The Psychological Impact of Infographics in Education

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Abstract
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. The main objective of this research is to investigate the students' perceptions about using infographics in education. The research is designed as a quantitative study. The total number of undergraduate students participating in this research was 163. Data were accumulated with close-ended questions during this study. The gathered data were analysed via the descriptive analysis approach.

Keywords: Social media; visual literacy; instructional design; infographics; educational infographics

1. Introduction

Technologies and social media become a regular part of our daily life and also are developed according to how individuals reach to and utilize information. The world that we live in is changing constantly and people are no longer searching for their queries in the libraries. Majority of people use web pages and search engines in order to keep their knowledge up-to-date or solve their problems. Additionally, former researches about mobile communication technologies have given people the ability to explore information from any place at any time. Therefore, based on the significant change in the method of accessing information which has influenced the format of presenting information for 21th century generations (often named the digital generation), nowadays, visual knowledge resources with brief textual detail are more preferred (Ghode, 2012).

Accordingly, the change in the format preference has an effect on the implication of learning and teaching activities. Moreover, 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 (International Society for Technology in Education, 2008). The following sections will explain the importance of social media, digital literacy and features of infographics for 21th century generations.

1.1. Social Media

Nowadays social media is transmitted to people's professional and personal lives, so they are connected technologically and also oriented in the higher educational classroom community (McWhorter, 2010; Friedrich, Peterson & Koster, 2011). The New Media Consortium defines that immediate access to the network and internet, especially in higher education, has led to an increase

in the learners' level of expectation, meeting their need of being more creative and collaborative.

This novel model is modifying the way of communication, information accessibility, connection with colleagues and peers, learning and socializing (p.6).

As social media has started moving to the main path, higher instructors are gradually getting interested in joining its engaging features for education (Joosten, 2012). For instance, education of Facebook, Instagram, Twitter, Pinterest and other types of social media platforms are representing a promise for education. Therefore, instructors are realizing that these social media tools are raising the skills of visual literacy, student engagement, interaction and communication with peers in the classroom (Dyrud, 2011; Rinaldo, Tapp& Laverie, 2011; Delello & McWhorter, 2013).

1.2. Visual Literacy for 21th Century Generations

The visuals are very significant for humans to express their demand and feelings since the early ages. Communication through images is used from cave dwellers to present the day of civilization, and history has shown that people were utilizing images in order to communicate. Based on the National Education Association (NEA, 2001), the Western civilization became dependent on visual images, visual artefacts, visual culture and visual communication. The visual images are generated from photos, statues, maps, dreams, ideas and memories (Mitchell, 1984). Hence, all visual images and imageries come in the form of a picture or symbol illustrating the real life and the mankind cultural values.

As society has changed, emerging communication tools have got the result in a widespread utilization of visuals in the virtual world and in any area of human activities. Although visual stimuli are increasing, new generations do not have an adequate skill of visual literacy in order to get engaged with visuals effectively (Hattwig, Bussert, Medaile & Burgess, 2013). Hence, learners cannot take any advantage from visuals in daily or academic life. Learners of visual literate can benefit in understanding visual reading the process of information, and thinking visually (Hortin, 1980). As a consequence, providing learners with visual literacy training is important, particularly for designers of messages such as instructors.

Furthermore, today, the development through information and communication technologies has increased a novel challenge in digital literacy and comprised an emergent need for skills of visual communication (Osterman 2013). It is realized that a growth on the visual culture of photos, images, videos and web are becoming a social currency form that could be shared and curated (Verma 2013; Walter 2012; Rainie 2012; Kern 2013).

The visual literacy is invented by John Debes in 1969. He explained the term as "a vision competencies group comprises of human beings, who are able to develop, by observing and combining the experiences simultaneously and so the development of these capabilities is essential to ordinary people" (p. 27). There are various definitions toward visual literacy since Debes' time. Case-Gant (1973) described visual literacy as a group of skills, which makes people enable to compose, interpret and read visual messages in personal relations. Hortin (1980) explained the visual literacy as not only the skill for comprehending and utilizing images, but also the ability of thinking and studying with regard to images.

Gray (2008) stated that "visual literacy is about having the ability to read and write the visual information, visual learning, speculating and solving problems in a visual environment" (para. 10). In addition, Burmark (2002) specified that visual literacy is the person's capability to comprehend and make visual information, visual photos and utilize them in order to make communication more efficient (p. V).

Although investigators described the term "visual literacy", from various perspectives, these similarities in these definitions comprise thinking and learning with images, creating meaning from visual messages and using images in communications.

Besides, explaining visual literacy is challenging in the new media technology' midst as it encompasses a huge variety of significations. Hence, we are in the beginning of a novel millennium

and it is obvious that visual literacy is important, as well as visual technology to be linked to the needs of new generation communications (Kellner, 2008).

1.3. Infographics

In this Modern World, in every various field, the rapid development, innovation and evolve of technology is observed (Dikmenli, 2015). The quick development can be contemplated as a significant phenomenon that is beneficial for society (Kılcan & Akbaba, 2014). Although, in the modern world, the growing intensity of knowledge and data and having easy access to the data can cause people to bombardment that requires an accurate selection of helpful information (Güler, 2008). Therefore, one of the useful and effective materials which can solve the problem is infographics.

For the first time, infographic was used by Christopher Scheine in 1626. He had published a book of Rosa Ursina sive Sol and demonstrated the steps of sun rotation in his book. Furthermore, James Joseph Sylvester (1878) presented the term "graph" in the Nature scientific magazine. He published a set of graphs, which illustrated the connection between properties of mathematics and bonds of chemical.

The term "Infographic" is made by Peter Sullivan in 1970, 1980s, 1990s for The Sunday Times, where newspaper encouraged utilizing more Infographic. Afterward, as time passes to year 2000, the Adobe Flash animation is used on the internet in order to create Infographic for different games and products.

An infographic is made from graphic information, representation of visual graphic information, knowledge or data words, which aimed to show complicated information fast and clearly (Newsom and Haynes, 2004). It may be called as data visualization, information design or architecture of information based on its target. The cognition can enhance the graphics by using the system of visual human to see tendencies and patterns (Heer et al, 2010).

The creation process of infographic includes data visualization; design of information or architecture of information and it became popular in social media as static images or a simple web interface, covering any number or subjects. The informatics is shared between users of social network such as Twitter, Facebook, Instagram, Pinterest, Google +, Reedit and etc (Ru and Ming, 2014).

The aim of infographic can be categorized into three objectives like speaking in public to persuade, entertain and inform the audience and also obtaining the readers' attraction, hence, the readers can distinguish why they need to read the infographic (Krum, 2013). At this point, some critical questions may come to mind such as: is it possible to use infographics in all subjects? The answer to this query is that the infographics nature and principles of a good design in infographics indeed have an effect. Furthermore, all the definition of infographics implies that a good infographic should be visualizing a story, process, an idea and defining the complicated information clearly along with an eye catching design, Hence, any subject is possible to be designed by infographics via having a suitable visual presentation (Lamb & Johnson, 2014).

Additionally, the infographics are used mostly in newspapers as well as in education. Infographics can be adopted as a promising learning tool in instruction. It can bring some advantages such as (1) enhance interpretation of information, (2) concepts and idea, (3) improving the ability to think about complex information, and (4) enhancing information recall and retention (The Institute for the Advancement of Research in Education, 2003).

1.4. Infographics in Education

In education, the infographics are used to illustrate the complex information in a compact form. This feature enables teachers to make ready various learning activities, comprises warm-up lectures and summaries of the unit in order to engage students with the course contents and make more chances for interaction (Vanichvasin, 2013). Moreover, in order to enhance student's visual communication skills, it can be required to design an infographic based on their visual knowledge and skills such as thinking, learning, and expression. Hence, infographics can be used as an

alternative tool and also make students be able to illustrate their highest achievements in education (Schrock, 2014).

Thus, instructors are looking for a way to integrate the applications and tools and then satisfy the visual learner's needs, by using infographics in the classroom. On the other hand, educators are moving beyond the method of reading the text and data interpretation. Hence, they are utilizing the infographics power as a way of communication. The author of the book "The power of the Infographics: Using Pictures to Communicate and Connect with Your Audiences", defined that infographics are reinforcing the comprehension speed of information, raising the chance of sharing and fuelling the information in a wide variety of digital channels (Smiciklas, 2012).

Another investigator has specified that infographics can be used in the class for students to carry out discussions or to make their own to share with their classmates or in online social media (MacQuarrie, 2012). Additionally, research has shown that the visual communication by using infographic has increased the collaboration, engagement and conceptual understanding of learners (MacQuarrie, 2012; Smiciklas, 2012). An investigator designed an instructional infographic in order to teach and illustrate processes of "How a bottle is recycled". The following figure (Figure 1) shows the complete process by circular pattern. As you can see, in order to design this infographic, the graphical means and textual information is used (Holsanova, Holmberg, and Holmqvist, 2009).

Figure 1. Sample instructional infographics: "How a bottle is recycled"

As it can be seen from Figure 1, this infographic demonstrates a brief paragraph describing the phase, along with short text messages in the middle and some relevant pictures that show the importance of the bottle recycling process. So, embedding a relevant infographics to a lesson enables teachers to activate the verbal and visual processing channels of students and also guide them to enhance meaningful learning (Uyan, 2014; Krum, 2013).

2. Aim of the Research

The main aim of this research is to increase the awareness of opportunities that infographics cater to education, and also investigate the students' perceptions about infographic in their learning process. In order to reach the goals above, this study seeks to answer the following questions listed below:

I.   What are the students' perceptions towards using infographic for learning?
II. What are the students' perceptions towards the effectiveness of using infographic in education?
III. What are the students' perceptions about using visual literacy rather than normal text?

3. Research Methodology

The data of this research are gathered by the quantitative research method. The questionnaire is designed and applied by the investigators of this study. The questionnaire is divided into two sections; the first section comprises demographic information (gender, age, department and nationality). The second section contains 20 questions using a five point Likert scale. The Likert scale for the questions was set as: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5). The questions, measure the students' perception of using infographics in education.

3.1. Participants

The survey was conducted with 163 undergraduate students who participated from four different departments of Education faculty at Near East University, N. Cyprus. The following table (Table 1) illustrates the detailed information of participants.

Table 1. Students' information through this survey.

	Categories	Frequency
Gender	Male	92
	Female	71
Age	18-20	127
	21-25	36
Department	Pre School Teaching	44
	Department for Teaching the Mentally Disadvantaged	61
	Classroom Teaching	33
	Department of Psychological Counselling and Guidance	25

3.2. Data Analysis

The collected quantitative data was analyzed by using SPSS program, version 23.0, 2011. The calculation was based on independent sample t-test to evaluate whether there is any gender difference in the students' perception of using infographic in education. Moreover, standard deviation and average values were used to determine the influence of infographics as a teaching method in higher-education instruction.

4. Implementation

This research is carried out by 20 statements that were given to the students, in order to obtain their perceptions about infographics. Additionally, necessary information about infographics

and also some samples of educational infographics related to their field were given before conducting the survey. Furthermore, different concepts toward learning courses with infographics was explained and demonstrated by some social media apps like Pinterest, Facebook, Instagram, Twitter and etc..

5. Validity and Reliability

The method used in the survey was examined the validity and reliability with the collected data. Joope (2000), specifies that the research reliability is the degree of the result that are constant over time and also if the result of the study is reproducible into another similar technology, so the instrument of the study would be considered as reliable. The outcome of the reliability of this research is based on the items (n=20) and it is measured by Crobach's alpha with 0.79, so it is found as high level internal consistency.

Table 2. General Reliability

Cronbach's Alpha	N of Items
.790	20

6. Results

In this section, quantitative data were examined and analyzed in order to get the students' perceptions about using infographics with social media in education, students' perceptions about using visual literacy and also general averages of students' perceptions toward utilization of infographics with social media applications for education. In the following table (Table 3), general averages are specified with the purpose of determining students' perceptions toward utilization of infographics with social media applications for education.

Table 3. Specify students' perceptions regarding infographics in education

Statements	Mean	SD
1. Infographics can show the subjects in an effective story form.	4.42	.49
2. I believe Infographics motivates students to learn more.	4.60	.56
3. I follow social media pages, which shares Infographics.	4.33	.65
4. I always like to share Infographics in my social media pages	4.36	.57
5. If instructors use Infographics in the class, students will be positively affected to learn.	4.25	.63
6. I believe learning with Infographics method is more efficient.	4.31	.53
7. I prefer to use Infographics (Visual literacy) rather than normal text.	4.32	.49
8. I believe Infographics make the students learning faster.	4.26	.47
9. I believe Infographics by providing visual literacy can make students to remember the concept easier.	4.32	.67
10. I believe Infographics motivates people to study new material at any age.	4.26	.62
11. I believe Infographics can improve people's knowledge	4.30	.61
12. I believe Infographics can enhance the imagination.	4.39	.50
13. I believe Infographics can enhance the creativity.	4.21	.66
14. I believe Infographics help students to learn the more complex content easier.	4.31	.55
15. I believe Infographics improve communication skills.	4.44	.49
16. I believe learning with Infographics takes less time.	4.36	.50
17. I believe Infographics by providing visual literacy, needs less effort in learning.	4.25	.61
18. I believe students enjoy learning with Infographics.	4.32	.49
19. Infographics are strong tools that show the information scientifically.	4.18	.69
20. Infographics utilize creative visual design and technology effectively.	4.23	.59

As Table 3 illustrates, students were asked 20 items and they expressed their perceptions about using infographic in education as "agree" in the entire scale. Furthermore, the significant result of the analysis shows that, there existed no any participants who "disagreed" or "strongly agreed" to any item, whereas the less percentage value of "agree" was 83%. Hence, this means that almost more than 82% of students truly agreed to use infographic as an educational method in learning.

6.1. Students' perceptions towards using infographic in education

Table 4. Students' perceptions towards infographics scores

	N	X̄	**Std. Deviation**
Students' perceptions about infographics learning method	163	86.51	5.17

As it can be seen from Table 4, 20 items were combined to specify the students' perceptions about using infographics in education. The result of the analysis shows that, the students' acceptance level of using this learning approach is fully positive as the Std. Deviation is 5.17 and mean is 86.51. Hence, nearly all the students were agreed with this instructional approach.

6.1.1. Gender differences on students' perceptions about infographics in education
In order to test whether the students' perceptions about infographics differ considerably among male and female participants, an independent sample t-test is applied.

Table 5. Students' perceptions about infographics motivates them to learn more, depending on the gender

Gender	**N**	**X̄**	**sd**	**df**	**t**	**p**
Female	71	4.48	.62	161	2.970	.003
Male	92	4.74	.43			

According to the Table 5, there is no considerable difference for male and female, t (161) = -2.970, p= 0.03 <0.05. It is understood that male and female students are similar in terms of motivation by using infographics in education. However, the result of the analysis shows that male students (X= 4.7465) are more motivated than female students to learn by infographics.

Table 6. Students' perceptions about learning with infographics take less time, depending on the gender

Gender	**N**	**X̄**	**sd**	**df**	**t**	**p**
Female	71	4.29	.50	161	1.981	0.49
Male	92	4.45	.50			

As it is shown in the table above (Table 6), t (161) = -1.981, p= 0.49 <0.05, average female and male students almost have the same perceptions regarding to the study time consumption by infographics. In addition, according to the average result (Table 5), the majority of students believe that infographics can show the subjects in an effective story form and hence make the learning faster.

6.2. Students' perceptions towards the effectiveness of using infographic in education
Table 3 above also illustrates the average result through the effectiveness of using infographics in education. Almost all students underlined that learning with Infographics method is very efficient, as it is enhances students' creativity, knowledge, motivation, imagination, and communication skills. Apart from that, this method not only motivates students, but also encourages people at any age to learn new subjects they would like to pursue.

6.3. Students' perceptions about using visual literacy rather than normal text

According to the Table 7 below, the result analysis shows, 83.7% of the students confirmed that using visual literacy in education is more engaging than learning with textual information. Consequently, students are preferred to study with infographics materials rather than books or other types of traditional materials.

Table 7. Students' Perceptions towards using visual literacy Vs normal text

	N	%	X̄	Std. Deviation
Students' Perceptions towards using visual literacy than normal text	163	83.7	4.32	.49

7. Conclusion

Research to date are mainly focused on the understanding the aspects of infographics in the education. Although students should have the knowledge to understand the educational context by infographics, the teachers should also have the ability to present the instructional information by infographics. In this study, the students' perceptions about using infographics in education are assessed. This study specified that almost all the students had a positive opinion about infographics. They remarked that instructional environment is a rich environment, and this method masters their learning skills, motivation, creativity, therefore, they preferred to study with visual materials rather than books or other types of traditional materials. However, there were also a few neutral notations of the process regarding the utilization of infographics. The main problem of these students could be considered as not having accurate knowledge about this method and may time consuming to study or design. To sum up we can draw the conclusion that almost all the students were satisfied with this method in education in order to increase their knowledge and learning skills efficiently.

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