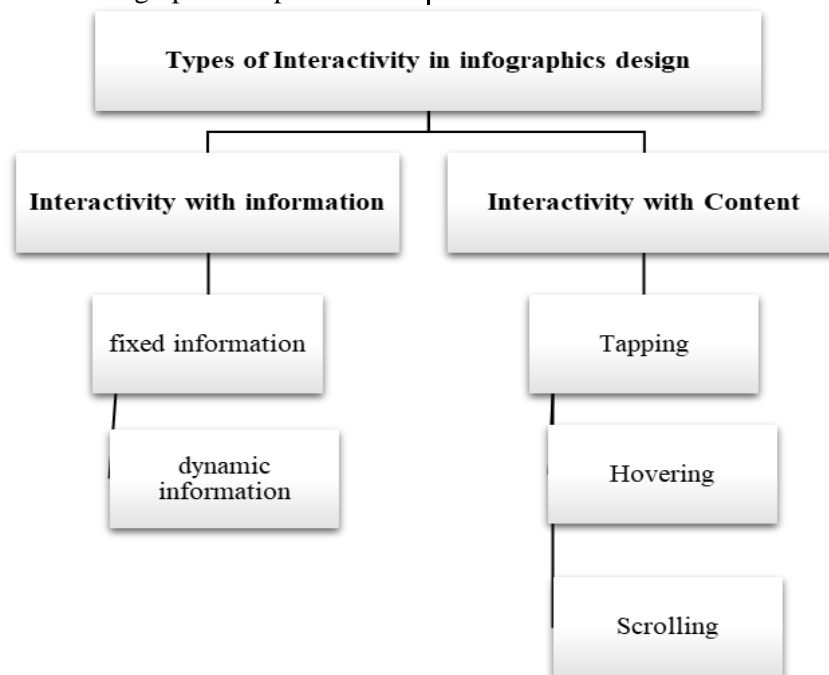

Fig (6) Classification of types of Interactivity in infographics design

Interactivity with information

Interactivity with fixed information: This interactivity with infographic makes the recipient interact with fixed information by just clicking or hovering on icons to explore more data as we can see in
Figure (7) This infographic showing information about the skyscrapers in Manhattan city in the United States when recipient hover on any building a pop ups appear to give more information about the building, this kind of interactivity can be also used to view information in a consecutive or chronological sequence where the recipients can click or scroll to display information in a specific sequence. (Lankow, 2012, p. 83)

Fig (7) Interactive infographic with fixed information where recipients can click or hover to display more information
https://www.nationalgeographic.com/new-york-city-skyline-tallest-midtown-manhattan/

Fig (8) Interactive Infographic with dynamic information where recipients can display changeable information every day related to spreading Coronavirus
https://covid19.who.int/

Interactivity with dynamic information: This kind of interactivity with infographic make the recipients see different information that changing with time when clicking or hovering on specific element in the infographic design a new data display , As we can see in, Figure (8) It is the world map showing the amount of spreading the Coronavirus globally in each country by zooming and hovering with the mouse on any country recipients can see different statistics according to the time they interact with the infographic. (Lankow, 2012, p. 85)

Interactivity with Content: Interactivity with content commonly varies between tapping / hovering or scrolling, Recipients of infographic can tap on icons to see more information they either can be in the same page of infographic or they can navigate to another page to see more information about the topic they tapped on. this information can be charts, illustration with minimal text or may it can be motion graphic. On the other hand, recipients of infographic can hover on specific icons then pop ups appear to show more information ,Also scrolling as interactive features can be used in interactive infographic to show information in consecutive order and it can be a very powerful tool to the recipients because they might see unexpected information while scrolling which make the infographic more interesting.as we can see in the following sample Figure (9) .It is an infographic to give children some information about the planets and the solar system where they can scroll down to go deeper in the space and to discover more planets to know more information also they can tap on some elements to read more information according to their preferences as shown in Figure (10) , Theses interactive features may lead to more engaged and informative infographic.

Fig (9) the content of the infographic changes while scrolling
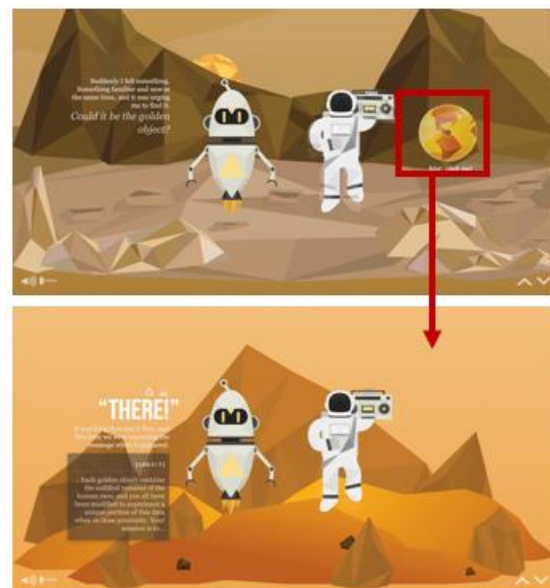http://nasaprospect.com/

Fig (10) recipient can click on specific visuals to see more information
http://nasaprospect.com/

Methodology (Applied Study):
From the previous methods that the researcher has followed to assemble information about Infographic and the role of interactivity to enhance
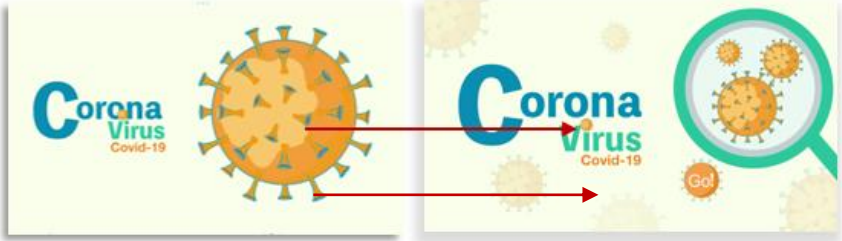
its effectiveness , The researcher went through applied study through designing interactive infographic with static information to increase the awareness against Coronavirus , then quantitative approach was applied to measure the impact of applying the appropriate design criteria in the interactive infographic on clarifying the information toward the recipients ,and to measure the role of interactivity to increase the efficiency of the infographic to raise awareness against Coronavirus through a questionnaire form.The following design considerations were applied in the proposed design of the interactive infographic

Integration between multimedia elements like motion, text, images and interactive features was considered in the design to influence on all the senses of the recipients to guarantee memorizing information.also there are some of design principles that was applied regarding the user interface and the interactivity.

All these aspects were measured to see its effect on the recipients and its role to enhance the effectiveness of the interactive infographic to raise the awareness against Coronavirus. These considerations can be clarified in Table (1) as follows:

Table (1) Design Considerations in the proposed interactive infographic

Design Considerations in the proposed interactive infographic		
Design Elements	**Illustrations**	The used illustrations in the infographic were chosen to be very simple and expressive to the topic it clarifies , and this is to give the recipient a quick visual information to understand without reading, this is also considered in the design of the illustrations used in buttons to make the interactivity with infographic more intuitive and predictable. The size of the illustration that express the main info in each screen of the design was big in size to create a focal point and to help grabbing the attention, Figure (11). Fig (11) The expressive illustrations were chosen to visualize information clearly
	Topography	Fig (12) Sans serif fonts and minimal text were chosen to motivate recipient to read Sans serif fonts were chosen in the design to increase legibility and this was achieved by considering the contrast between typography and background, also the content of the typography was chosen to be simple and specific to motivate recipients to read minimal and short text even in the buttons the chosen typography was just one word with sans serif font to increase usability and to add intuitiveness to the interactive features. Figure (12)
	Colors	#2DC99D #ED8218 #FFF5DE #0A8EB1 Fig (13) The chosen color pallet for the design As shown in Figure (13) the color pallet of the design depended on using blue and green colors because they reflect health and hygiene which is suitable for the topic of the infographic, Orange also used with the chosen value to be complement with the blue color to grab the attention, because

		orange is a hot color it gives a sense of warning which is also suitable for the topic, a neutral light beige color was chosen in the background to make every element at the top of it clear and to make the eyes comfortable while seeing the design.
	Interactive features	The icons and buttons were the main interactive features in the design, the size of them was considered to be suitable enough for the eyes to be noticed to motivate recipient to interact. The design of the buttons and icons depended on the usage of expressive illustrations and minimal text to add intuitiveness and to make the design more usable and predictable, as we see in Figure (14) recipient can click on any button to reveal more information. Fig (14) by clicking on any icons from the three shown in this figure recipient can move between the categories to see the preferable information.
	Motion	Motion was used in the design to add a sense of life and to enhance the intuitiveness of the design this help recipients to feel that they clicked on the buttons and the elements is moving which make the recipients more engaged with the design, Motion designed to be very simple to avoid cluttering. Figure (15) Fig (15) A motion between the first two screens was applied to grab the attention and to inform the recipient about the topic of the infographic
Considered design Principles	**Simplicity**	Simplicity was applied in the design to make the information clearer , by considering the space around visuals , so recipient can focus on them easily and to see the interactive features obviously as shown in Figure (16) Fig (16) Space around interactive features and visuals was considered to achieve simplicity
	Hierarchy	Visual hierarchy was a crucial principle in this design by making the main information as a focal point by considering the contrast in size between visuals this is to make emphasize to help recipient focus more on the information, as we can see in Figure (17) the main symptoms of Coronavirus visualized through illustrations and minimal text with a big size creating a

|		focal point to focus on it to guarantee memorizing it easily.
		 Fig (17) Visual hierarchy is crucial to focus on the information easily
	Information classification	The classification of information about Coronavirus was categorized into 3 main categories transmission, symptoms and precaution to give recipient the information in a consecutive order by knowing the causes of transmit Coronavirus and then the main symptoms of the disease, finally the ways of prevention, this classification help to classify the information so it can be more understandable and clearer toward recipients. Figure (18). Fig (18) The three main categories of the information
	Interactivity /navigation system	Interactivity was applied with the content in a very simple way to make the design intuitive and the information more reachable, the navigation system also designed to be usable as the information of Coronavirus that are related to each other was in one screen and recipient can move between them by using arrows or moving between different categories by clicking on icons as shown in the following Figures (19,20,21).
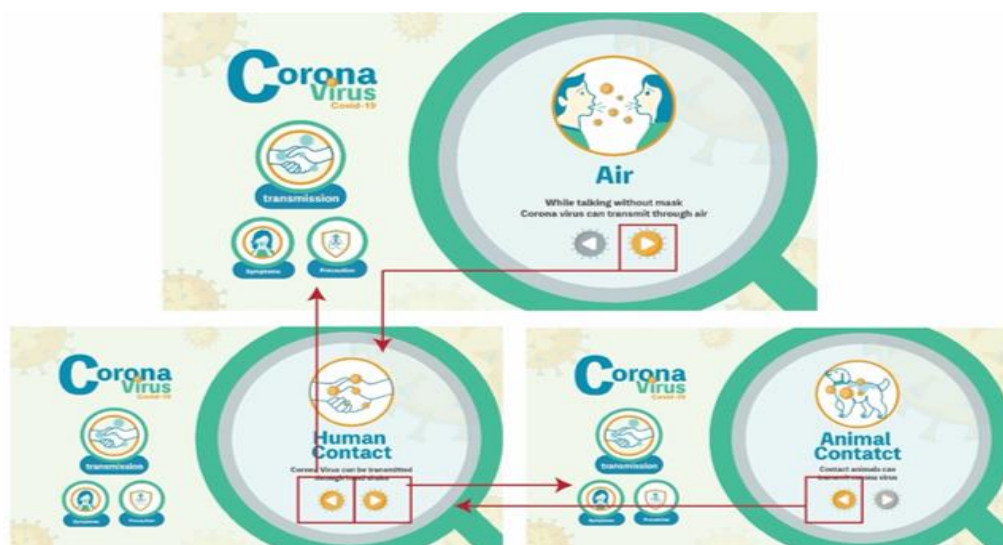
Fig (19) by clicking on transmission the recipient can interact with the arrows to see different causes of transmission Coronavirus
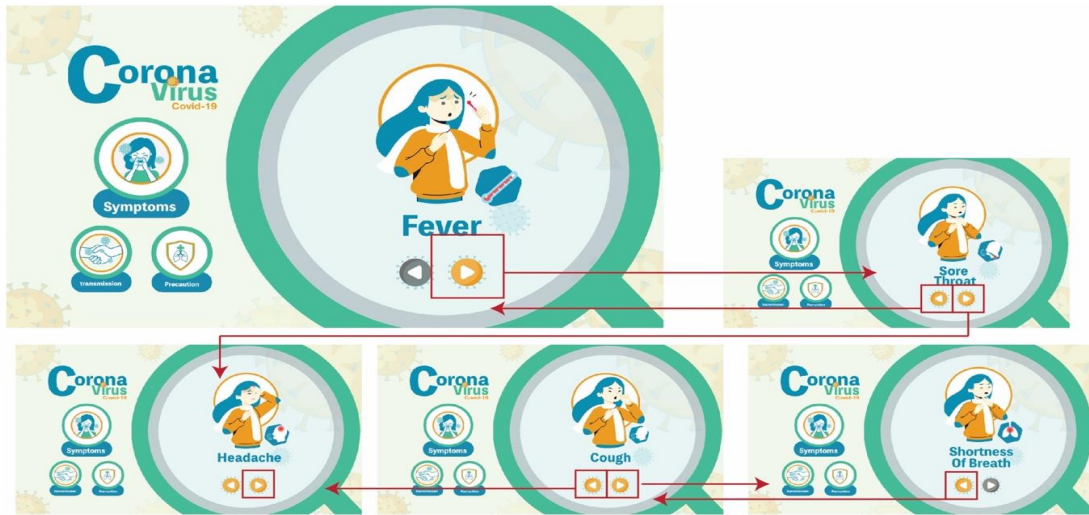
Fig (20) by clicking on symptoms the recipient can interact with the arrows to see the main symptoms of Coronavirus
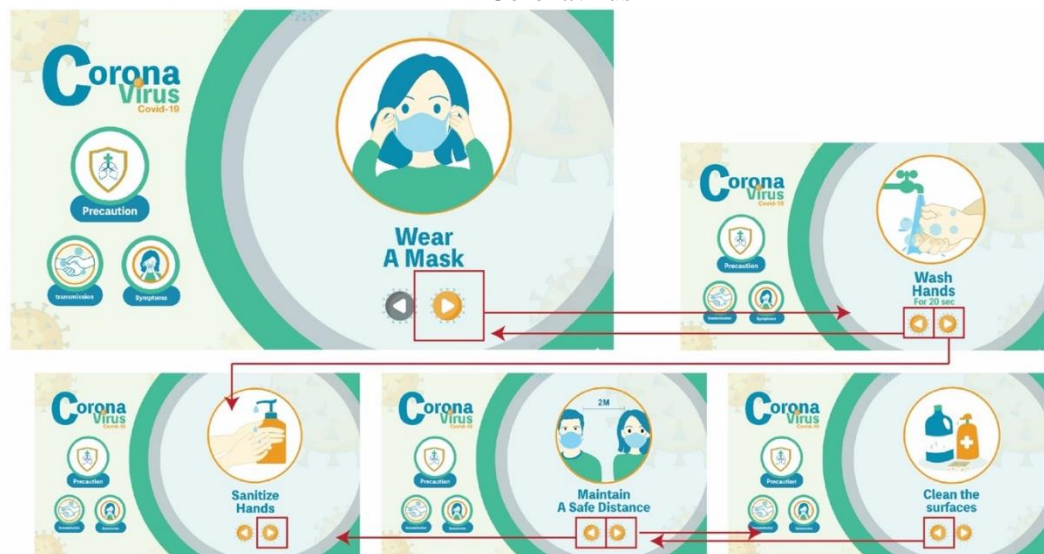

Fig (21) by clicking on precaution icon recipient can view how to protect himself from Coronavirus

Procedures of the Applied study:

The designed interactive infographic was displayed and a questionnaire form was distributed to 100 participants, 50 of them are specialized in graphic design field and the other 50 are a normal recipient.

The Purpose of the questionnaire is to measure the following:

- The impact of choosing the appropriate design elements and principles in the interactive infographic to grab the attention toward the information about Coronavirus and increase its memorability.

- The role of interactivity in enhancing the effectiveness of the infographic design to raise the awareness about Coronavirus.

The characteristics of the chosen participants:

Table (2) characteristics of the chosen participants for questionnaire

Graphic design specialists (50)	Age	Gender	Education	Reason of choice
	From 22 to 60	Both	Graduates from faculties of fine or applied arts specialized in graphic design	Graphic design specialists have knowledge about graphic design and their answers on the questionnaire about design criteria and interactivity with it will be on a strong scientific base so the results will be more accurate.
Normal recipients (50)	From 16 to 60	Both	well/intermediate educated	Normal recipients will be considered as a user's and their answers on the questionnaire will measure their ability to interact and perceive the information in the designed infographic

Results:

In order to take an accurate answer from the participants, 2 questionnaire forms were designed one of them was directed to the graphic design specialists, and the other one was for the normal recipients the questions and the answers with the obtained results from both forms are clarified in Table (3)

Table (3) The obtained results from both questionnaires

|	Questions	Yes	May be	No
Questions to graphic design specialists (from Q1 to Q5) related to design elements and principals (Q6-Q7) related to interactivity	1- Do you find the chosen illustrations help to make the information about Coronavirus more understandable and memorable?	92.6%	7.4%	0%
	2- Do you find the used typography specified and informative toward the recipient?	94.1%	5.9%	0%
	3- Do the chosen colors make the information clearer toward the recipients?	75.7%	18.6%	5.7%
	4- Do the principles of design like hierarchy and simplicity help the information to be more grabbier to the recipient's attention?	85.3%	14.7%	0%
	5- Does the information classification of this interactive infographic help recipient to be more aware about Coronavirus?	80.9%	19.1%	0%
	6- Do you think the interaction with the infographic increases its effectiveness toward the recipients to raise awareness against Coronavirus?	75%	22.1%	2.9%
	7- Did you find the interaction with this infographic will be usable toward the recipients?	89.7%	10.3%	0%
	Questions	**Yes**	**May be**	**No**
Questions to Normal recipients (from Q8 to Q12) related to design elements and principals (Q13-Q14) related to interactivity	8- Do you find the chosen illustrations help you to understand and memorize information about Coronavirus?	83.3%	14.3%	2.4%
	9- Do you find the used typography specified and informative?	90.5%	7.1%	2.4%
	10- Do the chosen colors make the information clearer?	57.1%	33.3%	9.5%
	11- Do simplicity and hierarchy help the information to be more memorable and grabbier to your attention?	73.8%	21.4%	4.8%
	12- Does the information classification of this interactive infographic help you to be more aware about Coronavirus?	69%	16.7%	14.3%
	13- Do you think the interaction with the infographic increases its effectiveness to raise awareness against Coronavirus?	61.9%	31%	7.1%
	14- Did you find the interaction with this infographic usable and the information reachable?	78.6%	14.3%	7.1%
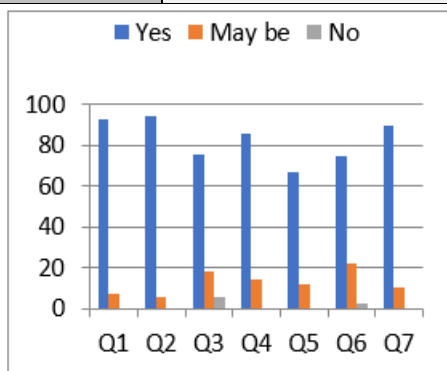
Fig (22) Statistic to show the percentage of answers the questions that were directed to graphic design specialists
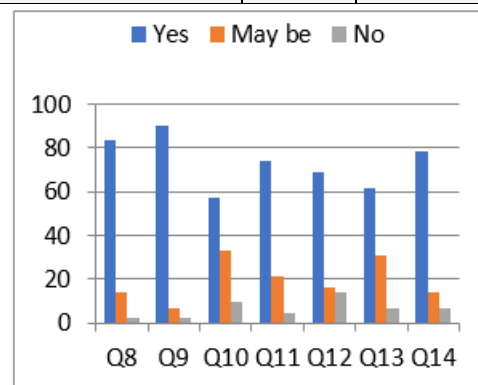

Fig (23) Statistic to show the percentage of answers the questions that were directed to normal recipients

Discussion:

The obtained results related to the design elements and principles of the interactive infographic: Illustrations were chosen and designed to be simple and expressive to the information it presents, The results of the questionnaire showed that 92 % of the specialists in graphic design agreed that the used illustrations in the infographic design made the information more understandable, while 83 % of normal recipients agreed that the expressively illustrations made them clearer and the information more understandable and memorable.

The typography was designed to be very simple, specific and expressive for the illustrations; the obtained results showed that more than 90 % from both graphic design specialists and the normal recipients found the typography were specified, simple and informative.

the chosen colors were considered to represent health and to make the information clearer 75% of the graphics design specialists and 57% of the normal recipients found that the colors made the information clearer.

Simplicity was considered in the interactive inforgaphic design in addition to visual hierarchy in a way that can help to make the information more attractive, thus 85% from graphic design specialists thought that simplicity in the infographic design made the information grabbier to the recipients' attention, while 74% from the normal recipients found that simplicity and visual hierarchy helped the information to be gabbier to their attention.

The classification of the Information in the interactive infographic design was considered to be specified and all the information that were related to each other were assembled to be in one screen so the recipients can relate between them easily 80% of the graphic design specialists agreed that this way was effective to the recipients while 69% of the recipients agreed that this way helped them to be aware about the dangers of Coronavirus.

From the previous results the researcher elicited the appropriate design criteria for interactive infographic designs to raise awareness against Coronavirus as following:

- Illustrations about Coronavirus in interactive infographic designs should be simple and expressive to the fact it presents to make the information more understandable and memorable .It also should be simple when using to design buttons and icons to make the interactive features more intuitive and predictable.

- Sans Serif fonts is recommended to be used when design the typography for interactive infographic also considering the contrast between typography and background will help to increase legibility, also typography should be simple, specific and expressive for the used illustrations.

- When designing for interactive infographic to raise the awareness against Coronavirus colors should be represent health and hygiene also using complement colors will add contrast and this will help to grab the attention.

- neutral light colors can be chosen in the background of interactive infographic to make every element at the top of the background clear and the eyes more comfortable.

- Considering simplicity in interactive infographic will make the displayed information about Coronavirus more attractive and grabbier to the recipients' attention.

- Visual hierarchy is crucial and it can be achieved by making contrast in size or colors.

- Assembling information that are related to each other in interactive infographic will help to make the information structure clearer and more specific.

The obtained results related to the role of interactivity in interactive infographic to raise the awareness against Coronavirus: Comparing with the static infographic 75% from the graphic design specialists and 61.9 % of the recipients agreed that the interaction with the infographic increases its effectiveness toward the recipients to raise awareness against Coronavirus.The interaction with this infographic was designed to be user friendly so the information about Coronavirus can be more reachable hence 90% from the graphic design specialists and 79 % of the recipients agreed on that.

From the previous results the researcher elicited the role of interactivity in infographic designs to raise awareness against Coronavirus as following:

- Usability should be considered when designing interactive infographic so the information can be reachable and the interaction more intuitive.

- Interactivity in infographic design increases its effectiveness to raise awareness against Coronavirus.

- Adding interactivity in infographic design help creating a new interactive experience with its content which enhance its

effectiveness.
- Icons and buttons should depend on the usage of expressive illustrations and minimal text to add intuitiveness and to make the design more usable and predictable.

Conclusion:

In this paper the author examined the impact of applying the appropriate design criteria and the role of interactivity in infographic design to enhance its effectiveness to raise the awareness against Coronavirus the results revealed that the hypotheses H1. Applying the proper design criteria for interactive infographic design may grab the recipient's attention, and make the displayed information more memorable..H2. Adding interactivity in infographic design may help creating a new interactive experience toward the recipient which may lead to raise the awareness against the dangers of the Coronavirus are not rejected , Applying the appropriate design criteria when designing for interactive infographic has a great potential to make the information about Coronavirus more understandable and memorable beside that adding interactivity in the design of infographic will increase its effectiveness to raise the awareness against the dangers of Coronavirus.

This study contributes to the enhancement of interactive infographic design through affording the design criteria and the role of interactivity to enhance its effectiveness ,Findings are promising; however, more exploration is required to deeply examine the impact of each design element and principle of infographic design on the Psychological impact on recipient.

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(Kwak S., n.d.) (Sujia Zhu, 2020)