

School Tactile Cartography in Brazil: the challenge of training teachers

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Abstract. This paper presents and discusses experiences in the continuing education of public school teachers in the State of São Paulo, Brazil. With support of the state government, were held 12 workshops with 8 hours classroom (each) and remotely activities like the videoconferencing "*Confecção de Mapas Táteis*" (available on the website: <http://www.rededosaber.sp.gov.br/>) and email support, with the main goal of training the teachers on School Tactile Cartography and providing classroom activities. The participants were teachers coordinators of Special Education and Geography, as well as teachers of rooms for Inclusion support, totaling approximately 200 teachers. After this experience it was possible to establish a methodology for implementing workshops, defining content and practical activities for other workshops,

The paper also analyses the results of using the social networking site Facebook as a tool to support teachers and as a means of receiving feedback from course participants who have applied Tactile Cartography with all students, encouraging the processes of inclusion at schools.

Keywords: Tactile Cartography, Training Teachers, School Geography

1. Introduction

School Geography has undergone several phases of renewal in recent decades. The traditional Geography teaching model, singularly concerned with the rote learning of data and information about places and the memorization of staid facts and figures, completely devoid of any meaning in students' everyday lives, is no longer relevant to the necessities they face in the 21st Century.

The geographical space, understood as a constantly shifting social and concrete space, requires an analysis of society and nature, as well as the dynamic that occurs between them. School Geography can supply students with the elements they need for reasoning and interpreting reality and spatial relationships; accordingly, it has an important role in helping students understand the globalized world and its interrelationships, contradictions and problems. Geography teaching needs to establish a critical approach to the society-nature relationship and the environmental issue. Accordingly, students need to have the opportunity to develop the ability to interpret texts, photographs, maps and other graphic media, and to carry out activities that further their knowledge of the medium.

Using maps to represent the language of Geography has become an important aspect of teaching, as they can be used to facilitate and expand the analysis of a particular physical space, because they have the power to define and simplify different realities and their interrelationships. Maps provide a visualization of the happenings and phenomena within a geographical space and they are a valuable didactic resource in the learning and teaching processes at all school levels. Accordingly, School Cartography has a fundamental role in preparing students to use the language of maps. However, despite their importance in the learning process, cartography activities are not often part of the Geography curriculum, especially when it comes to visually impaired students who depend on the availability of tactile graphic media.

Tactile graphic media, especially maps, are fomenters of geographical knowledge and they facilitate students' understanding of the world. Accordingly, cartography activities in Geography classes involving the use of these materials are essential, because they enable the development of spatial observation, perception and representation abilities for all students, including the visually impaired.

Tactile maps may be used both in the classroom and in daily life contexts for orientation and mobility, as well as for teaching students to interpret graphic information and images in general; however, despite their importance, the availability of these materials is still negligible and, consequently, as a resource they are still very much under-used. Furthermore, tactile graphic media for the visually impaired are still not available in sufficient quantity, even in the school environment. This is due to a number of factors; for example, a lack of appropriate material and equipment for production and reproduction, development time/production costs, a lack of human resources with the technical and theoretical knowledge necessary for the production of tactile didactic material, insufficient research in the area and even lack of awareness on the part of teachers with regards to the

application of the tactile graphic language in the teaching of Geography to visually impaired students. Accordingly, most of these students do not have any contact with adapted didactic material, which compromises the teaching of spatial concepts, Cartography and Geography to these students.

2. School Tactile Cartography, Geography Teaching and Educational Inclusion

2.1. Educational Inclusion in Brazil

In Brazil, students with disabilities traditionally attended specialized schools. However, in recent decades, these students have been increasingly integrated into regular schools in a process known as educational inclusion.

Educational inclusion involves the incorporation into the regular school system of people historically excluded from the formal education process. It implies that students with some disability can attend classes and be successful within the context of regular schools. Under ideal conditions, it requires the school space to feature physical and architectural conditions capable of receiving people with special educational needs. Furthermore, a school must be capable of presenting diversified educational responses to meet the learning demands of all its students. Sometimes, this inclusion requires flexibility in school curricular methodologies and proposals, without neglecting the fact that teaching objectives must be identical for all students. (MAGALHÃES, 2010)

Inclusive Education is the result of discussions, theoretical and practical studies including the participation and support of organizations representing people with disabilities and educators, both from Brazil and around the world. It is also the result of a historical context in which there has been a recovery of the educational environment as a place to exercise citizenship and ensure individual rights. The World Declaration on Education for All (1990), the Salamanca Declaration (1994) and the Inter-American Convention on the Elimination of All Forms of Discrimination Against Persons with Disabilities (1999) are some examples of documents that show the concern in the region for ensuring the right of a quality education for all people, free of any kind of discrimination. (GIL, 2005)

In Brazil, the right of people with disabilities to access education is guaranteed under the 1988 Federal Constitution, which, in clause III of Article 208, defines “specialized educational access to people with disabilities, preferably in the regular school network” as a duty of the state. This right is

reinforced by other documents, such as the Salamanca Declaration¹, of which Brazil is a signatory. Inclusive Education arose as the preferred policy for dealing with people with special educational necessities², especially from the second half of the 1990s onwards, with the publication of the aforementioned Declaration.

According to this document, the importance of inclusive schools is not limited merely to the provision of a quality education for all children; their existence is also a decisive step towards helping change discriminatory attitudes and creating more inclusive and caring societies. A change in social perspective is essential, because, for a long time, people with disabilities have been stigmatized by discriminatory societies that emphasize their limitations, rather than their potential. (UNESCO, 1994).

The Salamanca Declaration states that inclusive schools must cater not only to people with disabilities, but also those with many other special educational necessities, such as children with learning difficulties, those who have been exploited in some fashion (as slave labor or sexually), homeless or extremely underprivileged children, overachievers, and even those who attend school but who have been excluded for some reason.

Special educational necessities include the already time-tested principles of balanced pedagogy that benefits all children. It is based on the principle that all human differences are normal and that learning must therefore adapt to the necessities of the individual child, instead of each child adapting to the supposed principles with regards to the rhythm and nature of the educational process. Child-centered pedagogy is positive for all students and, consequently, for all of society. [...] Furthermore, child-centered schools are the basis for a people-centered society that respects both dignity and the differences of all human beings. (UNESCO, 1994)

¹ In June 1994, in the city of Salamanca, Spain, the issue of inclusion for people with special necessities in the educational process was discussed, giving rise to the Universal Declaration of Salamanca. The text is not legally binding, but it does establish the principles for Inclusive Education.

² People with special educational necessities are those with sensorial disabilities (hearing and sight), mental disabilities, severe behavioral disorders (including autism and psychosis), multiple disabilities (cerebral palsy, deafblindness and other conditions), as well as intellectual giftedness (overachievers).

From the standpoint of inclusion, special education activities have been undergoing revision. A few years ago, special education in Brazil was operated as a parallel teaching system, directly involving students with special necessities. Now, however, its role is to support regular school activities.

According to data from the Basic Education School Census, in 2000 only 24.4% of people with some kind of disability were enrolled in regular public schools; by 2011³, this number had increased to 74.2%. This data indicates the importance of Inclusive Education, currently one of the great challenges of the Brazilian education system.

In order to respond to the necessities imposed by this new reality, educational inclusion must be included in initial teacher training; however, most teacher-training courses do not currently include sufficient discussion on teaching students with special needs. Accordingly, continued education courses are often the only opportunities to foment these discussions.

Teachers, as learning mediators, have a fundamental role in the inclusion process and accordingly they need to be prepared to receive students with special necessities and actually contribute to making their presence in the classroom more than just a mere legal formality.

Rethinking pedagogic practices may begin with the type of didactic material to be used. With regards to visually impaired students, specially adapted didactic material is of fundamental importance. This group of students cannot do without material adapted to their necessities. To be effective, visually impaired students need to have access to and dominate some basic and indispensable material; for example, tactile graphic media in Geography and Science classes and in other classes that use images in their teaching and learning processes.

ALMEIDA, R. A. (2002) states that maps are even more necessary for visually impaired people than for sighted people, because as well as the use of graphic language in several other school subjects, these products are essential for orientation and mobility, localization and for understanding geographical spaces. Accordingly, all kinds of cartographic material, in different scales, should be available in a tactile format, in order to contribute to the integration of visually impaired people in schools, at work and in day-to-day life.

Currently, images, including maps, have a relevant role and they are present in all areas, in both work and leisure, in the everyday lives of people

³ Source: The Anísio Teixeira National Study and Research Institute, <http://inep.gov.br/> accessed in March 2013.

and in both formal and informal education. For this very reason, School Cartography is essential, as it prepares children and youths for using cartographic language.

The graphs, models and maps that are mostly printed or digital and designed for visual perception can also be perceived by touch, as long as they are made with this purpose in mind. The inclusion of visually impaired students in regular classes requires schools to make tactile-adapted cartographic material available and to prepare teachers to deal with this reality.

The aforementioned documents on inclusion declare that children with special necessities should have access to regular schools, but there is no doubt that including these students requires significant reforms to the educational system and this implies in pedagogic changes, as well as changes in general attitude.

Courses and workshops can make teachers aware of the relevance of tactile graphic media to teaching, and they impart construction techniques for adapted didactic material and present guidelines for its use. Generally, these courses represent a significant rethinking of pedagogic practices that may be extended to all students, thus favoring the inclusion process.

2.2. The Formation of Teachers and the Role of Tactile Cartography

The issue of training and recycling teachers fundamentally consists of improvements in general teaching quality, specifically with regards to the inclusion of students with disabilities.

Teacher training courses in general do not sufficiently cover the issue of inclusion of disabled students in the common classroom, which can result in an increase in the learning difficulties that these students face, as they often find themselves unable to realize their potential due to the lack of significant pedagogical support that takes into account their special needs.

It is important for all education professionals to be trained in teaching students with special educational needs. Such knowledge cannot remain exclusively in the hands of a few “specialists”; it must reach the greatest number possible of educators, ideally all of them.

An experiment involving workshops on Tactile Cartography and Geography Teaching will be presented below. Twelve on-site workshops, each consisting of 8 class hours, were held using São Paulo (Brazil) state government infrastructure, as well as long-distance activities [through video conferencing, which can be viewed on the Rede do Saber website <http://www.rededosaber.sp.gov.br/> (go to “videoteca” and look for “Confeção de mapas táteis”), and email support]. The approximately 200 par-

participants in these workshops were coordinating teachers in the Special Education and Geography areas, as well as teachers involved in inclusion support classes.

The government target with regards to the execution of these workshops was to train multipliers who could reproduce them for their fellow professionals in their cities of origin.

In these workshops, the importance of tactile didactic material in the teaching/learning processes was highlighted, as well as the importance of new technologies in educational processes involving people with visual and hearing impairments. Several subjects pertaining to the concepts of cartography and the production of tactile graphic media, as well as the application of this material in the classroom, were discussed.

Following the conclusion of this experiment, it was possible to establish a workshop application methodology, where content and practical activities were defined. The minimum content proposed involves the following subjects: The History of Tactile Cartography; the Inclusion of students with special needs in regular schools; Geography and users with visual impairment (Didactic material for school use; Maps for orientation and mobility); Theoretical principles of Tactile Cartography; Presentation of different construction and reproduction techniques for tactile didactic material (advantages and disadvantages of each, equipment/tools required); An Introduction to Cartography (symbols; creating the key; the qualities of a good map; the elements of a map); Introduction to tactile graphic language and the use of the map (scale, orientation and point of view); Visual and tactile variables, with examples of application; Basic principles for developing tactile graphic media; The use of tactile graphic media in other subject areas; Practical activities using tactile graphic language (construction of the didactic orientation set, collage and aluminum maps) and the application of tactile didactic material in the classroom.

This content may be adapted according to the target audience. For example, if the participants are resource room teachers or if they have already worked with students with special needs, the discussions on inclusion may take a back seat, since these teachers will already be familiar with the subject. However, for Geography teachers, it is an important subject to be broached, since in their initial training, the subject is generally not dealt with.

With regards to the practical activities of construction of tactile didactic materials, there is a concern to present feasible options from the economic and productive standpoint. For example, a collage map may be constructed from several different types of fabric (velvet, satin, wool, felt, tulle, lace, denim, etc.), paper (chamois covered paper, cardboard and other textured paper), carpet, EVA (smooth or textured), polystyrene, cork, wood- and

iron-sanding paper, wires and threads (cords, string, wool, cotton, sou-tache, rickrack, etc.), beads, straws, buttons of varying sizes, textures and shapes, sand, popsicle sticks, dried leaves, vegetable sponge, foam, chalk, spackle, papier-mâché, etc. In other words, the material is simple and low-cost, and so it is an excellent resource for teachers and schools in general, which generally do not have many resources at their disposal.

The construction technique for aluminum maps has also been successfully developed in workshops and courses. Despite not being common in Brazil, this technique is widely used by the researchers at the Teaching and Didactic Material Laboratory (Laboratório de Ensino e Material Didático, LEMADI) of the Geography Department at the University of São Paulo, in the production of tactile graphic media.

American Printing House for the Blind sells aluminum rolls and a kit for preparing graphic media. This tool kit contains several reels, texture boards, spatulas for making symbols, rods, slates, rubber and an instruction manual. Due to the price and the necessity to import the material, this kit is not always easily accessible to Brazilian cartographers, but the tools may be easily replaced with different kinds of pens, reels for different purposes that are readily available on the market; in place of boards for productions using sand, surfaces with varying textures may be used, such as rough files.

The potential for developing didactic resources using simple and easily accessible material was an aspect that was much appreciated in all the workshops and courses, considering the lack of these didactic resources and the economic reality of the schools in Brazil and other countries in Latin America.

A page on “School Cartography” <<http://www.facebook.com/CartografiaEscolar>> was created on the social network Facebook, which is used as a means of communication, to lend support to teachers and as a channel for feedback from teachers who have applied tactile cartography not just with visually impaired students, but all students, thus encouraging the process of educational inclusion.

3. Conclusion

Assessment of the workshops showed that Geography teachers have, in general, little knowledge on the specificities of students with visual impairment who are enrolled in schools within the public network. When they come across these students in the classroom, they often do not know how to approach certain subjects with them, especially when they involve the use of graphic media.

In all the groups it was possible to ascertain that practical activities invariably stimulated the creativity of the teachers, encouraging them to create new activities and classroom dynamics. Accordingly, it is important to empower the experience of teachers and their creative capacity to develop their own materials. Furthermore, workshops provide for the beginning of a reflection of how cartography can help in teaching Geography when it is applied in a manner that is more dynamic and significant for students.

It became evident during these courses and workshops that, despite the limitations teachers face within the reality of the Brazilian school system, above all in public schools, where the large class sizes, a lack of didactic resources and low salaries, among other issues, are especially poignant, the teachers are nonetheless extremely motivated by the possibility of developing and constructing their own didactic materials.

The activities involved in constructing tactile graphic media were well received by the teachers, who attempted to apply the theory discussed to the proposed practical activities. These practical activities provided a challenge to the teachers in defining the subjects to be explored in the classroom and in the pedagogic activities themselves.

One of the difficulties found in the training of educators in Brazil is the wide range of social and cultural realities that exist in our country, beyond the challenges imposed by geographical considerations. Accordingly, the website <<http://lemadidg.wix.com/cartografia>> was created to make these contributions available to researchers in the Tactile Cartography area, in order to publicize our experiments and make their results available to all interested parties. The use of Facebook has also brought very positive results in the disclosure of activities in the area of School Cartography as a support tool for teachers and especially in order to obtain feedback from teachers who are already developing and applying tactile didactic material with their students.

Tactile cartography in schools has immense potential for educational and everyday life applications by students with visual impairment. Accordingly, it contributes towards people with visual disabilities, individual students, having the same opportunities as those who can see.

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