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The Use of Infographics in Online Newspapers

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Abstract:

Infographics is the representation of data and information using graphics. The use of infographics attracts the attention of users and explains complex information quickly and clearly. This study explores the new trends of using infographics in two different models of Arabic and English online newspapers that are Al Bayan website and USA Todaywebsite. An analysis of infographics that have been published in these both online newspapers was conducted. The dominant type of infographics used in both online newspapers is type-based graphics. USA Today used more types-based graphics.

Keywords: Infographics, Visual Storytelling, Online Journalism, New Media.

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Introduction:

With an ever-growing emphasis on the visual component in news presentation, infographics, loosely defined as a set of technologies that present complex information in an easily accessible manner[1], has become a relatively common element in online journalism.

The internet has changed the practice of the news reportingnot only in printed news, but in all traditional channels. According toFranklin,technological advances are multiplying the outlets for storytelling, and, as a result, changing the way people get their news[2]. Journalists tell stories based on their investigations. Data visualization is an appropriate communication medium for storytelling, in particular when the story also contains a lot of data[3]. However, these data stories told by data journalists differ from traditional forms of storytelling[4]. The recent design revolution, which brought modular design, infographics and increased color, has made today's newspapers more attractive, more navigable and easier to comprehend than ever before[5]. Currently, the use of infographics has become a familiar and significant part of the contemporary online newspapers.

(1) M.Smiciklas, The Power of Infographics: Using Pictures to Communicate and Connect With Your Audiences,(Indiana, 2012), Que Publishing, 2nd. ed., pp. 13-20.

(2) B. Franklin, Key Concepts in Journalism Studies, (London,2005), Sage UK, 1st. ed., pp. 240-252.

(3) Robert Kosara& Jock Mackinlay, Storytelling: The Next Step for Visualization, IEEE Computer, (2013) 46,5, pp. 44-50.

(4) Edward Segel& Jeffrey Heer, Narrative Visualization: Telling Stories with Data, IEEE Transactions on Visualization and Computer Graphics, (2010) 16,6, pp. 1139-1148.

(5) Sandra H. Utt & Steve Pasternak, Update on Infographics in American Newspapers, Newspaper Research Journal, (2000) 21,2, pp. 55-66.

Defining the research problem:

Nowadays, infographics is the basic and essential component of online newspapers. Infographics is the representation of data and information using graphics. The use of Infographics attracts the attention of users and explains complex information quickly and clearly.All the major newspapers also started

e-newspapers editions. The new media users want to consume much more information within very short time and here infographics plays a major role. Although the use of infographics has proliferated in recent years, it remains unclear the use of it in online newspapers.Moreover, the increase of data visualization in online newspapers requires rethinking how infographics is reshaping the representation boundaries of news storytelling.The main purpose of this paper is to explore thenew trends in use of infographics in online newspapers.In addition, it attempts to clarifythe kinds of infographics that are used in online newspapersto effectively present complex information for the readers. This paper explores the differences between Arabic and English online newspapers regarding to use infographics.It alsoclarifies the infographics environment in online newspapers by analyzing the content of infographics of two examples of online newspapers: AlBayan and USA Today.In addition, the study focuses on infographics as a new approach of telling stories and it aims to fill the gap in the literature about theuse of infographics especially in Arab online newspapers.

Brief Theoretical background:

In this fast information age, it is important to present and design information to the readers. The newspaper design and presentation also change as per the time and technology. Therefore, one of the main challenges to current journalism is the adaptation of journalistic content to a technological panorama which is always changing. The challenge is

based in two fields: form and content.

Media richness theory was used as a theoretical framework in this paper. Media richness theory (MRT) was introduced in 1986 by Richard L. Daft and Robert H. Lengel. Leaning on information processing theory for its theoretical foundation, MRT was originally developed to describe and evaluate communication media within organizations. In presenting media richness theory, Daft and Lengel sought to help organizations cope with communication challenges, such as unclear or confusing messages, or conflicting interpretations of messages(1).

Other communication scholars have tested the theory to improve it, and more recently Media Richness Theory has been retroactively adapted to include new media communication mediums, such as improved video and online conferencing. Although media richness theory relates to media use, rather than media choice, empirical studies of the theory have often studied what medium a manager would choose to communicate over, and not the effects of media use(2). Since its introduction, media richness theory has been applied to contexts outside of organizational and business communication such as: nursing and Distance education and e-books.

Online newspapers are distinguished by their unique features such as the interactivity, the use of multimedia and infographics, the immediacy of feedback, and the ability toprovide an electronic archive of previous editions of the newspaper. Then, the richness of the online newspapers is increasedwith these characteristics.

(1) R.L.Daft; R.H. Lengel , Organizational Information Requirements, Media Richness and Structural Design,Management Science,(1986) 32,5, pp. 554-571.

(2) A. Dennis & S. Kinney, Testing Media Richness Theory in New Media: The Effects of Cues, Feedback, and Task Equivocality, Information Systems Research,(1998) 9,3, pp. 256-274.

Information richness is defined by Daft and Lengel as "the ability of information to change understanding within a time interval"[1]. . Media richness theory states that all communication media vary in their ability to enable users to communicate and to change understanding[2]. The degree of this ability is known as a medium's "richness." This theory places all communication media on a continuous scale according to their ability to adequately communicate a complex message. Media that can overcome different frames of reference and clarify ambiguous issues are richer whereas communications media that require more time to convey understanding are deemed less rich. In addition, the main purpose of selecting a communication medium for a specific message is to decrease the equivocality of a message. If a message is equivocal, it is unclear and thus more difficult for the receiver to decode.

For example, infographics used to present complex information quickly and easily which saves time and efforts to understand the information are considered to have higher levels of media richness than written media.

In their 1988 article regarding media richness theory, Daft and Lengel state, "The more learning that can be pumped through a medium, the richer the medium."Media richness is a function of four characteristics that are:

1. **Immediacy of feedback:** The ability of the medium to allow users to quickly respond to the communication that is being received. Moreover, the key reason of using infographics in online newspapers is to present complicated information quickly. Then, users can immediately respond to the news that published.

2. **Capacity to include personal focus:** Every media has different

(1) R.L. Daft ; R.H. Lengel, Organizational Information Requirements, Media Richness and Structural Design,pp. 250.

(2) A.R. Dennis; J.S. Valacich, Rethinking Media Richness: Towards a Theory of Media Synchronicity, IEEE Computer Society,Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. (1999), pp. 10.

levels of personal focus, especially when media incorporates more personal feelings and emotions; the message gets conveyed fully in better terms. The readers of online newspapers can notice the role of infographics to present media content in a simplified and interesting way, which attempts to fulfill audience needs.

3. **Conveyance of multiple cues**: There are various ways in which the medium of communication information is reached, and these cues can be either visual or auditory. For example, using infographics to show evils of smoking by using a combination of cues like stop symbol, numbers of deaths by smoking, with an illustration of someone who suffering in a hospital bed.

4. **Variety of language carried:** It refers to the range of meaning that can be sent using language symbols like numbers or using natural language. Numbers indicate precision while natural language helps convey various concepts and ideas. Infographics used to clarify media content by using symbols, numbers, charts, and so on.

Literature review:

The literature on infographics studies indicates that varying schools of thought dominate the research on the role and use of newspaper graphics: are they used mainly to complement an article's content or to grab a reader's attention – or perhaps do both?[(1)].

Several American studies have examined the usage of infographics and attempted to determine if it is increasing or decreasing. For instance, Smith and Hajash[(2)] described the use of infographics in 30 US daily newspapers. They found that infographics are an important aspect of how newspapers

(1) Sandra H. Utt & Steve Pasternak, Update on Infographics in American Newspapers, pp. 55-66.

(2) E.J. Smith ; D.J. Hajash, Information Graphics in 30 Daily Newspapers, Journalism Quarterly,(1988)65,3, pp. 714-718.

communicate information. Maps, followed by bar charts, were the most used type of infographics. A large proportion of the graphics in dailies were found in the business section. Little incidence of embellishment was found in the graphics, leading Smith and Hajash to conclude that they are being used as basic communication tools and not as creative devices.

Utt and Pasternack conducted three studies related to the use of infographics: their 1989 study(1) found that most papers had been redesigned to include more color and graphics, and more than half of the daily newspapers published between three and six infographics each day, with many of them in color. A notable percentage was on page Al and others were sprinkled throughout various sections of the publication.Their 1993study(2) found that 78.1 percent of the newspapers examined had infographics on their front pages and almost half ran color infographics every day. In their 2000study(3), almost half of the 125 newspapers they examined ran more than six infographics on an average weekday.

Another study "The Importance of Explanatory Infographics in Journalism" by Henriquez in 2014(4) focused on the declining use of explanatory infographics in the newspaper and news magazine industry in the United States because of the nation's struggling economy and other forces affecting the print news industry. This thesis discussed the evolution and value of explanatory graphics in print news reporting and provides a feasible plan on how to integrate them in today's downsized newsroom environment. This study concluded that with the decline of print news,

(1) S.Utt ;S. Pasternack, How They Look: An Updated Study of American Newspapers Front Pages,Journalism Quarterly, (1989)66,3, pp. 621-627.

(2) S.Utt ; S.Pasternack, Infographics Today: Using Qualitative Devices to Display Quantitative Information, Newspaper Research Journal,(1993) 14,3/4, pp. 146-155.

(3) Sandra H. Utt & Steve Pasternak, Update on Infographics in American Newspapers, pp. 55-66.

(4) H. Henriquez, The Importance of Explanatory Infographics in Journalism, Master's thesis, Savannah College of Art and Design,(2014).

and as online and digital publishing continue to take a larger share of the communication market, there is a need to continually search for better ways to disseminate information to readers. While, Crosten[1] tested the theory of the efficiency of quantitative graphs at displaying information – content over style – in three national US newspapers. He found that graphics sampled in the Wall Street Journal displayed the highest average amount of data while those in the New York Times and USA Today had significantly lower average data densities.

A study "Visualizing the News: An Analysis of a Year in Interactive News from The New York Times and The Washington Post"[2] by Maria T. Olivo in 2015 explores how The New York Times and The Washington Post incorporate principles of design and data visualization to present complex information for their readers. The results from the quantitative analysis show that The New York Times is more likely to publish infographics as part of larger stories instead of presenting them as news items on their own. And most of the infographics (63%) were linked to a story, which means that data visualization is being used to enrich stories.

The literature also shows that newspapers consider journalism values such as accuracy when editing infographics, but it does not show that infographics in newspapers adhere to journalistic standards[3]. However, there are no clear-cut answers on the effects of infographics and what forms work the best.

(1) M.J. Crosten, A Content Analysis of Quantitative Graphics: Graphics in Three U.S Newspapers, Paper presented to the Visual Communication Division of AEJMC, (Kansas 1994).

(2) T.M. Olivo, Visualizing the News: An Analysis of a Year in Interactive News from The New York Times and The Washington Post, (2015). Thesis. Rochester Institute of Technology.

(3) E. Vines, Is This Journalism? A Study of Whether the Snapshots on the Front Page of USA Today Adhere to Journalistic Standards, Master's thesis, Louisiana State University,(2002), pp. 2–14.

Kelly[1] concluded that sidebar stories were more effective than graphics at aiding reader recall.Wanta, W. & J. Remy[2] found that recall is most efficient for information from pullout quotes and least efficient from information in graphics.

Research Questions:

Drawing on the literatures, the following questions is poised to test the current use of infographics in theonline newspapers:

1. What are the most used types of infographics in online newspapers?
2. What are the most topics of online newspapers that use infographics?
3. To what extent are the used infographics related to their topics in online newspapers?
4. To what extent are the used infographics clear in online newspapers?
5. Where are infographics placed in online newspapers pages?
6. What are the differences between Arabic and English online newspapers regarding the use of infographics?

Research Design:

To answer the research questions, an analysis of infographics of two selected online newspapers was conducted.Content analysis is a scientific approach to study the infographics environment in online newspapers. It provides a quantitative and objective description of the use of infographics in online newspapers.The study focuses on the various topics and issues that use infographics in the online newspapers. Moreover, the sample includes two online newspapers: Al Bayan and USA Today.

(1) D.J.Kelly, The Data-Ink Ratio and Accuracy of Newspaper Graphics, Journalism Quarterly, (1989) 66,3, pp. 632-639.

(2) W. Wanta; J. Remy, Secondary School Students Reading, Newspapers, Cognition and Reasoning Feature, Newspaper Research Journal, (1995)16,2, pp.112.

Al Bayan is one of the oldest and the most widely spread online newspaper in UAE and is owned by powerful and rich establishments. In addition, it is one of the UAE online newspapers among the leading Arab newspapers in implementing recent technology. Whereas, USA Today shares the position of having the widest spreading of any online newspaper in the United States with The Wall Street Journal and The New York Times. It has a daily readership of nearly 3.2 million.

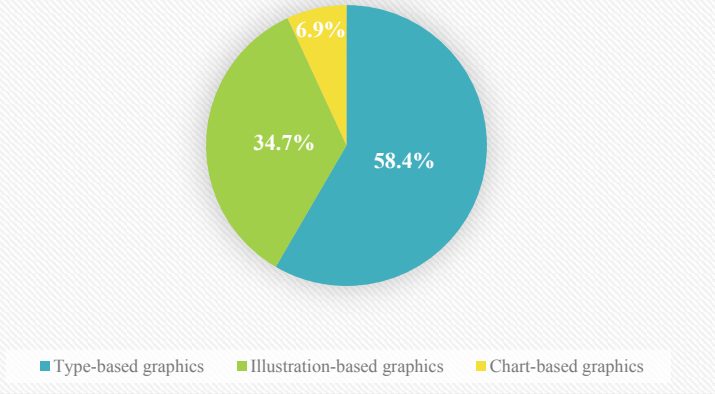
The infographics that have been published in these both online newspapers between 1/5/2017 and 7/5/2017 are randomly analyzed. Infographics was considered as a unit of analysis.

A total of 375 stories were found: 188 byAl Bayan and 187 by the USA Today. Infographics were examined by using the following recording units: 1) type-based graphics; 2) chart-based graphics; and 3) illustration-based graphics. The study also examined the topics, locations, clarity of infographics, and the relationship of infographics with topics.All the infographics categories were nominally coded.

Research results:

Out of the 375 stories, the study found that the most frequently used infographics in the online newspapers were type-based graphics (58.4%), followed by illustration-based graphics (34.7%) and chart-based graphics (6.9%). The dominant use of type-based graphics is due to the attempts to enhance the appearance of these kind of newspapers. (Figure1)

Figure 1: Types of infographics in online newspapers



In type-based graphics, the most dominant kinds were pull quotes, lists and summary. In the illustration-based graphics, the most dominant types were drawings and illustrations, icons and logos, and maps. In the chart-based graphics, the most dominant types were bar charts, tables, and line charts.(Table 1).

The results indicate the dominance of type-based graphics, such as pull quotes and lists, that do not demand a lot of skill and effort to be produced.

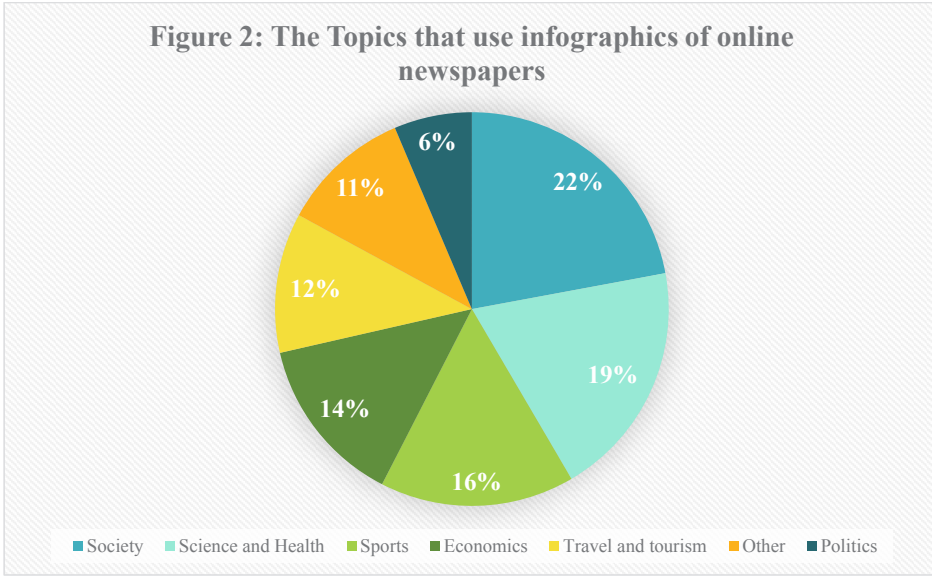
Table 1: Types of infographics in online newspapers Percentage

Type-based graphics	Pull quotes	30.6
	Lists	15.1
	Summary	11.9
	Sidebars	2.7
	Timelines	5.0
	Quotations collections	7.8
	Q & A	7.8
	Step by step guides	2.3
	Checklists	5.0
	Ratings	2.3
	Bio Box	8.2
	Glossary	1.4
Illustration-based graphics	Drawings and illustrations	76.2
	Maps	4.6
	Icons and logos	16.9
	Diagrams	2.3
	Tables	34.6
Chart-based graphics	Bar charts	46.2
	Line charts	11.5
	Pie charts	3.8
	Pictorial charts	3.8

In Addition, the study found significant differences between the USA Today and Al Bayan online newspapers and their use of lists (Chi square = 196.8, df = 120, $p < 0.0001$); bar charts (Chi-square = 172.8, df = 125, $p < 0.0001$); and maps (Chi-square = 56.5, df = 40, $p < 0.0001$). The USA Today online newspaperusesmore types-based graphics such as: (Pull quotes 24.8%, lists 16.3%, Q&A 11.6%) by 69%, while 47.9% of types-based graphics used in Al Bayanonline newspaper.

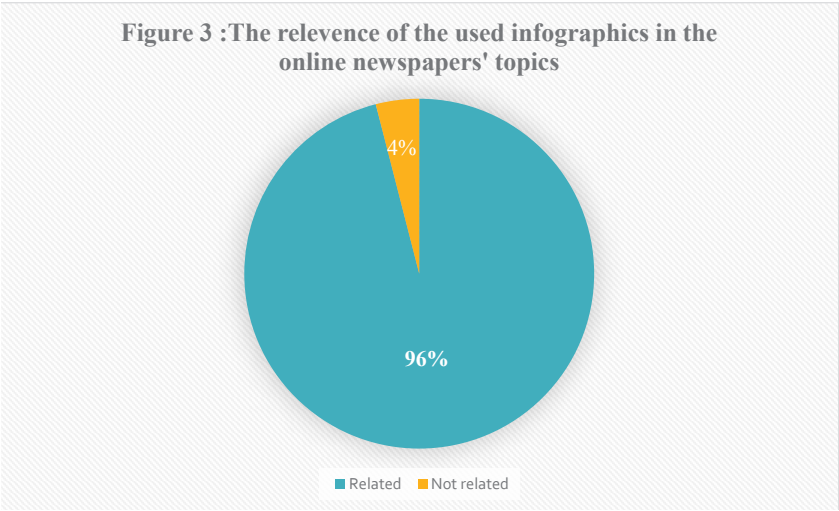
Infographics are most frequently used in online newspapers to illustrate information on the socialtopics with 22.1 % of all issues. 19.5 % of the analyzed infographics cover issues on science and health. 16.0 % cover sports, 13.9 % economics, and travel and tourism with 11.5%. Politics is rarely discussed with the help of infographics 6.4 %.Another 10.7% could not be assigned clearly and were labeled as other. (Figure 2)

Figure 2: The Topics that use infographics of online newspapers



The USA Today online newspaper uses infographics mainly in certain topics: 21.4 percent were used in economic issues, 20.3 percent in social issues, 16.6 percent in science and health. Whereas Al Bayan online newspaper uses infographics in these topics: 23.9 percent were used in social issues, 22.3 percent in science and health, and 20.7 in sports topics.

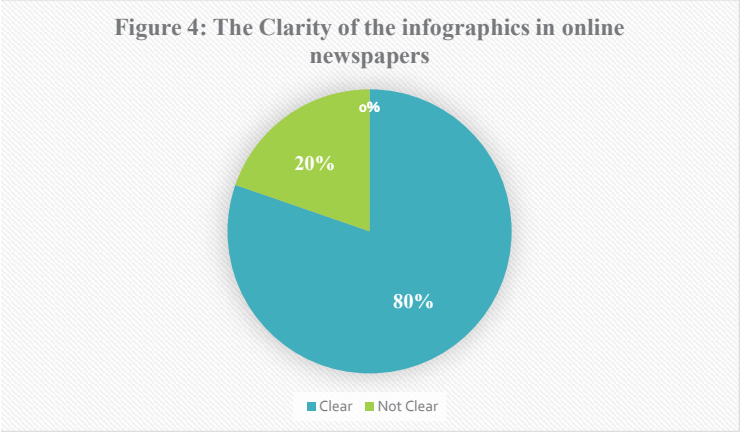
In addition, the study concluded the vast majority of the infographics in USA Today and Al Bayan, which used to visualize the contents, were highly related to the topics by 96.0%. While 4.0% of these infographics were not related to the topics, because they do not visualize or clarify the written data. (figure 3).



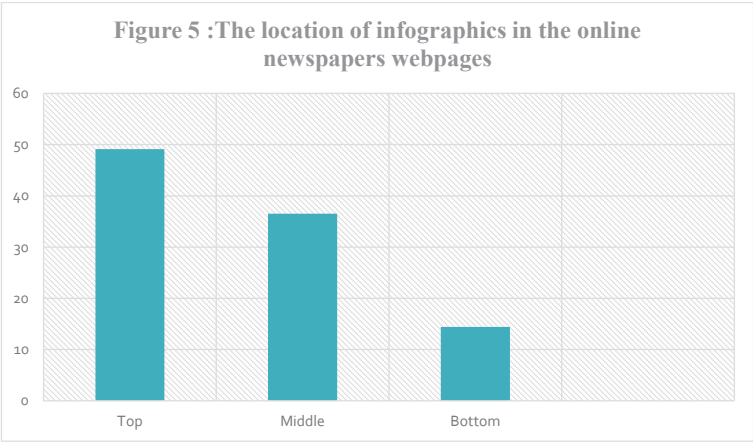
This result support "an Analysis of a Year in Interactive news from The New York Times and The Washington Post" which concludes(1) that most of the infographics (63%) were linked to a story, which means that data visualization is being used to enrich stories.

While figure 4 show that 80.3% of the use infographics in Al Bayanand USA today online newspapers were clear, and 19.7% were not. Based on a study "Moving Graphics: The Effects of Interactive Infographics on Media Users"which found that the clear graphical visualizations seem to facilitate users' recall more. Then, they can recall the information easier and faster.

(1) T.M. Olivo, Visualizing the News: An Analysis of a Year in Interactive News from The New York Times and The Washington Post.



Further, the study found that much of infographics were published in the top of the webpages by 49.1%, 36.5% in the middle, and 14.4% were published in the bottom of the webpages. The reason for the high use of infographics at the top of webpage is to show complex information quickly, which allow the users to consume much more information within very short time. No significant difference was found between USA Today and Al Bayan online newspapers in placing infographics in the webpage. (figure5).



There is a significant correlation between the location of infographics in web page and the type of these infographics. (Chi-square =62.167,significance= .000). The type of infographics, which is illustration-based graphics, is mostly located in the top of the webpage. This is supported by somestudies that show that 90 percent of the information that we remember is based on visual impact.

Conclusion:

Infographics are a powerful way to distill and convey complex information as a visual narrative. With the use of various components in combination, a well-defined Infographics can be designed which can be simple to understand and influential to attract readers. In recent years, the number of infographics has generally increased in online newspapers, due to the use of technology, competition between the newspapers and the impacts of globalization and internet, etc.Both of online newspapers use infographics on most of their webpages. Much of these infographics where published at the top of webpages to attract and to catch a reader on the webpage longer than others. Because of its nature and its features, the infographics attract the curiosity of readers, who understand well the visual and extremely fragmented language.

The study found that both online newspapers used specific types of infographics, particularly type-based graphics, which do not require a lot of effort and skill to produce. On the other hand, a significant difference was found between USA Today and Al Bayan online newspapers in using infographics in specific topics. This may be explained by the differences of these online newspapers in a number of topics, design formats and editing styles of infographics.

On the whole, the study explores the infographics environment in online newspapers, and it attempts to clarify how infographics were used in storytelling presentation by online newspapers. Nevertheless, it is essential

to pay attention to the people who produce infographics, how they produce it or the different types of infographics they use.

Limitations:

Although there is much remains to be done, this work generates important findings in the field of using infographics in online newspapers. There are some limitations to this study. The main limitations are expressed as follows: the first limitation concerns the time of analysis took a week, which is very short period to analyze a huge number of infographics. This may lead to neglect some kinds of infographics that may be published later.

The second limitation isthe inability to interview graphic journalists to explore their profile and analyze their perceptions of the role and use infographics.

Recommendationsand future research:

More research should be done on the development of using infographics especially in different Arab countries. Future research should focus on the obstacles, problems and drawbacks that Arab online newspapers encounter in using infographics and producing them locally. Upcoming studies should also address the perceptions of infographics held by journalists and newspaper staff.Moreover, further research should examine the characteristics of graphic journalists in the Arab world in general and in the UAE in particular, on their perceptions of infographics and on the factors shaping the infographics environment in the online newspapers.

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Appendices:

Content analysis code sheet

	Type of infographics	Type-based graphics	Chart-based graphics	Illustration-based graphics	Topics	Relationship with topics	Clarity of infographics	Location in webpage	The online Newspapers
DAY AND DATE	1. Type-based graphics. 2. Chart-based graphics 3. Illustration-based graphics	1. Pull quotes 2. Lists 3. Summary 4. Sidebars 5. Timelines 6. Quotations collections 7. Q & A 8. Step by step guides 9. Checklists 10. Ratings 11. Bio Box 12. Glossary	1. Tables 2. Bar charts 3. Line charts 4. Pie charts 5. Pictorial charts	1. Drawings and illustrations 2. Maps 3. Icons and logos 4. Diagrams	1. Politics 2. Economics 3. Sports 4. Travel and Tourism 5. Society 6. Science and Health 7. Others.	1. Related to topics 2. 2.Not related to topics	1. Clear 2. Not Clear	1. Top 2. Middle 3. Bottom	1. AL Bayan 2. USA Today

Coder instruction Sheet

1. Types of infographics:

In term of:

- Type-based graphics: is infographics designed by means of the word or text.

  1. Pull quotes: a brief, attention-catching quotation taken from the main text of an article and used as a subheading or graphic feature.

  2. Lists: a number of connected items or names written, typically one below the other.

3. Summary: a brief statement or account of the main points of the article.
4. Sidebars: a narrow vertical area that is located alongside the main display area, typically containing related information as additional or explanatory material.
5. Timelines: it shows major events over a period of time.
6. Quotations collections: A collection of storytelling quotes from relevant sources that provide added insight to the story.
7. Q & A: Simple listing of questions posed to a source and the source's responses.
8. Step by step guide: guide to explain progress gradually and carefully from one stage to the next as a process.
9. Checklists: A list of information that readers can use to help them prepare for an event.
10. Ratings: An evaluation of something on a comparative scale.
11. Bio box: A list of relevant, statistical information about one or more of the sources in the story.
12. Glossary: A list of words and definitions that help readers to better understand the accompanying story.

- Chart-based graphics: is infographics designed by means of the chart formats to show amounts, numbers, classifications etc.

1. Tables: A collection of related data held in a structured format and It consists of columns, and rows.
2. Bar Charts: A diagram in which the numerical values of variables are represented by the height or length of lines or rectangles of equal width.

3. Line Charts: A chart displays information as a series of data points called 'markers' connected by straight line segments.
4. Pie Charts: A chart in which a circle is divided into sectors that each represent a proportion of the whole.
5. Pictorial charts: A chart of data comparison which use relative sizes of repetitions of the same icon or symbol to show data relation.

- Illustration-based graphics: is infographics designed by means of the illustration.

1. Drawings and illustrations: A picture or a drawing that used to explain or prove something in the story.
2. Maps: A diagrammatic representation of an area of land or sea showing physical features, cities, roads, etc.
3. Icons and logos: A symbol or other small design adopted by an organization to identify its products, uniform, vehicles, etc.
4. Diagrams: A simplified drawing showing the appearance, structure and workings of something; a schematic representation.

2. Topics in online newspapers:

In term of:

- Politics: Articles that related to the politics.
- Economics: Articles that related to the economics.
- Sports: Articles that related to sports.
- Travel and Tourism: Articles that related to the travel and tourism among countries.
- Society: Articles about celebrities, social activities, society issues, cultures and traditions, books.

- Science and Health: articles related to the health and science.
- Others: stories not sorted within all up articles.

3. Relationship of infographics to topics:

In term of:

- Related to topics: it is related to the topics when it shows the importance of the topic, it uses appropriate colors, visuals and graphic elements that simplify and clarify the data.
- Not related to topics: It ignores the importance of the topic, it uses inappropriate colors and it is not visualizing or clarifying the written data.

4. The clarity of infographics:

In term of:

- Clear: It is clear means it is easy to be understood and it uses readable font formats and size, common visuals and symbols, and the space between data and graphics.
- Not clear: It is unclear when it uses unsuitable colors, unreadable fonts, unknown symbols and visuals, and no spaces between the elements.

5. Location of infographics in webpage

In term of:

- Top: The infographics is in the top of the webpage.
- Middle: The infographics is in the middle of the webpage.
- Bottom: The infographics is in the end of the webpage.

استخدام الرسوم المعلوماتية في الصحف الإلكترونية

منار عماد ظاهر[1]

ملخص البحث:

الرسوم المعلوماتية هي تمثيل البيانات والمعلومات المعقدة باستخدام رسوم إبداعية تجذب الانتباه وتيسر على المتلقي إدراكها بسرعة ووضوح. تظهر مشكلة الدراسة في الاتجاهات الحديثة لكيفية توظيف الرسوم المعلوماتية بالصحف الإلكترونية من خلال المقارنة بين نموذجين مختلفين من الصحف الإلكترونية العربية والإنجليزية وهما صحيفتا USA Today والبيان. من خلال تحليل الرسوم المعلوماتية التي نشرت في هاتين الصحيفتين تبين أن النوع السائد من الرسوم المعلوماتية المستخدمة في كلتا الصحيفتين الإلكترونيتين هي الرسومات القائمة على الكتابة؛ إذ استخدمت صحيفة USA Today عددًا أكبر من الرسومات القائمة على الكتابة.

الكلمات الدالة: الرسوم المعلوماتية، رواية القصص البصرية، الصحافة الإلكترونية، وسائل الإعلام الجديدة.

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