



# Visualizing Concepts Through Infographics: An Overview

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## Abstract

Science and technology play a crucial role in every aspect of our life. Meteoric rise and development of technology in the digital age enforce mankind to change every aspect of living which include teaching learning process as well. Teaching and learning process encompasses transfer of knowledge and information effectively and efficiently. Information Communication and Technology (ICT) can improve classroom interaction by catering to the need of diverse learners. Technology can act as support for educators, planners, administrators and evaluators. Infographics is one such way to visualize ideas, concepts and information. It can help educators to present complex information through graphics, images, texts and symbols in such a way that it can become easy and interesting and engaging for learners. In this paper authors try to throw light upon the concept, type, tools and steps to develop infographics and its use and significance in teaching learning process.

*Key words:* Infographics, ICT, Digital Age, Visualize

## I. Introduction

Since the prehistoric time human strive to communicate and disperse knowledge and information to others and future generations. This led human to draw cave paintings which ranges from Palaeolithic to Mesolithic age (Chandra, 2015). Some experts believed that the history of infographics going as far as 50,000 to 60,000 years ago (Smiciklas, 2012, Akhmad et al, 2018). Earliest infographic design can be evident in Bhimbetka rock shelters (Madhya Pradesh) in India. Egyptian hieroglyphs, Chinese writing, Hittite hieroglyphs and other ancient writing systems use symbols to depicts ideas and concepts (Smiciklas, 2012).

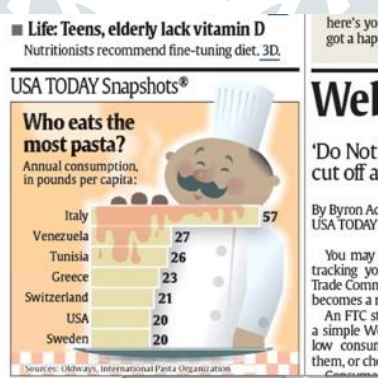


Bhimbetka war scene by commons.wikimedia.org is licenced under CC by SA 3.0



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William flair considered as first modern infographic designer, he created pie chart in the year 1786 while Edward Tufte, an American Statistician was considered as the pioneer of data visualization (Simakova, 2019). In 20<sup>th</sup> century, rise of infographics can be seen in print media and advertisement with the use of colourful chart and graphs.



Infographic shows annual pasta consumption by USA TODAY (Hopkins, 2011)

With the advent of digital age in 21<sup>st</sup> century, human and computer and technology interaction increases thus resulted in rise in use of infographics and data visualization. Many experts says that there is difference between data visualization and infographics, data visualization is a part of infographics (Krum, 2014). Infographics comprises of data visualization, storytelling and message by using elements like text, image, icon, sound, animation and videos. One of the reasons for infographics to become so popular in 21<sup>st</sup> century is due

'information boom' especially in online content. Internet is flooded with information; it is hard to filter that information properly. According to George Dyson (2011), "*Information is cheap, but meaning is expensive.*" So, infographic is a simple and efficient way to present large information into minimum space.

Recently it has been frequently used in advertisement, education, research, business, marketing etc. It has been very well utilized by ed-tech companies for various purposes be it delivering lesson, conducting assessment or providing recorded lesson or advertising their courses and forum.

## II. Concept of Infographics

Infographics is made up of two words "info" which means information and "graphics". It is also known as data visualizations. Infographics is a mean to present complex data in minimal space in such a way it will be easy to visualize and understand the information which cannot be possible otherwise. The process through which humans perceive, interpret, use, and convey visual information is called visualization (Scaife and Rogers, 1996). In recent times, data visualizations have been utilized in computer systems that are often and customarily used, such as desktop publishing and website or blog publishing. Infographics are becoming increasingly popular among educators as a visual communication and data display tool (Siricharoen, 2015; Afify, 2018; Basco, 2020).

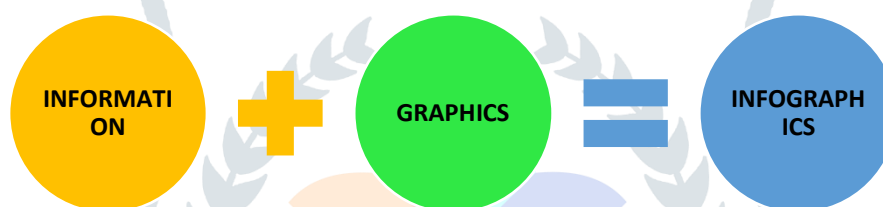


Figure shows the combination of information and graphics can form information graphics

Infographics help people think more clearly by using pictures to enhance the human visual system's ability to recognize patterns and trends (Heer et.al., 2010). An infographic is a graphic depiction of knowledge, information, or data. It stands out from regular pictures and photographs because it offers information in a focused and useful way. It can be applied to signs, maps, and technical publications that call for a concise and understandable presentation of intricate information. Charts, maps, logos, calendars, pictures, and other visual components are all included in infographics. Infographics use images to improve the capacity of the human visual system to identify patterns and trends, which facilitates clearer thinking (Siricharoen, 2015; Bosco, 2020). According to Smicklas (2012) *The process of developing and publishing infographics is called data visualization, information design, or information architecture.*

According to Krum (2014), An infographic is a type of graphic design that combines text, illustrations, photographs, and data visualizations. Infographics are the most important means of efficiently and effectively presenting complex information. However, to achieve this, they use visual elements to enhance cognition and increase the abilities of an individual's visual system to identify patterns (Yildirim, 2016).

According to Prof. Meirelles (2013), "Infographics stand for visual displays in which graphics (illustrations, symbols, maps, diagrams) together with verbal language communicate information that wouldn't be possible otherwise." Hence, effective and efficient use of graphics enable the transfer of information without

any glitch. In order to maintain focus on crucial elements of the message, good infographics frequently employ basic visuals rather than highly complicated imagery (Krum, 2014).

### III. Why infographics?

Though occipital lobe is small at the back of skull but according to John Medina most dominant sense is sight or vision as it takes up to half of our brain's resource. Many studies shows that more than 50- 80% of brain involved in visual processing (MIT, 1996) of information such as image, colour, icons, symbols etc., (Krum, 2014). Infographics enable visual learning as it is *easy on mind* (Simicklas, 2012). According to David McCandless *"There's something almost quite magical about visual information. It's effortless. It literally pours in. If you're navigating a dense information jungle, coming across a beautiful graphic or lovely data visualization is a relief. It's like coming across a clearing in the jungle"*

Numerous research has been done on the effectiveness of infographics in the teaching and learning process. It improves cognitive ability of learners (Damyanov & Tsankov, 2018), academic achievement (Madar & Buntat, 2011; Alrwele, 2017; Naparin & Saad, 2017; Yarbrough, 2019; Basco, 2020) and improves visual literacy (Dondis, 1973).

- It can grab learners' attention due to various eye-catching component of infographics like colours, icons, sound, animations etc.
- It is designed by keeping learners grade level that ensure readiness of learners to learn.
- It avoids too much text and handy to summarize the lesson or concepts.
- It is easy tool for comparing and contrasting, thus providing conceptual clarity among learners.
- It can be helpful in attention, retention and recall of information.
- It can enforce meaningful learning by activating verbal and visual processing faculties.
- It aids in visualizing the concrete as well as abstract concepts, thus making it easy to understand the topic.

### IV. Types of infographics

There are various types of infographics based on various factors such as complexity, components, type of information etc. It could be statistical infographics or timeline infographics, geographical infographics, process infographics, comparison infographics, list infographics, hierarchical infographics based on the function they perform such as statistical graphics can visualize data in the form of pie chart, bar diagram, etc whereas hierarchical infographics represent hierarchy or steps such as Maslow Hierarchy of Needs. In geographical infographics various information related to geography are visualized in the form of maps and charts for example indicating the presence of mineral ores in India on map or presence of various elements in different layer of earth through charts. Comparison infographics are used to compare the different things such as comparison animal and plant cell or comparison of economic condition of country.



According to Krum, 2014, there are mainly six types of infographics based on their complexity such as static infographics, clickable infographics, animated infographics, video infographics and interactive infographics.

- **Static Infographics:** visualization of data or concepts through stationary image or text that have been designed for printing or digital use. Posters and diagrams that go with newspaper or magazine articles are examples of printed materials. Digital materials include those used on websites or in screen view, such as digital displays.
- **Zooming Infographics:** An interactive layer added to the design. Infographics that are basically static in nature but could be zoomed in and zoomed out. Before getting into the specifics, customers can choose to scroll through the entire format on their screen and zoom in. Starting with the large picture gives the reader a greater understanding and context of how the details fit into the average plot (Krum, 2014).
- **Clickable infographics:** It uses features of both static and zooming infographics. Static infographic designs can be made into clickable infographics by adding HTML links to particular areas of the design. This interface is designed as an HTML Image Map, which the web browser uses to transform specific pixels within the static image into clickable links to URL locations. The secondary or supplementary information becomes visible as the reader drags the mouse pointer over different regions of the design.
- **Animated infographics:** Here the design of infographics change altogether. There is element of motion in this type of infographics. The series of images in a loop could be seen in the form of motion using GIF file and data is presented in an animated format. They can be objects on a web page and are animated using HTML code or an image file format. It has features of motion, smooth transition to attract the audience or learner (Krum, 2014)
- **Video Infographics:** This design combines the best features of videos and infographics that can be played and shared through videos supporting platforms like Vimeo, Dailymotion, Plumi and YouTube. Data visualization can be done effectively by incorporating in videos. It is usually in the form of short videos.
- **Interactive Infographics:** In this design learners have some control over displayed visualization. Here data can be shown changing or updated in real time and readers can zoom in at any point. It is more engaging than any other design. Interactive design readers are actively engaged in exploring further data or information.

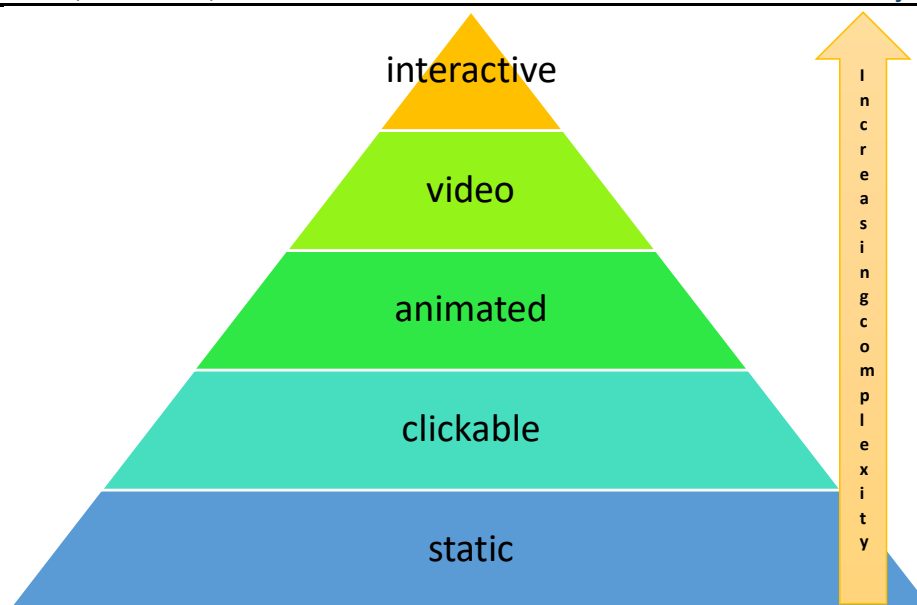


Figure shows increasing order of complexity of different forms of infographics

## V. Tools for Creating Infographics

“Excellent graphics exemplify the deep fundamental principles of analytical design in action. If this were not the case, then something might well be wrong with the principles” (Tufte 2006). There are various desktop tool or software through which infographics can be easily generated such as MS Excel, MS PowerPoint, Adobe Illustrators etc., can help to develop vector graphics while Adobe Photoshop, Acorn and Microsoft Photo Editor can be used as image editor. There are many online tools available for creating different types of infographics. Some of them are discussed below:

- **Canva:** It is a free online visual design tool that provides a large selection of templates and design elements to create infographics. Additionally, a drag-and-drop interface is offered, making it very simple to use. (<https://www.canva.com>).
- **Visme:** It is best tool to convert statistics and data into beautiful story. It can be used to generate charts, social media graphics, forms and surveys and presentation (<https://www.visme.com>).
- **Adobe Express:** With the help of customizable templates that can be personalize branding, logo, text, colours, etc., infographics can be created online for free (<https://www.adobe.com/express/>).
- **Designhill Studio:** It is free online tool that provides a large selection of templates and design elements to make infographics that appear professional (<https://www.designhill.com>).
- **Piktochart:** It can add animations and interactivity to infographics. It can be used to make banner, report, resume along with various video tools (<https://www.piktochart.com>).
- **Infogram:** online tool used to create digital charts, maps and infographics (<https://www.infogram.com>).

There are other online tools as well such as Inkscape, Amchart, Gapminder, Visually, Tableau, Snappa, Venngage, The Noun Project etc. and some them supported by Artificial Intelligence, thus can help to create infographic in lesser time.

## VI. Creating Infographics

Infographics is beautiful way to present and can also make it easy to understand complex information but it will become tedious and confusing when not created properly. It is very necessary to understand the steps and process involved in creating infographics. As a guide for creating and developing infographics for the teaching and learning process, Yarbrough (2019) offered four standards for high-quality infographics which are, a. meaningful and relevant, b. efficient for summarizing, c. helpful in quick recall and d. useful for conveying maximum information in minimum space. Kraus (2012) recommended five step process to create infographics, first step is to *Get the idea* about infographics is about then secondly *sketch it out* i.e., prototype on paper or computer. Third step is *collection of data* then fourth step is to *develop proof of concept* and last step is *lay it out with styles*.

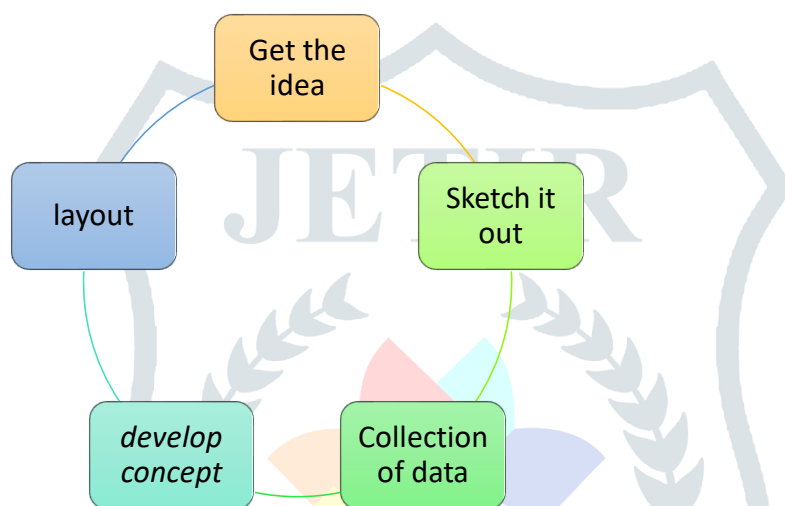


Figure shows steps involved in creating infographics

Cifci (2016) suggested seven principles for designing and creating infographics which are as follows:

1. Choose the aim or objectives for creating infographics
2. Determine the content or subject
3. Design it as simple, easy and comprehensible.
4. Incorporate attractive and attention-grabbing icon, template, animations, colours etc.,
5. Provide authentic citation and references.
6. Consider the cognitive capacity and comprehension of learner when creating infographics.
7. Integrate all the components, such as graphics, symbols, icons, illustrations, or animation, coherently.

Thus, good infographics design is essential for achieving its objective and dispersing information and data. Poor designing may cause confusion and misinformation among learners.

## VII. Conclusion and Suggestions

Infographics are the smart way to visualize the concepts, data, information in a minimum space. On the other hand, it is attractive, engaging and fun to learn with. Infographics can also help in improving visual, media and digital literacy along with critical and creative thinking of learners. Its feature like shareability,

persuasiveness and resonance i.e., lasting sensory experience make it a very promising tool for educators as well as for learners.

- It is very essential for designer or creator to understand the audience before creating infographics.
- High quality instructional material based on infographics needs to be developed to facilitate teaching learning process.
- More study and research need to be conducted to examine infographics' usefulness in the teaching and learning process.
- It should be simple and contain icons for easy understanding, instead of confusing complex images.
- Faculty development programme can be conducted in school for teachers to provide training in development and creation of all types of infographics.
- Smartphone friendly material should be designed for easy accessibility. Infographics material should be designed in a way that it promotes self-directed learning.

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