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## **An Investigation toward Advantages, Design Principles and Steps of Infographics in Education**

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### **Abstract**

Nowadays, quick development in technology have a remarkable efficiency in learners' educational life. The modern technologies that utilized in instruction are developing in order to deliver valuable information rapidly, regardless of time and place, modern media illustration format transpired. Infographic is the example of this format. Infographics can be defined as providing information in a certain stream with the aid of a story and various visuals such as writing, painting, drawing, graphics, sound and video rather than trying to explain an event, information, data or content contextually. Hence, education through infographics not only assists learners to explain information visually but also provide learners with an extensive and broader form of learning and comprehension in instruction. Furthermore, today's instructors need to provide and design a learning environment that enhances the students' experience, as well as their capability of choosing, developing and integrating visual materials in their instructions. Therefore, virtual literacy and infographics skills play a very significant role in the digital-age instructors' toolbox. The aim of this study is to explain advantages, design principles and steps of design infographics according to new trends in education. The paper would be useful for anyone interested in designing, preparing and implementing infographics in education.

**Keywords:** Infographics, Advantages of infographics, Design principles

### **Introduction**

Nowadays, internet has become accessible anywhere and at any time by mobile devices. Especially after the 90's, the rapidly developing voice, video, written communication and interaction opportunity reveal the web-based education concept (Su Tonga, 2015; Berber & Laborda, 2015). Therefore, the teaching-learning process beyond the classroom walls began to occur in different environments. New designed materials and new learning activities compatible with these learning environments have emerged (Yıldırım, 2016). Also, visualization of information and data is a frequently used method in the teaching-learning process so that people can cope with rich and complicated situations in content. As a result, information becomes more understandable, debatable, accessible, and mostly manageable (Nuhoğlu Kibar & Akkoyunlu, 2015).

Graphic is one of the visuals used for information presentation. In this way, the information that needs to be presented in pages can easily be transferred. However, today's learning approach involves more effective presentation method than a one-dimensional

presentation of information with classical graphics. However, today's learning approach presents a more effective presentation method than a one-dimensional presentation of information presented with classical graphics (Krum, 2013; Yıldırım, 2016). This method is called infographic that has become one of the new trends in learning. With this method, complex information can be presented with very little text (Williams, 2002).

"A picture is worth a thousand words" is used extensively to explain the effect of visual communication. Infographic can be defined as providing information in a certain stream with the aid of various visuals and texts (Smiciklas, 2012). Besides, Gebre & Polman (2016) defined infographics not only as a visual representation of graphs or charts but also as representation of an idea or data. In other words, instead of trying to explain an event, information, data or content alone in writing, it is said to be presented as an independent or integrated whole, such as writing, painting, drawing, graphics, sound, video and many other components (Figure 1). The use of components such as text, images, and graphics in infographic designs is very old. Innovation in Infographics is the way to use of components and tell content with story (Borucu, 2015; Yıldırım, Yıldırım, Çelik, & Aydın, 2014).

Stories are striking, impressive elements that help people learn by showing cause-and-effect relationships in the information process (Soydaş & Yılmaz, 2016). Besides, data visualizations are shown as a part of infographics (Uyan Dur, 2014) and also infographic are accepted as a data visualization strategy (Nuhoğlu Kibar & Akkoyunlu, 2015).



Fig.1 Sample of Infographic

The use of infographics is based on prehistoric times. The first example of infographics is that even before writing is not found, prehistoric people have begun to draw animal images to cave walls with in the stone age (30,000 BC) (Smiciklas, 2012). In 7500

B.C years, information graphics were used in cave paintings and maps in Çatalhöyük in Konya (Borucu, 2015). Another good example for infographic is Egyptian hieroglyphs. This writing language consists of hundreds of symbols and echoes that can easily be distinguished from each other. Each sign represents a particular object or voice (Smiciklas, 2012). Besides, in 1510, an anatomical study was carried out by Leonardo da Vinci to show the motion of the muscles in the arm. This is an important example of infographics (Smiciklas, 2012; Rajamanickam, 2005).

In the present meaning, the first infographic was used to describe the 18th century the UK economy in book by William Playfair which are "The Commercial and Political Atlas" in 1786 and "Statistical Breviary" in 1801. William Playfair used statistical graphs, bar graphs, line graphs and histograms to reinforce meaning in these books (Uyan Dur, 2014).

Moreover, the infographic of Napoleon's going to Moscow in 1861 was prepared by Charles Joseph Minard (Smiciklas, 2012; Rajamanickam, 2005). In 1936, Otto Neurath developed the pictogram language used as an international language of icons and pictures as a visual communication model to teach knowledge, thought and concept. Infographics have become a popular method to make comparisons and to present information easily between 1970 and 1990 in newspapers like "The Sunday Times (UK)," "Time Magazine" and "USA Today".

Akkoyunlu and Kibar (2014) carried out study regarding how to use infographics as an instructional tool to equip learners by using visual literacy skills. They stated that visual literacy is a collection of learned attitudes in order to explain and sing a visible context. Hence, visual literacy assists learners to comprehend and explain visual media in education. They were 64 second grade students who registered in Computer Education and Instructional Technology department who required designing an infographic by using their course instructional materials. Hence, learners had attained both theoretical and practical skills regarding infographic design. Afterward, researchers used a rubric (designed themselves) in order to gather data. The result shows that students have had low degree in their scores based on their design and so they should have trained with sub applications including Pinterest in order to achieve more experience toward designing infographics.

Furthermore, Ru and Ming (2014) throughout their study discussed toward applying infographics in educational design. Since infographics used in education, so it has become more interesting to design instruction. The study assesses and analyzes the relationship between design instruction and infographics.

Instructional design makes designers ready for society and business design. In order to design an education, designers should be aware of three parts of infographics such as knowledge, visual and content. So the design of education can be done by infographics. As a result, infographics visualization method enhanced the instructional design quality by combining information as well as context (Ru and Ming, 2014).

The use of infographics in education has become an indispensable tool of today's education system because Infographics tell content with story and visuals. However,

educators do not have professional design competencies and knowledge to design new infographics, as well as high-quality infographics in the sector. Moreover, the advantages of infographic use in education, quality infographic design principles and steps are not sufficiently known by teachers

Nowadays, Infographics are emerged in every aspect of life by developing themselves in many areas such as books, magazines, presentations, advertising, social media etc. (Smiciklas, 2012; Borucu, 2015). Infographics are used throughout the child's education period. They are also used to perform different educational and instructional purposes. So, the aim of this study is to describe advantages and design principles of infographics according to new trends in education

### **Advantages of Infographics in Education**

When the persistence of visual materials on the student is examined, a well-prepared infographic is likely to make a difference and to gain importance in the field of education (Borucu, 2015). There are several advantages of infographics in education such as reminding of existing information in normal or distance education, transferring processes and events, presentation of course content, summarizing learned information, showing relationships between concepts (Meeusah & Tangkijviwat, 2013). Besides, infographics provide to organize the information correctly, presenting information with the storytelling in an effective way, creative visual design and efficient use of the technology which will positively affect the development process of the student (Uyan Dur, 2014).

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According to Borucu (2015) and Institute for the Advancement of Research in Education (2003), the education-teaching contribution of infographics can be explained as follows:

- While the teacher describes the course work and the topic flow, the desired emphasis is supported by the visuals so that it is possible to grasp the importance of topic of the student in the most simple and understandable way,
- It provides better understanding of students' knowledge, ideas and concepts in order to enhance their learning experience,
- It allows students to develop critical thinking skills and to organize ideas,
- It allows students to remember and recall information better in the learning process.

Infographics are often used to present content in a simple way. In addition, infographic allows teachers to prepare a variety of learning activities, including warm-up sessions and unit summaries, in order to deepen students' interest in the subject and increase their chances of interaction (Yıldırım, 2016). Moreover, asking students to create infographics for assignments

allows students to improve their visual communication skills, thinking, learning and self-expression, and developing more general learning skills such as information organization and collaboration (Islamoglu et al., 2015).

Besides, Infographics is a useful teaching approach in health area since it can be utilized to provide people with the clarification of the care procedures, medical process, diseases, treatments and organs functioning. There are organizations such as Pan American Health Organization (PAHO, 2014) and World Health Organization (WHO, 2013) where use infographics as a tool to describe illnesses to people in general.

Cedillo, Villeda and Rosa (2015) conducted a research about pedagogical infographics in sexual diversity in order to enhance the students learning of medicine on the subject of human sexuality in disciplinary aspects as well as the importance of political schedule, examine the development of citizens who respect to other behaviors and expression and heterosexuality. Their study aimed to recognize the issues showed in the discussion of 21 learners of medical school while writing and sharing their experience in making pedagogical infographics on sexual diversity (Cedillo et al, 2015).

Their study had taken a place in Mexico at the National School of Medicine and Homeopathy of the National Polytechnic Institute (IPN). So, learners who registered in Human Sexuality class were trained to develop and design infographics in order to make people aware regarding different audiences on different expressions of sexual diversity (Cedillo et al, 2015). Learners required responding to a query about their studies in order to elaborate their infographic.

Each infographic developed by learners were assessed by both teachers and other students in the class. The related information for describing the course contents were gathered by students. The result shows that pedagogical infographics help to lessen the demonstration of behaviors and attitudes that forejudge against gay, transsexual, lesbian, intersex or bisexual people. Hence, pedagogical infographics show an opportunity to examine in a structured, well-founded form at the same time as they enhance the development of visual communication, writing to elaborate the infographics (Cedillo et al, 2015).

Other researchers carried out study toward making e-portfolio by using the creative technology including infographics. The portfolio has been used in assessing learners' knowledge, growth and serve as not only summative evaluations but also formative evaluations (Stephens & Parr, 2013). This study shows how to use different approach such as time-series, map, hierarchies, timelines and networks in order to design infographic for higher education doctoral of nursing practice (DNP) at Otterbein University (Haverkamp et al, 2015). The academic staff of Otterbein University found out that the new generations of learners are thrive on distributing information, so this method helping learners particularly DNP students to share and show their knowledge in order to support viewers' analyses. As a consequent, e-Portfolios reflected on contextual comprehension of instruction that shows the background of each learner's journey and outcomes (Haverkamp et al, 2015).

Ozdamli, Kocakoyun, Sahin ve Akdag (2016) conducted a case study to determine the opinions of the students about the infographics prepared for the anatomy lesson in their research. The study was conducted with the participation of 140 students enrolled in the Anatomy lesson in Physical Education and Sports Department of the Near East University

during a six-week training period in 2015-2016 academic year. In preparation, students were informed about the pre-study infographic and then the students under the curriculum of the anatomy course presented graphs of information about the digestive anatomy. At the end of the course presentation, a semi-structured interview form was sent to get students' views on 'infographic' and 'infographic anatomy'. In the survey, more than half of the students stated that they did not know the meaning of the "infographic" word and that many more students did not see any information graph before this study. Besides, students think that infographics are used as more effective visuals than traditional course visuals. In addition, it appears that students generally find infographics more effective because they see it as more understandable and more satisfying, easier to stay in minds. This study has shown that infographic can be used in many other lessons, not only effective, but also more permanent in the mind, this teaching method can be used more and more widespread.

Yildirim et al. (2014) conducted a survey to determine learners' views on infographic formation. As a result of the research, it was found that the students regarded the infographics as an innovative approach that they perceived as a new material. Besides, it is seen that infographics are much more advantageous as presentation and preparation compared to traditional materials which can present complex information in an understandable way and include visuals such as posters.

### **Design Principles and Steps of Infographics**

Generally, professionally prepared infographics are developed using Adobe's programs such as CorelDraw, Photoshop, InDesign, Illustrator. However, in order to use these programs, it is necessary to have high-level graphic design competencies. Those who do not know how to use professional graphic design programs can create amateur infographics with online tools such as Easel.ly, Piktochart, Infogr.am, Visual.ly, Venngage, and Visme.co. (Tacer, 2015).

The biggest problem in infographics is the difficulty of catching the desired effect because of the personal design desire without sharing the information of the owner with the chart. When specialist and the graphic artists are in communicate and work each other in the infographics designing process, quality infographics can be created. Also, important parts of the matter must be told to the graphics by the information owner. Graphic designers should designate important parts of the subject by using different techniques within the infographics with design features (Borucu, 2015).

According to Rajamanickam (2005), three important problems must be overcome to create successful infographic of the designer.

1. To determine clearly which quantitative, chronological, physical communication will be used,
2. Planning the information as a whole with a consistent design should include more than all parts (drawings, plans, diagrams) in the design
3. Select the appropriate environment for the topic (interactive, static or moving).

It is necessary to follow an effective method to present information in the process of infographic design. Therefore, the preparation, use and analysis of information is very important in this process (Islamoglu et al., 2015).

According to Davis and Quinn (2014), in order to design a successful infographic, the following conditions should be considered.

1. Identification of the use target of the infographic,
2. Identification of the components necessary for infographic design,
3. Deciding on the infographic type to be designed,
4. Submission of information in a way that matches the target.

There are strategies to be followed in order to design infographics that will make a difference in education. Ten strategies were stated to design successful infographic. by Rajamanickam (2005). These are organizing information, make the information visible, creating content, simplify, adding multiple emphasis, show cause-and-effect relationship, comparison, creating multiple dimensions, and integration.

It can be said that a successful infographic can be designed in 4 steps when the important conditions and methods mentioned above are included in the account. Also, Figure 2 is an infographic that shows easy tips to create successful infographic.

1. **Make a plan:** The first and most difficult step in infographic design is the preparing plan. Infographics can be developed on a topic of interest to the target audience. Before starting any project, two questions should be answered: ‘What?’ and ‘Why?’ Exactly what the goal of each project is, and exactly why it’s important. Therefore, in this step, subjects and the goals and objectives of infographic should be determined first. Then, designer should do research which is the very core of an infographics. Designers should find everything about the subject and store it in small pieces. Then, context, structure, the story of infographic should be determined. Story gives your audience a sense of excitement and curiosity like reading novel. The main feature that distinguishes infographics from other visuals is the storytelling to send messages. Besides the necessary components should be decided for infographic design. Also, existing information should be organized based on goals and objectives. Finally, visual inspiration or visual ideas should be gathered for infographic.
2. **Start designing:** In this steps, designing process stars according to decided plan. There are some options to finish this process such as using professional programs (Photoshop, InDesign, and Illustrator), online tools (Easel.ly, Piktochart, and Infogram) or outsource (Dribbble: popular freelance designing sites, 99desgins: professional designing company). If you will design the infographic yourself with professional programs or online tools, themes should be selected first like selecting a colour scheme. Then, content should be created based on decided plan. Also, the information to be conveyed must be simply, clearly, and visibly visualized or written which should simulated in the mind based on the infographic purpose. In addition to this, out of content can be confusing easily. infographic should be designed in the simplest way. The important points that may be interesting should be definitely mentioned. Cause-and-effect relationship should be showed because comparing content with cause and effect relations reinforces the meaning



3. **Check:** Before publishing infographic, content as a text, visual, story etc. should be checked last time. In this step, proofread is important to detect and correct production errors of text. Also, Infographic should be tested with different experts. For example, following questions can be asked. Does the content involve any errors? Does it flow and story can provide to see narrative the easily? Is the text too small or too large or too much or too little?
4. **Finish:** In this step, the infographic is completed and then published based on its purposes.



Fig.2 Some Advantages of Infographics

## Conclusions

Today, researchers are mainly focused on comprehending effectiveness and characteristics of infographics particularly in education. As a result of recent studies, infographics makes this possibility not only for instructors to deliver the complex information more convenient but also for students' prior knowledge regarding principles of how to create and design infographics along with its applications. The main objective of this research is to describe the principles of design, creation as well as pros of educational infographics based on the modern trends in instruction. Hence, this study would be useful for researchers who are willing to learn and teach infographics at any educational organization and for any level of instruction.

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