

# The Impact of Interactive Infographic in Enhancing the Quality of Education in Physiotherapy Field

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## KEYWORDS:

Interactive infographic- Quality of Education- Physiotherapy- biomechanics- Digital interactive media, anthropometry.

## ABSTRACT:

Quality of education is the fourth factor in The Sustainable Development Goals (SDG) 2030 Agenda, thus considering the development of education in the different fields is crucial nowadays, Physiotherapy field is an important health profession that considers the human anthropometry and the ergonomic considerations in the design of workplace. Thus, this field needs to be developed by integrating new interactive and technological ways of learning to enhance its quality of education like Interactive infographic which are a Simplified illustrations relies on icons, imagery and minimal text that explain information in an interactive visual way, the problem of this paper can be summarized in the following questions: q1- What is the impact of using interactive infographic on Physiotherapy Medicine students? q2- What are the appropriate design considerations in interactive infographic to enhance the quality of education in Physiotherapy Medicine field? ,This paper aims to enhance the quality of education in biomechanics course for physical therapy students by using interactive infographic as a new interactive visual tool in the learning process, the paper followed the applied approach by designing one topic in the field of Physiotherapy using interactive infographic and measure its impact on students. and Teaching staff. Results, clarified a satisfactory impact of the usage of interactive infographic on the cognitive skills of students moreover, adding entertainment and joyful feeling to the whole educational process in Physiotherapy field. Conclusion: The findings of this paper redirect the attention of instructors in biomechanics and ergonomics fields to add interactive infographic as a new tool in the teaching strategies to empower student learning.

## Introduction:

In the past, Pictures ruled as a way to communicate ideas, people drew remarkable pictures on rocks and walls to communicate with one another, Nowadays colored pictures and infographics are used to present complex information in a visual and easy ways.

An Infographic is a type of picture that blends data with design, helping individuals and organizations concisely communicate messages for their audience. It can be defined as a visualization of data or ideas to convey complex information to an audience in a manner that can be quickly consumed and easily understood. (Smiciklas, 2012, p. 3). 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)

Digital interactive media is a crucial way of dealing with information nowadays it refers to products and services on digital computer-based systems that respond to the user's actions by presenting content such as text, graphics, animation, video and audio, and includes the internet, social media, mobile communications and digital interactive signage. Interactive media shift the user's role from observer to participant and are considered the next generation of electronic information systems. (Britannica, 2022).

Quality of Education considers as the fourth factor in The Sustainable Development Goals (SDG) which focuses on educating students to become an active and productive members of society it is supported by three key pillars: ensuring access to quality teachers; providing use of quality learning tools and professional development; and the establishment of safe and supportive quality learning environments (Sean Slade, 2021), Thus integrating interactive infographic in teaching Biomechanics course shall be a new way to present information in more enjoyable interactive manner that can add a new interactive experience toward students while

learning which might lead to enhance the quality of education in Physiotherapy field.

**The Main contribution of this paper** is to present a new way of teaching Biomechanics by utilizing interactive infographic as new interactive media tool that simplifies information through considering the appropriate design principles in the design of interactive infographic and measure its impact on students in a try to enhance the quality of education in Physiotherapy field. Thus The problem of this paper can be summarized in the following questions: Q1-What is the impact of using interactive infographic on Physiotherapy Medicine students? Q2-What are the appropriate design considerations in interactive infographic to enhance the quality of education in Physiotherapy Medicine field? The paper aims to measure the impact of using interactive infographic on Physiotherapy Medicine students more over determining the appropriate design considerations in interactive infographic to enhance the quality of education in Physiotherapy Medicine field. The paper tries to proof the following hypothesis H1- using interactive infographic in teaching biomechanics course will improve the cognitive skills and adding joyful feeling to Physiotherapy Medicine students. H2-considering the appropriate design considerations in interactive infographic will enhance the quality of education in Physiotherapy Medicine field. The paper followed the applied approach by designing an interactive infographic to teach one topic in Biomechanics course and measuring its impact on Physiotherapy Medicine students through a questionnaire form.

## Literature Review:

Anthropometry is derived from the Greek root "Anthropos measure". In the context of studying and analyzing human movement, the features of the human body- body segment parameters - include length, mass, weight, volume, density, center of gravity and other kinetic derivatives.

Knowledge of these parameters is often essential for conducting kinematic, kinetic analysis for both normal and pathological motion as well workplace design, furniture, tools and sports

equipment's in ergonomics. (M, 2010) Most of this information has been derived from cadavers other are derived from mathematical models and imaging techniques ( (Bicen, 2017) ).

We use our sight the most for perceiving the world around us, human mind can perceive visual information quickly and efficiently compared to written or verbal information Thus visual communication is more effective than any other type of communication.

Infographics has a remarkable ability to respond to the communication pace of the century with its features of presenting complex information in a fast and effective way.

Interactive infographic can be defined as a new way of digital interactive media that allow users to interact with information and choose the way of presenting information visually through letting users control how much information can be viewed and in which detailed level ,With the designed interactive features like buttons and icons users can determine the way of presenting information according to their needs and this can set more bonds between users and information (Dur, 2014)

Infographics is seen as an effective method to present complex data, concepts and ideas in a clear, concise manner. In other words, to compress "boring" numbers and percentages in a visually attractive way in an era of information overload.

Meeuwssen and Millington told their audience: "Infographics use evidence- and practice-based data, compelling statistics, easy-to-read fonts, Nowadays, rapid changes in technology have significant influence in learners' educational life. The technological devices of information and communication are developed to deliver valuable knowledge quickly, regardless of the place and time, novel media demonstration formats emerged. Infographics are examples of this format, which use graphic visual pictures to show the information, knowledge or data effectively. Infographics are used in instruction, particularly in instructional design which is more challenging to design an education. Hence,

teaching by infographics helps students to interpret visual knowledge and provide a broader and extensive body of learning and grasp in education complimentary color schemes, simple charts, bold graphs, and other graphics to disseminate information in quick and easily digestible formats." (Parveen, 2021)

### **The role of interactive infographic as a learning tool in Physiotherapy field:**

- By applying interactive infographic as an interactive learning tool in in the classroom, students can begin to acknowledge the importance of design elements like illustrations of human body segments, white space, font, and color, Thus the artifact in question becomes more thought provoking and thus memorable, aiding in the ability to recall information from the graphical elements. (Smiciklas, 2012).
- interactive infographic gives students the ability to adopt the role of producer rather than consuming information. Through interacting with the content and choose the preferable information to be presented upon their educational needs.
- With the use of interactive infographics, staff members can utilize skills typically found in arts education to enhance the learning of statistical-based learning making subjects in Physiotherapy medicine field more comprehensible to students.
- interactive infographic can increase the retention ability of students in Physiotherapy field as the information in this field is often complex in nature relying on an understanding of numerical knowledge. In order for interactive infographics to be effective as tools to improve literacy, it should be appealing, understandable and meaningful. (Fridman, 2018).

### **Main design considerations to design interactive infographic in Physiotherapy field:**

visuals and interaction are an effective tool to improve Students' performance in the

classrooms. (Pang, 2021) Design elements like colors, illustrations, typography and interactive features like icons and buttons are a very powerful elements which enhance the effectiveness of interactive infographic. Some design considerations should be considered while designing interactive infographic which are summarized in the following points:

- Appropriate illustrations embodiment information in a very successful manner. They should be chosen carefully to present each part of the presented topic which enhances cognitive and retention skills of students in Physiotherapy field.
- Colors should be diverse to be specified to each part of the topic to enhance students' retention ability. Colors must be consistent and appropriate to the main topic; it should also be chosen carefully to guarantee grabbing students' attention toward the design and to make the interactive features more clarified.
- Typography should be legible by choosing the appropriate fonts with different sizes to achieve hierarchy and considering the sufficient contrast in colors to grab the attention and enhance legibility.
- Interactive features like Buttons and Iconography should be designed to be related to the topic it presents, this will help to make the interaction with the interactive infographic more predictable and usable.
- Navigation system and the architecture of information should be as simple as possible to achieve usability and intuitiveness while interacting with interactive infographic.
- Visual consistency in a very powerful tool to enhance the usability of interactive infographic it makes every single element in the design clearer and consistent in placing which enhance the memorability of information toward students. (Sara Ahmed Sayed Ali, 2021)

### Methodology (Applied Study):

Researchers went through applied study through designing interactive infographic to present the body segment parameters as an important topic in Biomechanics course for foundation students in the faculty of Physiotherapy. It's a basic information about the measurements of the human body segments and the percentage of each segment from the body weight and through qualitative approach the measurements of the applied study were calculated through presenting the information using interactive infographic in a real class and the results were obtained through observation and questionnaire form. Some design considerations were considered in the interactive infographic design to guarantee leaving a positive impact on students while learning and to add a new interactive experience with the content in addition to improve the cognitive skills through making the visuals simpler and more specified to increase the memorability of the information and to make them more understandable as well.

### Visual analysis of the proposed interactive infographic:

- **Design Elements:**

- Illustrations

The illustrations used in this infographic were designed to express each part of the human body segment to highlight the proximal and distal ends of each part, An illustrated skeleton was selected as the main illustration to express each part of human body in addition to illustrated geometric shapes to express specific information separately to make it easy for the students to focus on a specific information in each shape which may enhance the memorability of the information, The proportion of each segment from the body weight is an important information so it is chosen to be

written in illustrated circle to make it as a focal point. Figure (1)

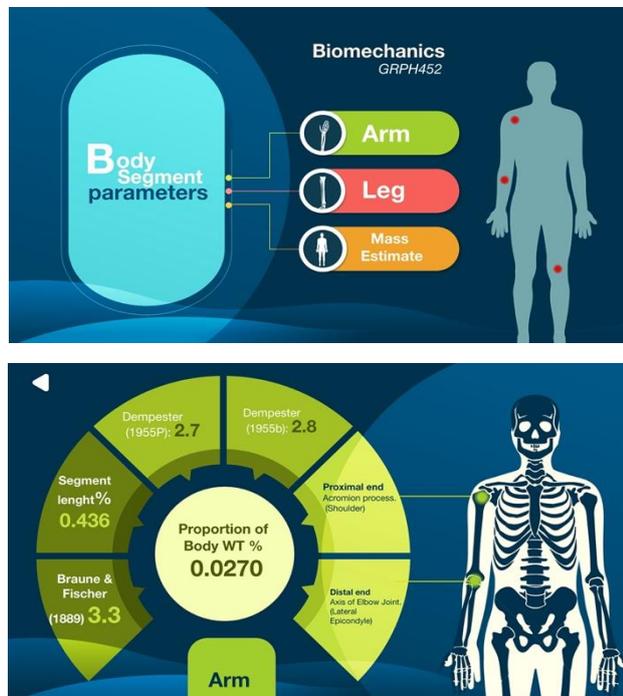


Figure (1) the used illustrations in the proposed interactive infographic

- Colors

The colors used in the design were chosen to make the appropriate contrast to grab the attention toward the important information, Dark blue color is used as the dominant color in the background due to its suitability with the content of the presented topic, Different colors as shown in Figure (2) were chosen to present the information in which each color is specified to present a specific information related to a specific segment of the body, this may help to improve the retention ability to students through remembering the color that is dedicated to each information in the body segment .



Figure (2) The values of the colors used in the proposed interactive infographic

- Typography

The sans serif typeface with diversity of the font sizes was chosen in the typography to achieve the appropriate hierarchy Figure (3), merging between different sizes of font was considered to highlight the important information like numbers to make student remembering them easily, also the contrast between the font color and the color behind it was considered to increase the legibility. Minimum amount of text was used in the design of the interactive infographic to be more specific and clearer to the students to facilitate focusing on the information and increase their ability to remember the information.



Figure (3) The sans serif typeface was chosen to increase the legibility

- Motion

The motion was considered in the design to add an interesting feeling while interacting as shown in Figure (4) when students click on the hand button the skeleton moves to be bigger in around (1) second and end up to focus on the hand, this may help students to remember the name of each part of the body segment and link it with its illustration through concentrating on the motion, The time elements take to move will make student's mind more focused on the information. Motion also designed to be very simple and comfortable to the eyes to enhance the intuitiveness of the design and to make it more interesting toward the students.

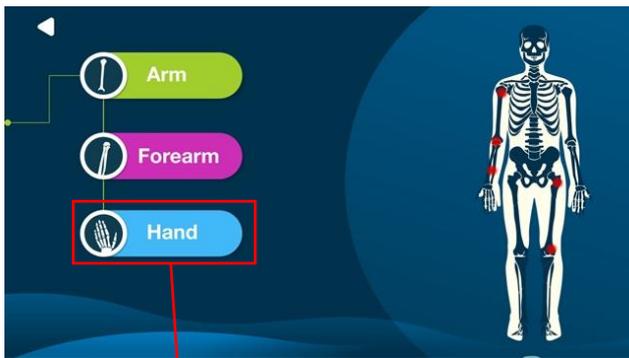


Figure (4) A motion is applied during the interaction to make each part of body segment clearer to the students

• **Interactive features:**

- **Buttons:**

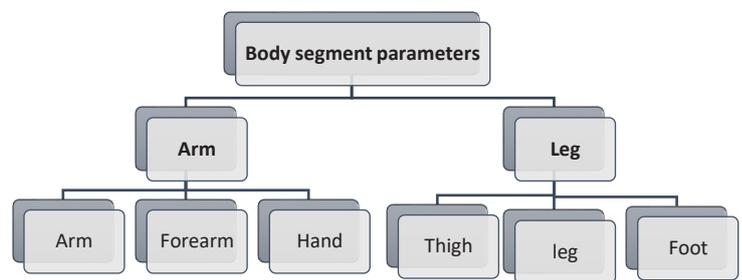
The buttons were designed to be simple and expressive to the information it presents, as shown in Figure (5) the buttons contain the shape of the arm to make the interaction more intuitive and predictable, Sans serif font was chosen to the design of the text inside the buttons to increase the legibility, each button was designed in a specific color to be like an indication to the specific part of the body segment to enhance the memorability.



Figure (5) the buttons designed to be simple and expressive

- **Information Architecture:**

The design of the information based on 3 levels as shown in Dig (1) the information hierarchy starts with the whole-body segment parts and then the students will go deeper from level 1 to level 2 in the hierarchy to know more information about a specific part of the human body segment like Arm or Leg, then students can navigate from level 2 deeper to level 3 to know more about each part of each segment like the thigh and its relation to the leg



Dig (1) the information architecture in the design of the proposed infographic was built on 3 levels

- **Navigation Systems**

The interaction between the interactive infographic screens was applied to be easy, simple and intuitive to the students, from the buttons that represent each part of body segment students can easily navigate to the required part to know more information about it and also they can easily go back to any part to reveal any other information Figure (6), the navigation system of this design was built on 3 levels to make it simpler and clearer the navigation system can be displayed through the presented QR code



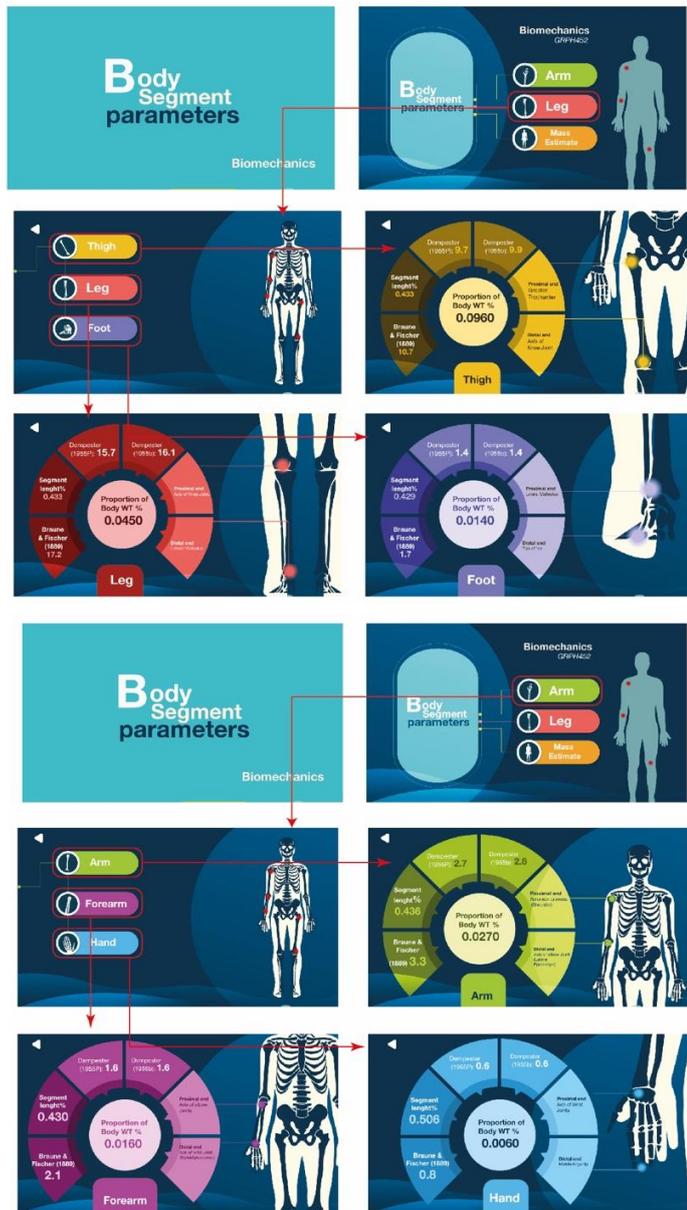


Figure (6) The navigation system between the screens of the interactive infographic

**- Visual Consistency:**

The placement of the buttons, illustrations and the way of interaction was designed to be consistent in each page to ensure the appropriate usability and intuitiveness of the interaction with the design. Through maintaining the placement of the information and the tone of the color behind it students can be more focused on the information which make it easier for them to remember each part of the presented information through memorizing its placement and color. Figure (7)

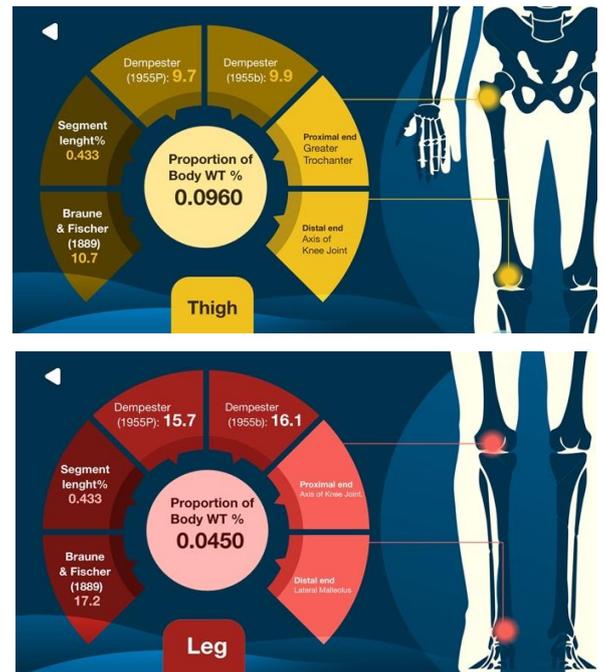


Figure (7) Visual consistency was considered to enhance usability and memorability of the information

**Procedures of Applied study:** The proposed interactive infographic was displayed in Biomechanics Course for foundation students in the faculty of Physiotherapy Medicine at October University for Modern Sciences and Arts (MSA), 2 focus groups of Students and staff members were asked to answer some questions using electronic questionnaire form regarding the presented interactive infographic to take their opinions into consideration. The study investigates if the interactive infographic as a new way of teaching will be positively effective on Physiotherapy Medicine students furthermore to make sure that the applied design considerations in the design of interactive infographic enhances the quality of education in Physiotherapy Medicine field. The Authors assumes the following assumptions to be measured through the applied study.

**H1-** using interactive infographic in teaching biomechanics course will improve the cognitive skills and adding joyful feeling to Physiotherapy Medicine students.

**H2-** considering the appropriate design considerations in interactive infographic will enhance the quality of education in Physiotherapy Medicine field.

**Participants:**

- **6 Students** in Foundation level in the faculty of Physiotherapy Medicine who registered in Biomechanics course.
- **6 Staff Members** graduated from the faculty of Physiotherapy Medicine (4 Staff Members taught Biomechanics course).

**The Purpose of the applied study is to measure the following:**

Impact of Interactive Infographic on students			
Retention Ability	Illustrations	Motivation	Joyful and entertainment
Do you remember the proportion of the arm from the whole-body weight?	Did the used illustrations helped you to know the proximal and distal ends appropriately ?	Do you think that this way of learning will motivate you in the future to learn and to more engaged in the class?	Did you have fun interacting with this prototype?
Design consideration			
Font sizes	Colors	Motion	Interactive features (Buttons)
Did the differences in the font sizes help you to be more focused on the information ?	Did you find the colors that specified to a specific information make it more memorable to you?	Do you think the used motion make this prototype more interesting?	Was the interacting with this prototype easy?

Table (1) The measurements of the experiment

**Results:** In order to take an accurate answer from the participants, the two focus groups from the students and the academic staff members were asked to interact with the interactive infographic firstly and then they were asked to answer some questions though an electronic questionnaire form the questions and the answers with the obtained results from both forms are clarified in Table (2)

Questions	Yes	May be	No
1- Do you remember the proportion of the arm from the whole-body weight?	70%	30%	0%
2- Did the used illustrations helped you to know the proximal and distal ends appropriately ?	90%	10%	0%
3- Do you think that this way of learning will motivate you in the future to learn and to be more engaged in the class?	75%	8.3%	16.7%
4- Did you have fun interacting with this prototype?	66.7%	25%	8.3%
5- Did the differences in the font sizes help you to be more focused on the information?	66.7%	16.7%	16.7%
6- Did you find the colors that specified to a specific information make it more memorable to you?	75%	25%	0%
7- Do you think the used motion make this prototype more interesting?	58.3%	25%	16.7%

(From Q1 to Q4) related to cognitive skills and joyful feeling while learning  
(Q5-Q8) related to Design Considerations

	8- Was the interacting with this prototype easy?	66.7%	8.3%	25%
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Table (2) The obtained results

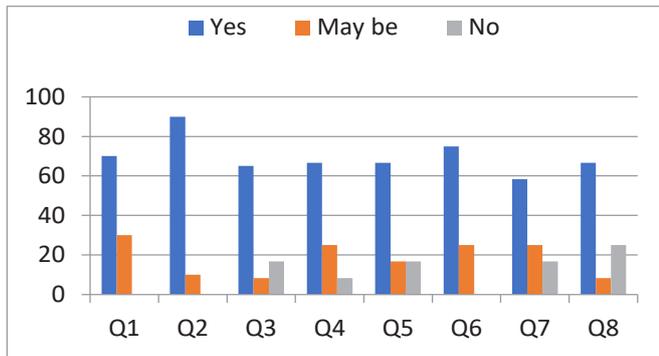


Fig (8) Statistic to show the percentage of the obtained results from the 2 focus groups

**Discussion:**

**The obtained results related to cognitive and practical skills in addition to the joyful feeling while learning with the proposed interactive infographic:**

- Visual consistency was applied through maintaining the placement of the presented information and the way of interaction to make the interaction more usable and intuitive furthermore to make the information more memorable toward students, The proportion of each segment from the body weight was an important information so it was chosen to be written in illustrated circle to make it as a focal point, The results of the questionnaire showed that 70 % of the chosen focus groups remembered the proportion of the arm from the whole-body weight which is a good indication of information memorability.

- illustrations was chosen as the main skeleton that represents each part of the human body with proximal and distal ends in addition to geometric shapes to present a specific information in a

separate geometric shape in the same place in each page to enhance the visual consistency ,90% of the chosen focus groups agreed that the used illustrations helped them to know the proximal and distal ends of each part of the human body appropriately.

- the way of interaction throughout the proposed interactive infographic was designed to be easy and to give students the chance to choose the information they want to see according to their preferences this way of interaction was applied through designing buttons with icons to represent the information in a way that can be more predictable and intuitive 65% of the focus groups agreed that this way of learning will motivate them to learn and it can let them to be more engaged in the classroom. While 66.7% agreed that they had fun while interacting with this prototype.

**The obtained results related to the proposed design considerations in the interactive infographic to enhance the quality of education:**

- The fonts were chosen with different font sizes to make the appropriate hierarchy so student can focus on the important information easily like numbers, also the sufficient contrast between the color of the text and background was applied to increase the legibility of the typography in the design ,66.7% of the chosen focus groups agreed that the differences in the font sizes helped them to be more focused on the information.

- Colors were chosen in a diverse way to remark each information related to a specific segment of the body with a specified color this chosen was to increase the ability of student to memorize each body segment by remembering its color, sufficient contrast was

also considered when choosing colors to achieve the sufficient clarity of information and legibility of typography 75% of the chosen focus groups agreed that the colors that specified to a specific information about each part of body segment enhanced their retention ability.

- Motion was an important visual element to add a sense of life to the design and to enhance the intuitiveness and the usability of this prototype 58.3% agreed that the used motion made this prototype more interesting.

-Navigation system was designed in this prototype to be easy and simple by considering the simplicity of information architecture to be in a logical and hierarchal way to achieve the appropriate usability 66.7% of the chosen focus groups found that the way of interaction with this prototype was easy.

- When focusing on the obtained results and the percentages of agreement we found that This percentages aren't high enough ,When observing the two focus groups we noticed that there was a problem with interaction in the first 2 minutes because the prototype was displayed online using "Figma" software and this was a new tool toward them so they took some time to get familiar with the way of interaction, This factor affected the obtained results , So in the future we recommend that both students and teaching staff should take a training priorly to get more familiar with the way of interaction.

**From the previous results the researchers elicited the appropriate design criteria for interactive infographic as a new tool of teaching in Physiotherapy field to enhance its quality of education as following:**

- Visual consistency is a crucial factor when designing the pages of interactive infographic, it can be achieved by maintaining the placement of visual elements like the illustrations of body segments and also the interactive features like button which will enhance the usability and intuitiveness of the interaction, Visual consistency helps students in Physiotherapy field to remember the important information by remembering its placement which enhanced their retention ability.
- Illustrations should be chosen to represent each part of human body segment with proximal and distal ends to help student see each part clearly this will help them to be more focused on each part and memorizing the information easily.
- The diversity of sizes in the used illustrations should be considered to achieve the appropriate visual hierarchy and this can be achieved by increasing the size of the illustrations that contains an important information to make it as a focal point this will help students to remember the important information firstly by remembering its big size comparing with other visual elements.
- Considering the freedom of choice is very crucial toward the students in Physiotherapy field so they can choose the information they want to present according to their needs and preferences so clarity of designing the buttons will make it easier for them to choose the information appropriately.
- The icons are a very powerful tool when designing the buttons of the interactive infographic in Physiotherapy field so considering the relation between the icons and the information it presents will make the interaction more predictable and the information more memorable.
- Fonts should be chosen to achieve the maximum legibility of text this can be

fulfilled by considering the sufficient contrast between the text and the background, also it is crucial to achieve hierarchy in designing the typography to let students be more focused on the important information and to enhance their retention ability.

- Colors is a very powerful tool to enhance retention ability, when designing interactive infographic for Physiotherapy educational purposes it is preferable to specify each information about each part of body segment with a specified color, by this way student will remember information by remembering its color. with the need to maintain the color identity appropriate to the topic of the subject presented.
- Motion should be used to enhance the interactivity and usability of the interactive infographic this can be achieved by making the motion consistent in each page in a specified element to make it as a moving focal point this will help student to be more focused on each part of the body segment as it is the moving focal point. Motion also adds interesting feeling while interacting and adds life to the design.
- Adding visual interactivity through interactive infographic to students while learning each part of body segment is an effective way that enhances the quality of education in Physiotherapy field thus Interaction with the interactive infographic should be easy and intuitive so information architecture should be simple with maximum 3 levels in depth to make the navigation system more usable toward both students and staff members.

## CONCLUSION:

In this paper the authors examined the impact of applying interactive infographic in enhancing the quality of education in Physiotherapy medicine field the results revealed that the hypotheses **H1**. using interactive infographic in teaching biomechanics course will improve the cognitive

skills and adding joyful feeling to Physiotherapy students. **H2**- considering the appropriate design considerations in interactive infographic will enhance the quality of education in Physiotherapy field.

are not rejected, applying interactive infographic as a new interactive visual tool in classes has a great potential to improve the retention ability of students furthermore adding joyful feeling while learning which will improve the cognitive skills of students in Physiotherapy field, in addition considering the appropriate design principles is a very powerful tool which increase the positive impact of interactive infographic in teaching courses in Physiotherapy field ;Biomechanics which enhances the quality of education in this field.

This study contributes to enhance the quality of education in Physiotherapy Medicine field through experimenting a proposed interactive infographic for biomechanics course to measure its impact on cognitive skills of students and the joyful feeling toward them while learning furthermore affording the appropriate design considerations to be applied in the design of interactive infographic in Physiotherapy field to enhance its effectiveness in teaching which improve the quality of education in this field Findings are promising; however, authors recommend to make more exploration to deeply examine the impact of interactive infographic in other topics in Physiotherapy field to know its effectiveness on students and the whole educational process to ensure its role to enhance the quality of education in this field

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