

Tactile Cartography: The Adapted Globe Experience on Social Inclusion

Barbara Gomes Flaire Jordão

Universidade de São Paulo (São Paulo State University)

Abstract. Social inclusion is a global trend, which beginning dates from 1960s and 1970s, and it has as a base a new paradigm of society which starts to build-up, counteracting the Aryan model, the hegemonic model, the Cartesian model and the positivist model hitherto prevailing. Since the last three decades school inclusion has been tried in Brazil. In this research, the focus were people with visual impairment who are about 35 millions of Brazilians, accordingly to the Brazilian Institute of Geography and Statistic (IBGE, 2010), whose have any disability in the visual organ. How can we represent a content to an individual with visual impairment? Within the tactile cartography perspective, at first it was opted to produce a terrestrial globe adapted to this public. Although, as the feedbacks about the usage of the materials used in the making of the globe were given, the usage of the globe in the classroom confirmed that the Tactile Cartography should not stay confined only to specialized institutions, but should be part of school's every day. Through literature research, visits to regular classroom and special institutions, we built an adapted globe from the evaluation of 90 students (of which 30 have disabilities) which could be used to teach different geography's subjects, among then the geographical coordinates. During the production of the globe, we choose a material that could give dynamism to the adapted globe, ie, a material that surpasses the one used on the regular static adapted globes, which are limited to some information. Therefore, the contents can be added according to the needs of each lesson. We selected materials that offer a good tactile perception and were low cost, providing an extension of their use in different regions of Brazil regardless of social status. As a consequence, evaluation results show that there is effectiveness; This is because, within the perspectives of Tactile Cartography in developed countries, we notice several experiments in the

use of three-dimensional materials in awakening the interest in Cartography by children, adolescents and adults who are blind or not.

Keywords: Social inclusion, Tactile Cartography, Adapted globe

1. Introduction

The representation of geographical space can be constructed in several ways, through charts, plans, sketches, maps, globes, topographical charts, mockup and others. These objects use the cartographic language in order to represent space and communicate information about it.

The cartographic documents are part of teaching material in Brazilian Elementary school, Middle school and Higher Education due to its importance for the understanding and construction of geographical concepts, environmental concepts, cultural concepts, social concepts and historical concepts of a location in the terrestrial surface.

Although, there is a group of people for whom these teaching materials do not facilitate on learning process, however, often it difficult their resolution on the subject, since they provide inadequate haptic recognition. According to the Brazilian Institute of Geography and Statistics (IBGE, 2010) about 35 million Brazilians have some type of visual impairment.

In order to discuss which contribution the Geography and Cartography can give forth the paradigm of inclusion in basic education, we made a globe adapted with the parallels and meridians represented in a way that could be used by the largest possible range of individuals, from those who can see up to those who have varied the functioning level of the visual organ.

It is justified the difficulty of dealing with an audience as heterogeneous as those with visual impairments. Therefore, the work encompassed only a small part of this group, confirming that the individuality of the students must be taken into account in the teaching process, albeit more time consuming individually, this becomes much more effective if done in accordance with the reality of each.

Throughout the paper we go beyond the mere identification of a land's area data from adapted geographic coordinates to follow the difficult task of reconciling the perception of those who do not have the perfect operation of the visual organ and the idea that location on geographical speech is able to show the existence of the individual, organize his thinking as well as being

responsible for the formation of representations that he makes of the world (Almeida & Passini, 1994.).

2. A Brief History of Special Education in Brazil

As a characteristic of underdeveloped countries, recently Brazil has begun to highlight the Special Education. The national story shows that the experiences in this area effectively initiated in the nineteenth century, modeled on the U.S. and Europe experiences, but with different characteristics from those observed in these countries.

The beginning of change was by a young blindman, Jose Alvares de Azevedo, who, upon returning from the Institute of Paris, began to teach Braille to the daughter of a doctor of the Brazilian Imperial Court (Ormelezi, 2006). This fact served as the initiative for the creation of "Imperial Institute for the Blind" in 1854 current known as "Instituto Benjamin Constant", setting up the first school for the blind in the country. Although the opening of this and other institutions has resulted in a significant advance regarding discussions on the national Special Education, in practice, the action was punctual with only a tiny portion of people with disabilities receiving care at these locations.

In the first half of the twentieth century was created the "Foundation for the Blind Book" today "Dorina Nowill Foundation for the Blind". This is a high profile charity institution, which is not configured as an institution of education, being a pioneer in the production of braille books starting the qualification of teachers to work in education and integrate students with visual impairments. Thus, the institute collaborated to create the resource room in Sao Paulo (1950) and Rio de Janeiro (1957), where the State assumes responsibility for educational services to individuals with disabilities (Sena, 2008).

The social integration movement in the global scenario had its greatest impulse starting from the 1980s', with the success of initiatives of rehabilitation services for people with disabilities and as a reflex of the movements for the rights of disabled. In Brazil, this decade was a period of social struggles headed by the excluded population.

These actions led to the inclusion of the State's obligation to ensure the specialized educational services for people with disabilities, preferably

within the regular school system, present in Article 208 - paragraph III of the Brazilian Constitution (Brasil, 1988).

However this insertion was partial because it was conditioned to the potential of the students, as they are responsible for adapting to the school structure. It was on account of this ideology that emerged and proliferated sheltered workshops, where people with disabilities perform work activities remaining in special schools' own space and, in turn, this fact inspired the creation of sheltered employment, where people with disabilities could be part of the daily lives of other workers.

In the following decade, Brazil participated in the World Conference on "Education for All" in Jomtien-Thailand, which began with discussions about the service model in inclusive school. In 1994, Brazil signed the Declaration of Salamanca in Spain, which proclaimed principles of rights to education for people with disabilities, from a student-centered pedagogy, and inserted the concept of inclusive education in national education. This new paradigm emerges as a reaction against the integration process, and its practice has generated much controversy and discussion.

Regarding the adapted teaching material, Brazil is at disadvantage when compared with other countries, based solely on the Braille system and on audio description for the representation of geographic space. Concerning the Brazilian production of adapted graphical representations, materials for orientation and mobility with little or no concern with the cartographical language and the communication of spatial information have prevailed since then.

In 1989, the research of Professor Regina Araújo Almeida starts at the University of Sao Paulo, first to discuss the importance of Tactile Cartography in Geography teaching for people with visual impairment. Were developed maps, charts, models, among other representations, which gave a new meaning to inclusive education. Inspired by this research, new projects were developed as the work of Sena (2002, 2008), Carmo (2009), Vantorini (2006), which expanded adapted resources, developing new procedures and concerning itself with the teachers' work as key agent for the efficient use of representations. Accordingly, disclosure of Tactile Cartography between all actors involved in education becomes paramount not only to geography.

3. The Adapted Globe

A globe allows visualization of geographical relations more broadly. It's a resource which exerts fascination among students, and it is an indispensable characteristic of Geography, however, is little explored in learning situations in schools (Schaffer et al., 2005). This enthusiasm in handling the globe is also experienced when it is adapted, facilitating the interpretation of earth's geographical location and shape by students with or without disabilities. It is emphasized among the positive results in its use, the possibility of teaching extremely abstract content, such as geographic coordinates. The use of the globe as a tool for non-fragmentation and interdisciplinarity is reaffirmed in this scenario.

The objective of this study was to demonstrate that an inexpensive adapted globe is effective in teaching Geography and Cartography topics. The tactile globe developed in this study has its continents, meridians and parallels embossed with different materials so that the difference in shapes and textures assists in the process of obtaining the desired information.

For the construction of the globe, we took into account the degree of raw material accessibility, i.e., the ease of which are found in various regions of the country and its cost, since the socioeconomic disparities in Brazil's case are even more high due to its territorial size which directly influence the type of material that is proposed to be used in other less favored places.

The globe is composed by a Styrofoam sphere covered with Velcro. This material has enabled this globe not be static, i.e., not limited to only a topic of geography. Information can be added and removed according to the need, thus optimizing its use in class and avoiding overlap of various themes at once, which would hamper the interpretation.

4. The globe's use

The Globe was rated by 30 people with some variety of visual impairment (including multiple disabilities), of different ages (from 10 to 50 years), sex, education degree and in different contexts (classroom and / or specialized care). The globe was also evaluated by 60 students without disabilities and 3 special education teachers.

Specialized institutions that contributed to the research include the Jacarezinense Association of Rehabilitation of the Deaf and Visually Impaired (AJADAVI). In Parana State, it is a regional referral center for rehabilitation, although does not function as a school. There is also the Benjamin Constant Institute (IBC) in Rio de Janeiro, it is the national

referral center for rehabilitation and education of people with visual impairment.

4.1. The use of the globe by the blind

From the people with disabilities who rated the globe, 7 reviewers have blindness, two with congenital blindness and 5 with acquired blindness. For everyone, the globe was presented dismantled in order to evaluate the material used in its cover. An important result was that everyone embraced the globe, comprising the entire Earth (*Figure 1*).



Figure 1: The globe and the continents - AJADAVI

Each individual, with my aid, placed the continents and answered questions about their perception of the shapes, textures and the subsequent complementation with the imaginary lines (*Figure 2 and 3*).



Figure 2: Assembling the Globe by blind student in the class – IBC



Figure 3: Assembling the globe by blind student - IBC.

Were discussed the concepts of latitude and rotation in some cases, when possible, was also discussed the concept of time zones.

During the evaluations with the blind were listed the following suggestions:

- The inclusion of a map legend in order to give autonomy in the globe's assembly;
- A globe support which should be developed to facilitate the explanation about earth's position in space and how it implies on the latitudes differences;
- The continent's topography should be more exaggerated to sense the difference between it and the oceans.

4.2. The globe's use in low vision

Among the group of people with low vision, 23 reviews were made. In these cases the globe was already presented with the continents. The first question referred to the recognition by color as well texture.

The evaluations were performed individually and in groups. In the group's cases, was developed an activity that allowed each participant to incorporate an imaginary line to the globe, as the questioning about the materials used and the discussion of parallels and meridians (*Figure 4*).



Figure 4: Handling the globe by students with low vision

It was observed (based on the understanding of the globe's coordinates) that students showed greater ease to spatialize phenomena, such as the location of England when learning about the Industrial Revolution.

During these evaluations were listed the following suggestions:

- For all students the existence of a support would facilitate the bonding of the lines as they would rotate with one hand and paste with the other;
- The colors of the continents and oceans were not as contrasting;
- It was also noted a need for a subtitle.

4.3. A special case

In Brazil, more than 70% of students with a disability are in ordinary schools, which do not have special rooms or specialized teachers for different types of disabilities. Thus, the greatest challenge of this work was within the perspective of inclusion, as it allows the globe use by a blind student in a regular class.

The implementation of the adapted globe occurred first in a special institution that supports student and later in a regular school. In a geography lesson the students followed the teacher's explanation about cartography the using adapted globe (*Figure 5*).

It was shown that the use of the adapted globe was important for understanding the information, which was previously only contained in the plane, making the lesson the same for all students. The student understood the purpose of the imaginary lines, as the characteristics change from one to another latitude as well as the concept of time zone. She also pointed out that now she can visualize what the North embossed on adapted maps represent.



Figure 5: Use of the adapted globe by the student in the regular classroom

It was noted that the other students were also interested in the globe. Thereafter, the globe has been presented to students who do not have visual impairment.

Recently 60 students from 10 to 12 years old, handled the globe in the ordinary classroom. They were divided into groups so that assemble the globe together. The theme time zone was the main issue pointed out by students when handling the adapted globe, making it easier to distinguish the time zone lines with the Velcro's seam. For them the common globe presents so much information that is difficult to filter what to observe. Finally, the students organized a competition to see who assembles the globe faster and according to the legend.

This new step, which strengthens the role of tactile cartography beyond a specific audience, becomes a teaching resource efficient in teaching cartography, regardless the presence of a person with a visual impairment in school.

5. Conclusion

The reviews of the globe demonstrated that: 80 cm size of the globe's circumference is ideal, the amount of lines represented is sufficient, the

geographical concepts dealt on adapted maps gain dynamicity when worked on the globe and it is possible and productive to work in group.

From the suggestions, the globe has been modified by being coated with blue Velcro which indicates the water, and the continents were made of yellow rubberized sheet. The imaginary lines have different colors, textures and heights. The legends were made in expanded Braille letters (*Figure 6*).



Figure 6: The adapted Globe with subtitles

The changes listed by the evaluators helped to produce a globe more attractive and effective for teaching. However, it has become clear that the more evaluations were carried out further modifications would be required.

The discussion on inclusive education bears a series of contradictions and challenges. In Brazil, what happens now is that, legally, people with disabilities should not be neglected any longer by social sectors, in practice, if resources are not developed and does not occur a serious investment in preparing special education professionals, this inclusion will remain in the law and shall not become effective.

The citizenship occurs in its fullness when the individual knows where he lives. The Cartography allied to the Geography is powerful in forming citizenship, especially when used in schools.

As a future perspective we intend to perform the adaptation of other Geography's contents that can be worked on a globe, and yet the interdisciplinary of the topics.

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