

A brief literature review about the comprehension of infographics in maps.

Mariane Félix da Rocha ^a

^a Geography Department, Federal University of Paraná, Curitiba, Brazil, mfr1306@yahoo.com.br.

Abstract. Infographics are, basically, information presented in a graphical way. It includes graphics, diagrams, images, illustrations, timelines and amongst other things, maps. This last feature presents the geo-location as data, and combined with infographics may expand the possibilities of thematic cartography, to the point that some authors apply the term geo infographics instead of thematic cartography. Attempting to reunite some perspectives about the comprehension, interpretation or understanding of infographics in maps, or geo infographics, this bibliographical review paper aimed to summarize a few studies on this topic. As a result, 6 studies were found, in which the analyses were separated by educational uses and other contexts. The first group combined bibliographical studies about the benefits of the use of geographic infographics for learning processes; a practical activity on the construction of traditional thematic maps and maps with infographics; and a guide providing more possibilities with the use of infographics in general as well as maps with infographics in teaching. In other contexts, a paper was found about the influence of journalism and social media in the cartographic patterns and maps elaboration; a call for the importance of including maps in the graphical information on disaster risks as a possibility to increasing the engagement in actions for self-protection; and an investigation on how maps and infographics may be used to spread some tendentious messages. In conclusion, there is a notable lack of studies aimed at checking the understanding or interpretation of infographics in maps in specific groups (such as divided by gender, age, educational level...) or with specific graphical materials (for example, testing different styles of maps, charts, colors, diagrams etc.).

Keywords. Infographics in maps, geoinfographics, graphic information, visual data, interpretation, apprehension, assimilation, perception, bibliographical research.

1. Introduction

According to some authors, infographics could be defined as a verbal-graphic element that transfers the information in an effective way [1]; the illustration of the information to a faster, easier and simpler understanding of the information [2]; visual representations of information, data or knowledge in order to present complex information quickly and clearly [3] and the compression or the sum of the words "information" and "graphics" [1] [3] [4].

Amongst other categories, infographics may also be classified as geo-locating [5]. In this perspective, many authors consider maps as part of infographics [1] [4] [5]. In fact, the traditional definition of thematic maps has been considered so strict that the concept of "geo infographics" has been proposed as a replacement [6]. It includes, as well as thematic maps, other expressions related to infographics, such as cartograms, schematic maps, topological maps, concept maps and others [6].

Furthermore, maps, graphs, charts, flowcharts, mind maps, signs, diagrams, timelines, tables, structured lists, illustrations, logos and calendars are considered as infographics [1] [3] [5]. Thus, the infographics must contain three main components: visual elements, which includes maps, graphs, colours, signs and others; content elements, such as statistics, texts and references; and knowledge (the message itself) [5].

All of these elements are used with the purpose of facilitating the comprehension of the message. These graphic visual representations of information use graphics to increase the human visual system's ability to see patterns and trends [4]. Therefore, the cognition is improved and the complex information is easier to understand [4].

In order to investigate how people interpret infographics in maps, this paper aimed to integrate multiple studies on this topic. Although it was not the main goal of this research, other similar contents were added, such as the comprehension of maps and

graphical information in general, in an attempt to present more perspectives that could add to the analysis of the comprehension of infographics in maps.

2. Methodology

As a bibliographical review article, searches were undertaken in the Google Scholar and Scopus websites for the following terms: understanding/ interpretation/ comprehension/ apprehension/ perception/ of infographics in maps/ geo infographics. Papers with abstracts that presented research to understand the interpretation of infographics in maps or geo infographics for some group as a main goal were selected. This way, 6 articles were found and analyzed.

The intent of this paper is to point out some discoveries about the interpretation/ comprehension/ understanding of infographics in maps or geo infographics, but also in general graphical information. So, the analysis is not quantitative about the papers found, but descriptive of some findings of these researches.

The option for a bibliographical review as research is justified because this text is the first part of an academic collaboration between the Palacky University Olomouc, Czech Republic, and the Federal University of Paraná, Brazil. The aim of this research is to investigate the understanding of infographics in maps by geography students and geographers of both countries. In this way, this bibliographical review provides a comparison basis for the results of this further research.

3. Results

3.1 Understanding infographics in maps in education

Naparin and Saad (2017) in a bibliographical review about infographics, found a series of studies that points to the use and construction of infographics by teachers and students as a tool to develop visual literacy skills. Also, they highlight that students who used infographics retained more information than the students that used texts, and earned better results in exams [7]. This way, they recommend the use of infographics to teach difficult subjects or challenging lessons.

Çifçi (2016) also noticed that in geography lessons the use of infographics also contributed to the increase of the student's visual and verbal learning levels [2]. They can be made by teachers or students, and also allow them to add video, sounds or animation. Compared to control groups, the author concluded that the use of infographics increased students' achievement in geography lessons in the experimental groups [2]. One possible justification for these results is that infographics are able to attract the student's attention, leading to a faster and more effective communication [2].

In a study involving college students with a background in cartography skills, Schaab, Adams and Coetzee (2021) asked them to make a traditional black-and-white map and one colorful infographic map, both in a layout suitable for magazines [8]. Figure 1 and Figure 2, taken from the text of the authors [8], brings both products as an example.

The authors indicate that the map in Figure 1 uses the cartographic conventions, so it applies proportional ring symbols to demonstrate the theme of the map. Also, it uses texts to complete the information [8]. On the other hand, the coloured map version, with infographic elements, uses the main topic, water, as a theme: from the choice of the colors to the drawings. It communicates through graphic or visual elements – the title and subtitle are the only texts in it [8].

Main Sources of Water in the Water-Scarce Region of Northern South Africa

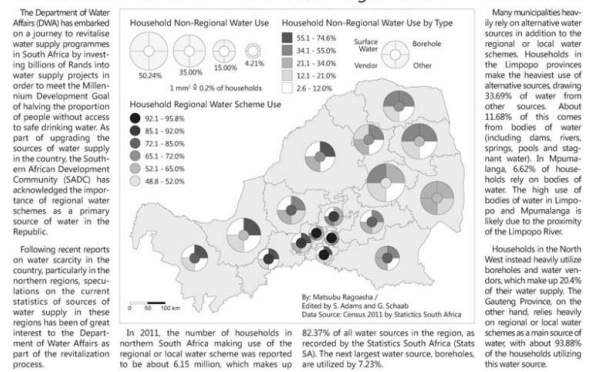


Fig. 1 – Black-and-white thematic map about the main sources of water in the water-scarce region of Northern South Africa [8].

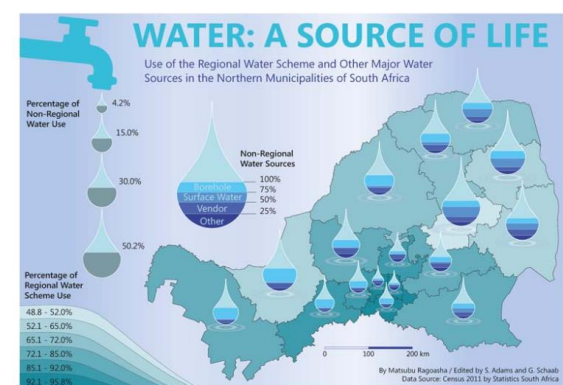


Fig. 2 – Thematic map with infographic elements about the main sources of water in the water-scarce region of Northern South Africa [8].

In conclusion, Schaab, Adams and Coetzee (2021) summarizes that the use of artistic concepts and aesthetical design may attract people to engage with data, which is especially important considering the lower educational level of the audience and statistical (and "boring") data [8]. Also, the infographics in maps could save the same space in the paper by using various graphical layers above one another, or the same symbol or diagram combining multiple variables, which facilitates the

correlation between attributes [8].

In education, the infographics also might stimulate creativity and self-dependence of the students, as well as the formation and development of modeling skills [5]. In this way, the infographics with maps appear as elements that might help to develop the “tasks for transcoding information from one model to another” and “evaluation tasks and tasks for modeling of casual links” [5].

The first one is related to infographics in maps because, amongst other reasons, it instigates the students to identify relevant information on the meaning of the image, evaluates the match between text and image data and emphasizes hidden connections while transcoding information. The second one keeps in touch with geographical infographic themes because it gives the students opportunities to reveal causality relations in the studied subject [5].

3.2 Understanding infographics in maps in other contexts

Schaab, Adams and Coetzee (2021) write that journalism (social media, above all) brought some tendencies to thematic cartography, due to the amount of cartographic data available online, which didn't need too much initial knowledge to use [8]. In this context, the narrative visualization uses a kind of storytelling through maps to reach larger audiences and explain complex information, as statistical data, in a way that they can be easily understood [8].

Infographics and maps have also revealed themselves to be important tools to prevent disaster risks: Liu et al. (2017) found out that warning messages that had maps were more likely to personalize risk information – in other words, emphasizing that the disaster warning is aimed at oneself. This may encourage people to adopt protective actions [9].

The authors also highlighted a lack of studies that examine public reactions to disaster updates communicated by graphic information, such as maps. Therefore, more tests involving different types of maps and publics are needed, as well as ways to improve the public education about visual information in disaster communication [9].

Going deeper into the iconographies of power, Jensen and Richardson (2003) studied the maps and other images as metaphorical representations of European space, rather than an accurate representation. This is due to the combination of visual data and concepts, that depend on the interests of the image author and the message that must arrive to the audience [10].

For example, the spatial metaphor of ‘shrinking Europe’: according to Figure 3, it seems like the improvement of the transportation system between the European countries made mobility faster and easier, integrating the different regions. However, it hides inadequate transport infrastructure and bureaucracy while crossing the borders, which

means additional travel time [10].

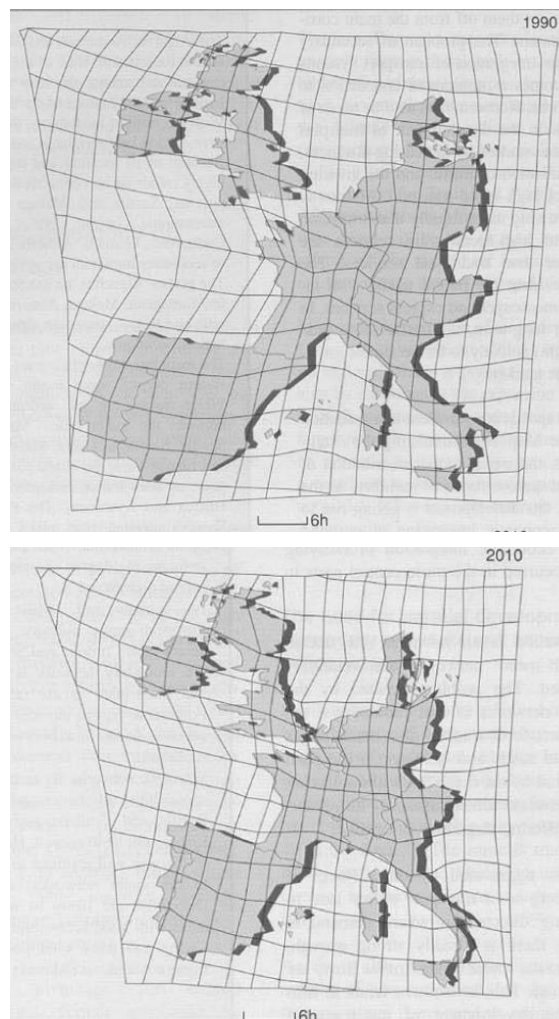


Fig. 3 – The European map showing the relative travel time between countries in 1990 and 2010, evidencing the ‘shrinking Europe’ [10].

4. Discussion and conclusion

As demonstrated in the results section, from the 6 papers found, 2 of them were about the use of infographics in educational processes, and didn't include maps or geo infographics. One of the studies was about infographics in maps and ways to improve thematic cartography by adding infographic elements, but the understanding of them was based on bibliographical research and material analysis. The last one about education, opened some new paths for the use of infographics with students, of which only those paths that included maps were cited.

In other contexts, one paper indicated how mass media changed the way maps are done, making them easier for different kinds of public to understand. A second paper analysed in this chapter pointed to the importance of the maps combined with graphic information to better inform people about disaster risks. Finally, the last paper to be included here illustrated how maps and graphical information can be used to send some “tricky” messages according to

the interests of the sender.

Therefore, the results suggested that the studies mostly investigated infographics or geo infographics in general through bibliographical research of the characteristics of the graphical material or the way that people use infographics in maps and in general.

Despite the limited research papers considered in this text, it suggests a lack of applied studies that intent to discover how different groups of people (students of all levels, age or gender groups, ethnicity or different countries groups...) understand infographics in maps, as well as how the different characteristics of the graphic material, such as drawing styles, tables, charts and others, affect the interpretation of the material.

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