

## **PERCEPTION OF THE WORLD: MENTAL MAPS AND SOCIOENVIRONMENTAL PROBLEMS**

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### **INTRODUCTION**

People build their world image in relation to stories they hear from family and friends, news that they observe in the mass media... School environment influence is relevant as well, especially from subjects such as Geography, which not only presents facts and data in the world but also a representation of the planet on a map.

In this article we provide empirical evidence on the mental construction of the world map by Teacher Training students of Valencia. By this, we want to show the need to work this content on cartographic skills to prevent deformation of the explanation of the planet Earth and its problems.

### **1. OBJECTIVES AND HYPOTHESIS**

The objectives of this research are:

- To corroborate the incidence of traditional teaching and influence of the mass media in particular cartographic representations the world.
- To analyse the importance of these mental maps in the deformed vision of the social and environmental problems of the planet.
- To reflect on the role of didactic material and teaching practice in the construction of scientific knowledge.

Therefore, the following hypothesis is proposed: Mind maps, through its cartographic representation, show the deformed vision of the socioenvironmental problems of the

planet people have, based on the knowledge derived from their social and cultural environment. Thus, we want to show the need to work these content cartographic skills because of their contribution to the construction of scientific knowledge of the world and its socioenvironmental problems.

## **2. THEORETICAL FRAMEWORK**

School knowledge in the Global Information Society is strongly influenced by the dissemination of news in the media through social networks, which influences the understanding and explanation of the world (Souto, 2011a). It is wanted the most appealing message to reach the maximum number of people and boost ratings (Caurin, 1999: 410). All this shows the importance of learning formal and non-formal education of a planetary citizenship criteria; it has been demonstrated in biased researches, as the mapping of land in Mexico (Pájaro, 2011) or the mental maps of the sea reliefs by the fishermen of the Balearic Islands (Lucas & Ordina, 2013). Other more generic studies have shown the intimate connection between linguistic competence and spatial cognition (Elian, McCarthy & Brewer, 1993; Landau & Jackendoff, 1993), which are conditioned by sensory and cultural factors and which determine the actions that we perform on the territory.

For these reasons we have been interested in reading authors who follow this line of thinking which integrates the perceptual and cognitive variables: “most of our spatial response is not perceptual but conceptual” (Bartley, 1976:256) as “society is subjectivated, is individualized, it becomes the guiding principles of human behaviour.” (Ortega et al., 1996:111). This patrimonialization and fragmentation of the space inclines us to understand the spatial subjective perception in relation to the understanding of our territorial behaviour and the differentiation between absolute and subjective space (Boira, 2005).

The main epistemological problem in the geographical study of the world is the confusion between space and territory (Souto, 2011b). In the first case we are witnessing the construction of an understanding of the world by people from a personal position, that affects perceptions and personal and collective behaviour. On the other hand, there is a parcelled explanation of the world by socio-economic regional groupings (China, EU, United States, Latin America, Persian Gulf) or political States, which involve the organization of economic and human resources. School cartography broadcasts this second perspective.

Consequently, the first question that justifies this research is the need to show this deformation of the planetary perception through future teachers’ mental maps, stealing as an important feature their flat, biased and territorial vision of the world that they are transmitting.

Mind maps are a subjective and significant representation of reality. Its use dates back to the origins of humanity (Robinson et al., 1987), but we'll have to wait for the second half of the 20th century so Lynch addresses the subjective vision of the space in his work *The image of the city*, giving rise, with other researchers (Gould, Löwenthal...) to the paradigm of geography perception (Capel and Urteaga 1988; Boira, Reques & Souto, 1994).

Recent neuroscience studies support the importance of the analysis of mind maps in the learning process of students, to show what is represented as significant and what it omits as not being representative, corresponding to a correlation with the problems associated with social and environmental actions. Also it is possible to appreciate the links between the problems explicit through written linguistic communication and its cartographic representation.

This experience aims to promote reflection on how future teachers may, through cartography, contribute in the coeducation of citizenship criteria. Above all, as they want to, since it is a question of attitude, enhance a full and comprehensive knowledge of the world.

The change of thought and behaviour that is proposed is a complex change, upstream of the dominant culture in our society (fragmentary, specialized, discipline, etc.), and this change requires not only a certain pedagogical attitude of teachers, which is often accompanied by a didactic approach activist and spontaneous, but also seeks to complement the social and political perspectives with the teaching techniques, incorporating the most recent developments in the psychology of education and didactics in the social sciences and of the nature (García, Martín & Rivero 1997, in Caurín, 1999:26).

In the context of current globalization, globalization, solidarity, intercultural, and sustainability are indispensable for the comprehension and understanding of planet Earth and raised the need to reflect on the identity and "the construction of the otherness of other people" (Baumann at Nash and Marre eds., 2001:50) in order to answer the question on "Do culture and ways of life (should be) transmitted in the educational system?" (García et al., 2010:10). For this reason, it is essential to reflect about our own representations of the world from everything that we have, and do not take into account, in our planetary perception with the aim that our teaching practice enables a full vision of the space and a meaningful, personal and socially useful learning to our student.

### **3. METHODOLOGY**

The methodology in this research is based on the study of cases of an experience carried out in the Facultad de Magisterio of Valencia (Spain). This practice has been developed in the academic years 2011/12 and 2012/13 with students who study the degree for Teacher Training in Nursery and Primary schools.

Our students' profiles are:

- Three groups of 3rd Grade consisting of 75 people who are studying the subject of Social Sciences Didactics: basic aspects.
- Four groups of 4th Grade, consisting of 129 people who are studying the subject of Social Sciences Didactics: applied aspects.
- Two groups of 2nd Grade, consisting of 55 people who are studying the subject of Natural Sciences for Teachers, as control groups.

The activity consisted in students drawing on a piece of white paper a map of the world, from their own geographical knowledge. The objective was to verify the relationship between the mental image they had of the planet Earth, a possible deformation of the knowledge of it and its social and environmental problems.

The implementation of this experience follows these guidelines:

1. The main objective is not clear for students: to display their previous conceptions.
2. It is being applied to the students who study the subject of SSSS Didactics (experimental group) because of the relationship this subject has with the content of their teaching guides.
3. The groups of CN for teachers are used as control groups. These groups are: 2K and 2J, both will serve as a reference for the contrast of the evidence of implicit knowledge. The group 2J, for its contribution to the location of the social and environmental problems, also exercises its oversight function in the explicit evidence.
4. In 4th Grade we diversified the practice between two groups that don't get any indication to make their representation (4F and 4H) and two more groups who are asked to locate five social and environmental problems (4A and 4E).
5. It is not allowed the observation of any type of material for the realization of the activity, excepting for the two groups of 4th Grade (A and E) that establish social and environmental problems, leaving this matter at their discretion. In this case is observed that students, occasionally, used personal computer networks.
6. Qualitative and quantitative analysis of the data obtained by comparing representations of mental maps with the same cartographic representation in an Atlas. Use of a coordinate axis as a test of mental representation, where the ordinate corresponds to the Zero Meridian and the abscissa with the Ecuador.
7. The use of alternative cartographic materials in the comparative analysis of proposals for worldwide representation.

#### **4. ANALYSIS AND DISCUSSION OF DATA**

The first question which arises in this research is to check if the student shows a perception of the world distorted in the cartographic representations of your mind maps.

##### **4.1. Representation of the world through mind maps.**

It is observed a preference for the use of a flat representation on the geoid. This fact affects the defective overview of the planet, to obviate the continental proximity manifested in places such as the Strait of Bering and the understanding of phenomena such as the rotation and translation or the Coriolis force, for example.

It also offers a biased view of the world when omitting, more often than it should, certain land regions and their associated problems. In this aspect, it highlights the case of the poles and their impact on biodiversity, climate, de-icing by global warming, and disappearance of the ozone layer.

The use of the Mercator projection or “Mercator with the Poles” is excessively used in representations and this use leads to the incongruity of terrestrial regions which do not appear (Polar Regions), which appear very disproportionate (Northern Hemisphere very extensive with respect to the Southern Hemisphere) or may appear very far apart (as in the case of America and Asia). The use of another type of projections provides other points of view and they can help to develop empathy with the social and environmental problems when considering the scope of cognitive attitudes. The use of the geoid projection allows us to see the planet as a whole, in which represented the masses appear Arctic and Antarctic, a fact that facilitates the study of the problems of global warming the same.

##### **4.2. Perspective and continental relationship.**

The supremacy of the Eurocentric focus on the Equatorial focus, stands an important marked identity in processes of “globalization”, but it is insufficient to understand correctly global processes. The exaggerated representation of the northern hemisphere contributes to territorial knowledge of the world known from Europe, but distorts the geographical spatial knowledge.

An exaggerated representation of the continents shows a fragmentary and stereotyped knowledge, but at the same time denounces a deterministic framework and a lack of dialogue relations between the regions of the Earth. Generally, there is a greater emphasis on the distorted view of the cartographic representation of the world in the control groups.

### **4.3. Relationship between the representation of mental maps and the vision the social and environmental problems associated.**

This research also aims to analyse the relationship between the mental maps and the social and environmental problems that are represented implicitly or explicitly. In an implicit way, through the drawings students had made without a chance to consult any material. In an explicit way, as well, when two groups of 4th Grade (groups A and E) are asked to locate five global problems, leaving them act according to their own criteria for using sources of information that enables ICT. At table 3 data are obtained in a tacit way, while Figure 3 shows the explicit representation of problems, where there is evident a minor focus problems, instead showing its systemic and ecological character.

### **4.4. Cartographic representation of the described problems.**

The social and environmental problems which worry students are: famine, war, poverty, economic crisis, environmental problems... Curiously, they identified the location of this troublesome world, recurrently, in a very concrete way despite its global nature.

There is a greater emphasis on the distorted view of the social and environmental problems in the data provided by the control group, which shows attitudes and more deterministic concepts. Also, and in general, this group shows a greater concern by environmental problems and health, while the experimental group takes precedence of a social nature. This fact is justified because of being pursuing the course of Social Sciences Didactics in the Teachers Training Grade, to enhance the knowledge of multiple identities and global identity creating situations of empathy. At the same time, this complements an integration of previous knowledge from the Natural Sciences, in an interdisciplinary way, in a vision more competent and useful of the world geographical space from the teaching of social and environmental education.

As teachers, we know that the student is who learns and who decides what he or she wants to learn, so at the end of practice on 4th Grade, we explain the purpose of the experience in order to lead to a reflection and to a change of attitudes in the future teachers.

## **5. CONCLUSIONS**

The results of this research allow us to draw the following conclusions:

- The cartographic representation of mental maps, in their vast majority, verifies the distorted view that students have of the world due to the territorial learning, than non-spatial, formal and non-formal education has given to them.

- The perception of social and environmental problems worldwide also participates in this distorted view in relation to what is expressed explicitly in the cartographic representation of mental maps.
- Alternative materials, methodological strategies and teaching practice are the key in the construction of scientific knowledge of the world.

Alternative materials like the Environmental Atlas and Globalisations of Le Monde Diplomatique (Bovet et al. 2008; AA.VV., 2011) contribute to a global and comprehensive presentation of the world problems. It is necessary to know the world geographic space from our own environment “to create social awareness among the students regarding realities they must know and modify” (Delgado and Rodrigo, 2012:55), but at the same time that local identity must conceive a “deeper root in the terrestrial human identity” (Morin, 2003:73).

Information and communication technologies (ICT) provide a valuable material on the matter from the use of Google Earth, to cite one example. But also traditional materials reused with another approach as it may be to show the Earth from different projections in the process of setting of the classroom or the use of the globe to carry out various activities. An example can also be comparative analysis of cartographic representations of different projections (e.g., Mercator and Peters), or the study of the geometric centre of the maps that are used in classrooms; e.g. using projections focused in the Pacific (as it is in some materials of Earth science and the environment). All these activities are strategies that help to improve mapping learning and environmental knowledge of the world.

Methodological strategies provide usefulness to the acquired knowledge in order to work for projects to solve the problems raised. In this way all the knowledge is united to put it in competence and it is dissociated to certain land regions of ‘intrinsic qualities’ which pejorative determinism is attributed from a disciplinary and skewed space study.

On the other hand, the teaching practice, from constructivist principles, fosters reflection on students and therefore participates in the formation of the criteria of persons by exposure of knowledge. The internalization or not, of them, is a matter of personal attitude: to discover them (cognitive), to develop a feeling of belonging (affective) and to participate in the construction of the knowledge of the world and its social and environmental problems from a solidary, sustainable, ethical, (conative) scientific practice and taking responsibility.

## **6. SCIENTIFIC CONTRIBUTIONS AND IMPORTANCE OF THIS WORK**

The scientific importance of this research lies in the verification of the hypothesis to prove the distorted view of the world and its social and environmental problems shown by many of Teacher Training students in the cartographic representation of their mind

maps. This research contribution to knowledge in the field of Social Science Didactics emphasizes the need of using alternative cartographic materials and reuse traditional ones to promote the comprehensive and global knowledge of the planet, showing other points of view and to create empathy situations that promote reflection and dialogue. Project working and a coherent teaching practice can contribute to the creation or modification of attitudes, based on “a deep understanding of the ecological and environmental phenomena integrated with social, economic and moral upon which to base reasonable criteria” (Caurin et al., 2012:232).