THE SCHOLAR CARTOGRAPHY IN BRAZILIAN UNIVERSITIES: AN EXPERIENCE IN OURINHOS

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Abstract. This paper presents the experience of implantation the discipline Scholar Cartography in Geography Course from UNESP (University - "Júlio de Mesquita Filho") in Ourinhos, Sao Paulo. This discipline was proposed as optional for teacher training and BA in Geography and aims to: understand the development of the concept of space in the school-age child; resume concepts worked in Cartography and adapt them to the Geography teaching; build and implement educational resources for teaching Geography and reinforce the importance of cartography as a resource of inclusion of the students with disabilities.

Keywords: scholar cartography, teacher training, maps for school

1. Introduction

Maps have always been a tool used by men to orient, locate, inform and communicate. It is used by scientists and by layman, both in professional activities as in social, cultural and touristic activities. In this sense, everybody somehow and sometimes resorts to map to express themselves spatially.

To use a map in a coherent manner, thus perceiving that it is a representation, therefore has symbolism, which is the result of generalizations and omissions; The user must master the cartographic language. This field is a necessity in the formation of any citizen, which appears as an important topic in the school curriculum.

"We have to understand Cartography as a social construction, not something done, finished or static. Cartography is not just a bunch of techniques, it builds and foremost reveals information" (Santos 2007 p. 1).

It is at school that the student must develop his capacity to represent and even in a simple way be able to understand his living space, more than that, be able to read, interpret and critically analyze graphical representations. Thus Cartography reveals an important path to understand the spatial issue, representing it through graphic language.

In the early grades, the structuring knowledge is worked and it will serve as a basis for the cartographic teaching in the following years, since it is at this stage of schooling that the spatial notion (topological, projective and Euclidean) is developed. Later, maps and other graphical representations are introduced with increasing frequency mostly in Geography lessons.

The teaching of the cartographic concepts is critical to the students' development, as the world rearranges itself over time and the technological revolution accelerate these changes. Consequently, understanding the cartographic representation can allow a more conscious and critical reading of the world and its contradictions.

"This situation is worrisome, because to develop an understanding of the "world reading" from the graphical representation of a map results in the formation of a student more aware of the changes and permanencies of space allowing that individual to understand the world from different perspectives, which results in a more complex analysis of reality. Therefore, the activity to locate, orient, identify routes, have notions of scale, read the information and symbols found on a map, know how to represent the elements and facts of everyday life through the cartographic language are skills that must be taught in school. Neglecting the development of these skills is the same as excluding the students' access to fundamental knowledge and skills to understand and act in the society." (Richter 2012 p. 5).

According to Almeida (2008) Cartography has been gaining ground in the Brazilian basic education during the past two decades, but the use of maps at school dates back the first Geography classes taught in the late nineteenth century. For a long time maps were used as a reinforcement to memorize names and places without the worry of forming a student able to read charts, much less able to produce of them.

Simielli (1999 p. 99) says that the maps are used only for the location, and this is just the first step in effective reading of information that must be interpreted and analyzed so that the student understands the meaning of representation.

To overcome this issue the author (Simielli 1999) recommends a "cartographic literacy work" since the first grade but without isolating the subject in a single moment. The cartographic literacy process must be

continued over the years and the maps a constant resource in the classes of all grades used even in other school subjects, such as History, Literature and Mathematics.

The 1990s the discussion on mapping taught in elementary school began and resulted in the creation of a working group on cartography and children by International Cartographic Association. In 1995 was held in Brazil the first symposium of Cartography for children where academic discussions on the topic converged. Many undergraduate and postgraduate studies were developed addressing the thematic of cartography and teaching.

The book "Cartografia Escolar" written by Rosangela Doin de Almeida, published in 2008, summarizes the main thesis developed on the topic so far. With this publication it was possible to systematize the concept of Cartography School and its coverage area.

Scholastic maps reside in the interface of Cartography (Geography and Education) since it considers knowledge and techniques for teaching as originated from cartography, which relies on Geography. As a result, Cartography is used to represent geographic space taught at school and try to find in pedagogy and psychology the theoretical and methodological bases for understanding how children learn about space and its representation. Figure 1

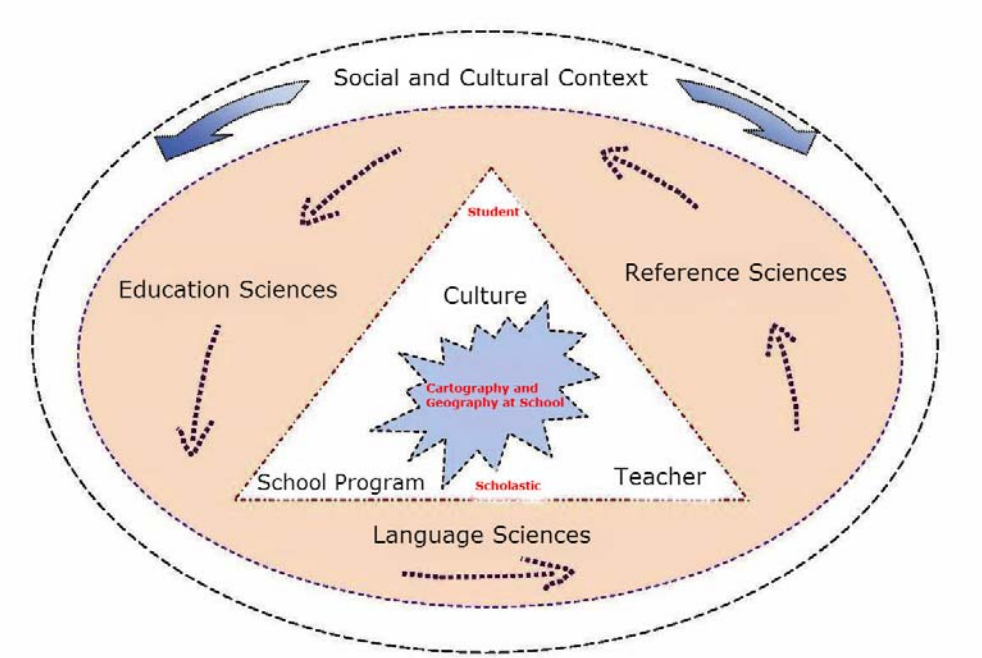

Figure 1: *Conceptual Map of school mapping (Almeida 2008)*

However, my experience as a teacher of elementary and middle school for 20 years and my recent experience as a professor in the undergraduate program in Geography demonstrates that teachers in this area are not prepared to teach cartography in school. This unpreparedness causes a deficiency in the education of children and young people when they need to read a map, both for its orientation and mobility as to understand represented spatial dynamics, therefore the students have great difficulty which results in misleading when a map is read.

"Despite advances, the scholastic cartography in Brazil still faces problems that require great effort of the researchers dedicated to this area. In our view, there are two focuses which are more urgent: the development of local cartographic materials appropriate to the scholastic use and the insertion of content Scholastic Cartography in teacher training courses, as well as the actions of continued training "(Almeida 2001 p.26).

Regarding the teacher's training (mainly Geography teachers), Melo's work (2007) is a national reference because it presents a historical review of cartography as a discipline at Brazilian universities and defends the inclusion of cartography in the geography undergraduate program.

"It is expected [...] that the scholastic cartography became to be discussed systematically and start to be part of the Geography course program, in

order to help the Geography teaching. For this measure to become effective it is necessary to create a program component called Scholastic Cartography in Geography College. We emphasize that our proposal is to add a new curricular component, ie, we are not considering the possibility of replacing the current program components of the Geography course by Scholastic Cartography. "(Melo 2007 p. 138)

It is important to highlight that the discussion about the inclusion of the scholastic cartography discipline in undergraduate courses is not restricted to Geography, because (as stated earlier) is in the early grades that many of the basics for reading maps are taught. Teachers who teach these classes are not geographers and cartographers, most are trained in pedagogy courses that do not include in their programs discussions and classes on teaching Geography and Cartography.

Some public universities in Brazil has introduced the discipline of scholastic cartography in the teacher's training, among them there is the Federal University of Juiz de Fora - Minas Gerais with "Practice in Teaching Cartography", the Federal University of Amazonas with "Cartography applied to education", the Federal University of Santa Catarina with "Scholastic Cartography", all within the course and Geography. However, the University of São Paulo (Ribeirão Preto Campus) offers "Scholastic Cartography" as an optional discipline for the Faculty of Education.

2. SCHOLASTIC CARTOGRAPHY AS A DISCIPLINE IN UNESP OURINHOS' GEOGRAPHY COURSE

The discipline of Scholastic Cartography was first offered in the second semester of 2012 as optional to the students with a total workload of 60 hours of which 42 hours is compounded of theoretical discussion and 28 hours is compounded of teaching practice.

The main objectives of this course are:

- Understand the development of the concept of space in the school-age child;

- Resume the concepts worked in Cartography and adapt them to the teaching of Geography;

- Construct and implement educational resources for teaching geography

- Reinforce the importance of Scholastic Cartography as a resource for the inclusion of students with disabilities.

The programmatic content with pathways to meet these goals, concerns:

1. From design to map how the child perceives and represents the space;

2. The basic elements of the map: point of view, scale, orientation, location, projection, legend;

3. Graphic semiology: building the legend;

4. Educational resources for the teaching of cartography in geography classes in basic education;

4.1. Topographic Mockup;

4.2. Sketch;

4.3. Tactile Graphical representations and tactile-audio;

4.4. Digital Cartography;

5. Visions and representations of the world;

5.1. Using old maps in a geography class;

5.2. Cartography in the media.

The course had great support from the students, especially those who were in the final year of graduation, and provided experimentation with new approaches to cartography taught in school. Themes such as cartographic scale, orientation, geographic coordinates, projections, among others were presented, discussed and practiced by students in classroom situations.

During the semester were offered lectures that were complemented with practical activities where the students had the opportunity to develop and build teaching material for cartography classes given in elementary school.

With the advancement of the lessons, we perceived a major difficulty for a significant number of students in accomplish the didactic transposition of the concepts related to teaching cartography.

It is believed that this difficulty is the result of a sum of problems that occur in initial teacher training in Brazil, specifically the training of Geography teachers.

The most evident problems in the teachers' training are:(1) the devaluation of the teacher as a professional, fact which discourages the students to pursue this career; (2) deficiency of basic education, since many students

are from public schools and their main flaws resides in difficulties in mathematics, reading and interpreting texts; (3) The structure of many degree courses that are, in essence, little in-depth in theoretical and methodological issues.

Concepts such as scale, orientation, geographic coordinates and projections, which had been worked in the disciplines of Cartography and Thematic Cartography, offered in the first year of the course had to be revised because if these future teachers do not understand these concepts, they will have a hard time explaining them to their 11 years students.

After the changes it was possible to work with the teaching methodologies on maps, considering the age of the students and grade in which each concept will be worked. Therefore, practical exercises were conducted in preparation of lectures on the topic, developing exercises and educational games, such as those exemplified below.

2.1. Subheading

One of the problems identified throughout the course was reading topographical maps, the students could not understand the areas of greater and lesser slope represented on the charts or even draw a topographic profile.

To overcome this difficulty was proposed the construction of topographic mockups with overlapping layers for each contour line. As a basis for the model was chosen a simplified representation of Brazil's topography, divided into regions. Based on the construction students realized the logic of contour lines and their practical use in topographic charts giving meaning to the lines drawn on the map. Furthermore, it was possible to propose a number of themes that can be worked with the model, such as topography and hydrograph (springs, watersheds, etc.).

On the theoretical and methodological issues of teaching and learning were discussed texts of authors who reflect the child's perception of space and formation of the student able to be a “mapper” and a map reader. It is worth mentioning the work of Almeida (1989, 2001, and 2008); Castellar (1996), Oliveira (1978) and Piaget (1993).

Among the activities proposed practice, one of the most significant was the analysis of graphical representations in textbooks.

Divided into groups, the students chose a grade of elementary or high school and sought a corresponding textbook. The groups were divided such

a way that all grades of elementary school and high school were included in the analysis.

The work consisted of a quantitative survey of drawings featured in the books, listing the number of maps, graphs, sketches and diagrams, as well as a qualitative analysis of where students should work with a chapter of the book discussing the relevance of using maps in relation to the theme of the chapter, i.e., if the maps were actually used or served only as an illustration for the theme developed.

Finally, the students chose 5 maps in the book and conducted a detailed reflection of each representation considering: the presence of the basic elements of the map, possible errors and relevance of the representation for the learning of the proposed content.

The result of the work exceeded all expectations as the students when quantifying and analyzing graphical representations contained in books advanced to a perception of the importance of Cartography in the Geography class. Most analyzes have demonstrated that the presence of maps in books is often restricted to the illustration of the theme, with a few suggestions for the effective use of the map. In addition, there were several errors in the maps, the most recurrent misuse were the colors and symbols, demonstrating that there is no concern with proper communication of mapped spatial information.

Before this activity, the students said that they did not worry about the quality of the maps featured in books, trusting that publishers make the necessary revisions to the material. But what we realized is that with the price reduction of printing books in color, the inclusion of maps and other graphical representations has become marketing attractive of which editors does not always consider the didactic importance of representations.

More than quantify, the activity permited the exercise of a new look of the future teachers over the material that is available when they go to work in school. The speech of the students, while presenting their analyzes, was significant because many reported that, when looking closely at the maps they began to think of ways to extract more of the charts in the classroom.

Due to many years of experience in research and development of tactile graphic representations for the use with students with visual impairments it was proposed a discussion on the contribution of cartography in the inclusion of people with disabilities, especially visual impairment.

Based on my doctoral dissertation allied to Araújo Almeida (1993, 2005) and Carmo's (2010) researches it was possible to present the principles of tactile maps and propose the development of a tactile graphic

representation. The result was very positive because the students had to retake the entire debate on the graphic semiology and the importance of communicating information in order to build the adaptation of maps commonly used in geography lessons, in addition to doing everything thinking about tactile representation for students with visual impairments.

One more time it was proven what has already been published in previous conferences, the tactile mapping provides an important reflection on the form of representation of geographic information in order to become an efficient communication for visually impaired users, and more than that the result of this construction (the tactile map) is an important educational resource for the teaching of geography in general, which is not restricted to be used only by students who do not see.

3. Conclusion

Many of the students in the discipline of Scholastic Cartography given in 2012 are now teachers and have reported the importance of this experience in their education. They comment that their Geography lessons are enriched with various graphical representations, which has worked on the basics of maps and inserted new technologies (satellite imagery and GPS) in basic education.

The year 2013 marks the implementation of the new program for the course Geography UNESP Ourinhos with the inclusion of the discipline of Scholastic Cartography as mandatory for "licenciatura" and optional for BA. This change represents an advance in the quest to improve the teachers' training and consequently in increasing the quality of education.

With the expanded use of maps by society, especially through the media and information technology (digital maps, GPS) the discussion of cartography as a discipline which is important in the formation of citizens goes beyond the academy and stands as a major theme in the elementary school course program , thus legitimizing the inclusion of the discipline "scholastic cartography" in the Geography undergraduate program.

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