

## **GEOGRAPHY FOR ALL: AN INTERACTIVE CD TO SUPPORT THE LEARNING OF GEOGRAPHY BY DEAF CHILDREN**

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### **Abstract**

This paper describes the educational CD *Geography for All*. The CD contains interactive applications designed to be used as supplementary material for the teaching of geography to deaf students in the public schools of the state of Sonora (Mexico). Also discussed are the theoretical framework, the distinctive features of the application, the content, some examples of activities and exercises included in the CD, as well as a brief description of the current status of the project.

### **Introduction**

According to the Mexican XII General Census of Population and Housing 2000, there are 287,200 people who are deaf in Mexico, and many of them are elementary or secondary students who despite government and family efforts have severe school performance problems, as it has been detected in other parts of the world (Gentry, Chinn, & Moulton, 2005; Torres et al., 1995).

Some possible reasons for this low performance include lack of communication between deaf students and their teachers, low parental involvement, and the absence of effective curricular adaptations and appropriate materials (Torres et al., 1995). In this paper we focus on the last one, especially in those materials involving the use of computers.

The importance of using ICT-based materials with people with disabilities has been widely argued by many authors, such as Aspinall and Hegarty (2001), Moisey and van de Keer (2007), and Sciadas (2005), who argue that people with disabilities stand to benefit the most from the new opportunities afforded by ICTs and that such technologies have a recognized and important range of uses within services for children and adults who, because of physical, sensory or intellectual disabilities, have special educational or support needs.

In regard to deaf children in particular, Gentry, Chinn, and Moulton (2005) argue that many educators presume to assist deaf students to compensate by adapting materials (i.e., by rewriting texts to control syntax, vocabulary, and figurative language) and, increasingly, by using computer-based instruction. According to the same authors, the latter mode of instruction in the education of students who are deaf began in 1968 when the Institute of Mathematical Studies in Social Science (IMSSS) of Stanford University began working with the deaf students at Kendall School for the Deaf in Washington, DC and by the early 1980s, computers gained rapid acceptance in most schools for deaf children (Mackall, 1996; Rose & Waldon, 1984).

Research on the topic of computers and deaf students has also grown rapidly, as the works of Reitsma (2009), Parton (2006), Henderson et al. (2005), Verlinden, Zwitterlood and Frowen (2005), and Barker (2003) evidence. Thanks to these and other inquiries, we have learned that “interactive language technologies will eventually revolutionize learning and training” (Cole et al., 1999, p. 1) and that learning by children with language limitations should be more and more, individualized, interactive and self-paced.

In Mexico there are some efforts to produce materials for the education of the deaf, such as those by Vargas, Rojano, and García (2008); Leybon, Ramirez, and Taboada (2006); and Costa and Gutierrez (1998), but few of them were designed to support the teaching of specific subjects. In an attempt to collaborate on developing such type of materials, particularly for the teaching and learning of geography, and to help make the teaching of this subject more alive, fun, meaningful, and connected to the daily life of students (De Amezola, 2000), as well as more individualized, interactive and self-paced (Cole et al., 1999), we designed *Geography for All*, a CD with interactive applications developed to serve as support material for the teaching and learning of state and national geography in the public secondary schools of the state of Sonora (Mexico).

This paper describes the theoretical framework and the main features of the project, the CD's contents, some examples of the activities and exercises included in the CD, and the current status of the project.

## **Theoretical Framework and the Main Features of the Project**

The theoretical framework in which the project was grounded was built upon Ausubel's concept of meaningful learning and Piaget's constructivist theory.

In order to address the problems associated with the incorporation of computers in education in Latin America, the authors decided to build a project that is grounded in these theories and achieves the following:

### **Promotes Meaningful Learning**

According to Ausubel, meaningful learning takes place when the content and the educational activities designed by the teacher are seen as meaningful by the students. To achieve this, both the content and the activities must be focused on the students' interests and needs to help them link what they already know with the new knowledge. Following this idea, the authors tried to design activities: (a) where students had to apply what they learned in the course to solve problematic situations; and (b) that were based on games to promote students' interest.

### **Promotes the Construction of Knowledge by the Students**

Constructivist theory posits that: (a) learning will last longer and will have more possibilities to be transferred to new situations when students construct their own knowledge through thoughtful and reflective actions; and (b) good teaching will be the one that seeks to create a cognitive conflict between what the students already know and what the students have to learn (Arancibia et al., 1999). Based on this theory, the authors included activities where students have to reflect about what they learned in the course and activities that challenge students to go beyond what they have already learned.

### **Is Linked to the School Curriculum**

The uniqueness of *Geography for All* is that it is specifically based on the curriculum for secondary first grade students of Mexican geography and was designed to serve as support material for deaf students enrolled in that course.

### **Provides Teachers' Training**

One of the recurring problems associated with the use of computers in schools has been the insufficient computer literacy of teachers as well as their knowledge of the pedagogical applications and implications of computers for teaching (Ramirez, 2009). To overcome this, the authors will provide teachers with the

necessary training for the administration and use of the CD and will help them design lesson plans that can be enriched with the activities included in the CD.

### **Guarantees the Proper Infrastructure**

Another one of the serious problems associated with the use of computers in schools, particularly in Latin America, is the lack of appropriate infrastructure (Fischman & Ramirez 2008; Tedesco 2006). To solve this problem, the authors, with the support of students from a BA program in computer sciences, will install the required software in those schools interested in using the CD with their students.

## **Description of the Project**

*Geography for All* is a CD with several computer applications and interactive activities such as puzzles, crosswords, soup of letters, associations and text activities. Each activity has a counter in the right side corner of the screen that informs the student the number of correct answers, the number of attempts, and the time invested in the activity.

It was designed using *JClic*, a free software application based on open standards that works in various operative systems like Linux, Mac OS X, Windows, and Solaris, to create, implement and evaluate educational multimedia, which are developed on the Java platform.

The CD consists of 20 lessons, organized around five central themes: the study of geographic space, natural resources and environmental preservation, population dynamics and risks, economic spaces and socio-economic inequality, and cultural and political space.

The design was on charge of a multidisciplinary team made up by 1 sign language teacher, 2 geography teachers, 1 expert in computer sciences, and 3 education advisors. The Educational TV channel of the state of Sonora collaborates creating videos that will complement the CD materials.

## **Examples of Some of the Activities**

To give a more detailed picture of the activities included on the CD, we provide several examples here.

### **Word Search**

In this activity the students have to find the name of some animals. The exercise is focused on teaching students biodiversity. Every time the students find a name, a

picture showing the animal is displayed and the name of the animal is highlighted, as shown in the screen below:



### Match Pictures & Concepts

In this activity the students have to match the pictures with the concepts or elements.



### Puzzles

In this activity the students have to put the pieces together to find an image related to environmental pollution to help them reflect about the urgency of preserving the environment.



### Match the Pairs

In this activity the students have to match the pairs of pictures to remember the products that men and women can create from natural resources.



## Current Status of the Project

Currently we have almost finished the compact disc and the printed manual that describes the contents. This material has been piloted in an informal manner by some teachers with their students and they have reported that it has been of great interest for their students.

At the end of the school year, the software needed to run the application will be installed in the schools that request it. Then two weeks before the new school year begins, we will have a workshop for teachers interested in using the CD, in order to teach them the pedagogical and technical aspects needed to manage the applications and to help them design lessons plans needed to use the application in accordance with the official program of the course. Students from at least one of the 5 school districts of the state capitol city as well as those from the schools that requested the software will be asked to take a pre and post-test related to the content of the course, and their results will be compared to evaluate the impact of the software on the students' learning. Additionally, during the school year, a follow-up study of participating teachers will be conducted as well as an evaluation of the CD by students, to assess the project and make the necessary adjustments and changes to improve it.

## Conclusions

The use of ICTs in the educational context can be an integrative tool for deaf students because it allows them to work on an equal footing with hearing students.

While it is true that the incorporation of ICT in schools is not the magic answer to all problems faced by deaf students, the use of such resources can increase their motivation and lead to positive results in their academic performance.

We hope that the material described here is a contribution in that direction.

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