

# **DIDÁCTICA GEOGRÁFICA**

Nº 13 (2012)



Asociación de  
Geógrafos Españoles  
Grupo de Didáctica de la Geografía

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nº 13 (2012)

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## **A DIDACTIC ITINERARY FOR THE INTERPRETATION OF THE PHYSICAL ELEMENTS OF THE SIERRA DE GUADARRAMA**

José Manuel Crespo Castellanos

### **1. INTRODUCTION**

In the beginning of the 19th century the Institución Libre de Enseñanza adopted field trips as a fundamental part of their new teaching approach. These afforded the best conditions to achieve a comprehensive education which integrated the whole person (Ortega, 1998, p.81-113). In 1886, Francisco Giner de los Ríos and Manuel Bartolomé Cossío organized the first teaching field trip of the Institution in the mountain range northwest of the Madrid region, the Sierra Guadarrama. This event was the beginning of a renewed regard for the landscape of the area and gave birth to a movement called *guadarramism*.

Since then, numerous authors have highlighted the indubitable educational potential of itineraries and field trips in the teaching of the social sciences in general and of geography in particular (Marrón, 2001; Sánchez, 1995; García, 1994; Gómez, 1986). They all coincide in the idea that visiting the terrain gives the students the chance of understanding and relating the geographical facts that would be hard to attain using any other resources, as it allows for significant learning through the field experience. In our opinion, visiting a geographical space can and should be considered the best tool to interpret, know and value a certain landscape unit. Only through hands-on analysis can we understand in any significant manner the role that each of the parts plays in the whole. That is to say, we will be able to identify the relationships between all the elements that make up the reality we are contemplating. García Ruiz (1994) considers that it is through field work that Geography becomes the best discipline to put the student in contact with spatial reality.

The design of the itinerary we are presenting is the result of our participation as teachers in the program *Madrid, un libro abierto (Madrid, an open book)* organized since 1984 by the Dirección General de Educación y Juventud, Sección de Educación Ambiental, of the Madrid municipality. The program is part of the seminar

*Interpretación del paisaje (Landscape interpretation)* aimed at students of the second stage of compulsory secondary education (ESO: ages 14-16), Bachillerato (16-18) and post-secondary vocational training (17+). It is composed of six places with a didactic interest. The goal is to allow the direct observation of the physical aspects of the landscape and their relation with the humans who transform it. The proposed stops make it possible to analyse traits of lithology, relief, soils, hydrography and vegetation in the Madrid segment of the Sistema Central mountain system.

## **2. THE ITINERARY**

The locations chosen for this design possess characteristics that qualify them as places of didactic interest. Among them are the clarity with which the phenomena which intervened in the birth of its elements can be appreciated and the ease with which the relationships among them can be identified, such as altitude and vegetation, fracturing and the modeling of the rocky formations, and soil and relief. The itinerary, on the other hand, has as its setting the Bustarviejo and Canencia valleys, both catalogued as high-visual-quality landscapes (Aramburu et al, 2003) in which the degree of human intervention is relatively small.

The itinerary starts at kilometer 2.5 of the road between Miraflores de la Sierra and Canencia and all of it is located within the limits of this last municipality and of Bustarviejo. It ends at Arrollo del Sestil del Maillo, approximately at the 9.5-kilometer marker on the same road. During the first six kilometers we ascend from 1,200 m to a little more than 1,500 m at the Canencia mountain pass. From that point it descends by the North Slope down to 1,400 m, the altitude of the last place to visit.

These are the six places which make up the stops of the didactic itinerary. We also give the goals to achieve and the concepts to develop at each one.

### **First stop: Melojares de Bustarviejo**

- To introduce on the terrain itself the concept of landscape and to identify the elements, both abiotic and biotic, which make it up.
- To learn the concepts of edaphic profile and horizon and to become aware of the fragility presented by the soil system.
- To identify the traits and taxons of the supramediterranean floor.

Concepts: landscape, biotic, edaphology, soil profile, edaphic horizon, humidification, erosion, shady slope vs. sunny slope, marcescence, biogeography.

### **Second stop: Arroyo Sardinero**

- To identify the vegetable species associated with the great water courses.
- To understand the process of alteration of granitic rocks and to identify some of the resultant formations.
- To value and differentiate natural autochthonous forests.

Concepts: bioclimatic floors, potential and actual vegetation, ecological succession, riparian, climatic forest, granitic modeling, tors, fractured domo limb, perched boulder, alteration.

### **Third stop: landscape in the valley of Bustarviejo**

- To value the importance of botanical elements in a landscape.
- To acquire cartographical skills such as: locating elements of the territory on the map, orientation, or interpretation of the map upon reality.
- To make and to interpret landscape charts

Concepts: Cañada Real, drovers' roads, Mapa Topográfico Nacional (National Topographical Map), scale, orientation, contour line, landscape interpretation charting, foothills, hydrographic basin, stream, spheroidal weathering, and alluvial fans.

### **Fourth stop: Canencia mountain pass**

- To identify human intervention in the Canencia mountain pass landscape through the modification of plant cover.
- To appreciate the fragility of this natural space and to identify the problems generated by the pressure of tourism.
- To define the term bog and to know both its origin and its ecological and scientific value.

Concepts to work on during the stop: bog, quaking bog, granite disaggregation, mountain pass, hill, rivulet, visual impact, compactation.

### **Fifth and sixth stops: Canencia birch forest - Sestil del Maillo stream**

- To understand the concept of relict forest and its fragility when faced with changes in the local environment or climate.
- To value natural spaces and to acquire sustainable behavior patterns that contributes to their preservation.

- To value the presence of unique trees and their importance for the landscapes in which they live.

Concepts: relict forest, biogeographical areas, unique tree, rounded boulders, blocks, deciduous, evergreen, biodiversity.

### **3. WORK IN THE CLASSROOM**

As happens with other field activities, the results of the itinerary can be optimized if after the field trip other activities are carried out that consolidate the concepts that have been introduced. Marrón (2001, p.307-335) proposes three phases in the organization of the work: "classification and analysis of the information and materials collected during the fieldtrip, interpretation of their significance and establishment of interconnections and material expression of the results achieved". In relation to the last point, there are diverse resources that allow us to synthesize and express the information that has been gathered. Here a few of them are described briefly:

#### **3.1. Cartography**

This consists of mapping the different elements that have been studied: vegetation, lithology, topography and hydrographic network, among others, and then superimposing the maps in order to discover the relations extant among them. This activity develops spatial and cartographical skills and constitutes one of the best tools for understanding the structure and dynamic of a landscape.

#### **3.2. Altitudinal zonation**

Graphical expression of the altitudinal zones of both slopes of the itinerary, sunny and the shady, which allows us to relate vegetation with altitude and orientation. Icons can be used to represent the vegetable species that are significant for the landscape and their location on one or the other slope.

#### **3.3. Photographic series**

This is the graphical and synthetic expression of everything that has been studied on the terrain. It makes use of the material gathered during the itinerary and applies it to the interpretation of the visited space. The images can be both panoramic views and close-ups of the elements found at the different stops.

### **3.4. Presentations and interpretative murals**

As a work of spatial synthesis murals can be made either dedicated to specific elements or to the landscape as a whole. The same contents can be used for classroom presentations either for the group participating in the activity or for a different group of students.

### **3.5. Landscape guide**

Taking visual travel guides as a model, we can draft a document which using all the resources available, such as photographs, drawings, silhouettes, graphs and maps, will constitute an interpretation guide of the whole.

### **3.6. Topographical scale model**

The landscape that was visited can be represented through a model that superposes layers following the contour lines. As in any other form of cartography, we can include information about vegetation, water courses, lithology and soil utilization in order to expose the relationships between the components of the geographical space.

## **4. CONCLUSIONS**

Didactic itineraries constitute a first-order tool for the discovery, understanding and inter-relation of the physical elements that make up landscapes. Through these learning experiences, these elements and their role in the landscapes are understood as a functional unit. Through them we can approach concepts, procedures and attitudes in such a way that, based on the synthesis work in the classroom, they will provide significant learning without taking up any more time than other activities done exclusively in the classroom. Therefore, we believe that didactic itineraries –as well as other field work–can be the best starting point for attaining a comprehension of geographic facts within the teaching-learning process. As proof of the excellent results afforded by this type or resource we can refer to the numerous itineraries that have been published during recent years in different journals and congresses on geographical didactics (Cruz, 2011; Mínguez, 2010; Ruiz, 2002).

In our case, we have designed the itinerary with the foremost goal of developing skills for the recognition of the elements that make up natural landscapes in the Sierra de Guadarrama, as well as understanding of the relationships among them. Directly from the interpretation and knowledge of the systems that make up landscape stems a second goal: to value geographical spaces as an important part of the natural and cultural heritage of the Madrid region. These goals, as well as those that have been exposed at the beginning of the detailed description of every stop, have been reached in all the occasions when we have taken the itinerary in recent years.





## **FIELDWORK AND GEOGRAPHICAL COMPETENCES AS A WAY TO MOTIVATE THE STUDY OF GEOGRAPHY: APPLICATION IN A SECONDARY SCHOOL GROUP**

José Jesús Delgado Peña

Jesús Rodrigo Comino

### **1. INTRODUCTION**

This work has made in the frame of “Information Program” about the qualifications of the Grade “Geography and Management of the Territory” (previously “Geography graduate”), that the Geography Department of the Malaga University is being realized some years in High Schools in Malaga and its province. Its purpose is to encourage final year secondary pupils begin university studies in Geography.

One of the objectives of this program is to break with old prejudices that students and teachers have, showing the real professional and practical aspect of the new Grade.

#### **1.1. Field work like a classic method in the education of the Geography**

There are many authors who, for many years and nowadays, indicate the field work as a very appropriate instrument to make the student learning of Geography more vivid and closer (AA.VV, 2004, p.121; Bailey, 1981, p.161; Frieria, 1995, p.209; Hernández, 2007, p.108; Licerias, 1997, p.297; Meyer, 2009, p.134; Souto, 1998, p.370). The advantages of the field work are unquestionable: direct contact with a concrete type of sources; intense work; acquisition of conceptual contents; to increase the motivation of the pupils; and to confront problems and real cases (Hernández, 2007, p.108). Bailey (1981, p. 162), it also adds the advantage that teachers and students can know each other.

The field work must be perfect and rigorously planned (Hernández, 2007, p.108). According to Souto (2011, p.169-170) and Meyer (2009, p.135), the fundamental phases in the development of field trip must be:

- Previously, raising the objectives and geographical purposes to develop the activity (compilation of information and preparation of materials). It is fundamental that the place to visit can motivate the pupils.
- Active observation in the excursion, writing down the results in a card of field work (promoting not to be a simple spectator and to play an active role).
- Sharing of classroom events analyzed, drawing conclusions regarding the objectives. Measurement, presentation of results and reflection.

## **1.2. Geographical competences in the current teaching of Geography**

As teachers, we understand that the learning based in competences is fundamental to any educational level today. Therefore, in the experience that we present below, we develop activities and materials from this crucial perspective, to get a geography teaching really useful and applied to the real world. What do we mean by educational competences? It's a "know to make complex", result of the integration, mobilization and adaptation of skills and abilities (cognitive, affective, psychomotor and social) and of knowledge used effectively in situations that have a commonality (Herrero and Pastor, 2011, p.76). The White Book of the Title of Grade of Geography and Spatial Planning (AA.VV, 2004, p.180-181) develops a deep analysis about the specific competencies of our discipline:

- Combination of temporal and spatial dimensions in explaining territorial processes.
- Geographical information registry, both cartographic and statistical, and its use as a tool to interpret the territory.
- Field work and direct knowledge of the territory.
- Proposed management and territorial organization.

## **2. METHODOLOGY**

We propose an activity for a group of last year students of a private High School in the city center in Malaga. We wanted with the activity that young people did two sessions in class (once a week so it does not take a long time), and other one more practical in the field (about three hours). Also, it provides a small field notebook with blank maps, inventories and landscape photographs (they had to complete to get a bonus in the final qualification of the subject).

## **2.1. First session (theory): What is a geographer? What is the Grade of Geography?**

We have detected a weakness in the theoretical background on key concepts through a series of previous questions, and we have noticed they do not know about the role of a geographer in society. They also ignore the more practical and applied aspect of this discipline, focusing only on learning of encyclopedic knowledge.

So, the first session was divided in two theoretical parts: What is the geographer and how is the Grade? And an explanation of a particular practical work that a geographer can elaborate on the territory and that they can experience firsthand a field work session (meeting second-practice-).

If we want to answer the raised questions about what skills a geographer learns during their training to undertake this work, we had to refute the idea that the geographer is a mere container about encyclopedic data in physical and political accidents. It is an arduous task to demonstrate the interdisciplinary nature of geography, since many of the sciences today are seeking specialization versus holistic knowledge on related subjects.

We show the curriculum of Grade of Geography and Management of the Territory, explaining interdisciplinary subjects and the different topics they can choose to "make" his or her studies, according to their interests and vocation. Furthermore, we found interesting to explain the practical nature of some subjects with the use of tools (GIS, remote sensing...) and field trips to check in situ what happens in the studied realities in the classroom.

Once doubts resolved, we explain the field work in a particular area of the city of Malaga we would visit next week. So we made a second presentation where using thematic maps and photographs, we explain the characteristics of the area which is object of our visit (Mount Victoria), and the task they would have to do. Mount Victoria is a residual relief belonging to the physiographic unit of Montes de Malaga, which lies in the central district of the city which names it.

It is home to a large complex lithological (as a consequence of previous geological events), which, in any case, influences on biological and edaphic differences, all profoundly modified by using intense anthropic, which has undergone over the centuries (many cultures from the Phoenicians to the Romans, to Arabs and the "modern man steeped in agrarian and industrial revolution"). Inside, we found remains of terraces for agricultural use, cultivation of olive trees, landscaping applications, communications towers, remains of urban waste, lots of debris, etc., making it a marginal and undervalued in the urban context where it is inserted.

The reason for our choice, as we explain in the classroom, was because it is an area known for them, accessible, with a marginal (not integrated into the landscape) and degraded character. The intention would therefore arouse in them feelings of

environmental awareness and a critical spirit to find solutions to this milestone of ecological landscape, tourism and recreation.

## **2.2. Second session (practice): Field work in Mount Victoria (Malaga)**

To carry out the activities of field notebooks, students are distributed in groups of two or three. This would facilitate the process of taking notes of what geographers were counting along the set route from the school to the top of Mount Victoria. The small dossier consisted of four blocks, which we also show some graphic examples:

1. Thematic outline maps: study area boundaries, hypsometry and lithology.
2. Inventory of vegetation: in order to collect a list of six or seven species with its common and scientific name.
3. Panoramic photos: prepared to facilitate the delineation of homogeneous landscape units and help establish a synthetic view of the territory.
4. Questionnaire and final survey: questions were raised regarding the most feasible solutions for environmental restoration and landscape of Mount Victoria in the territory, about the performed work done by the geographer and the acquired experience after the completion of field work.

Logically, those who collaborate in the field work were attending students during the tour to answer all questions they had regarding to the realization of the activities of the notebook (whose results we will see in the next section), and what we were watching from the different parts of the slopes of Mount Victoria. We explain the two processes related to fields of geography, human and physical. issues such as urbanization and planning, and on the other hand, reforestation, weathering and soils, were marking the climb to the top and increasing the interest of all students, excited to find the elements of reality which daily, both in class and in the media, are sometimes in a decontextualized.

## **3. RESULTS**

Any activity in a classroom must be directed to obtain a pedagogical purpose which gives us a result the learning or developing of a set of competences in any subject we teach. Three questions are set out to be answered by the students so that they reflect on possible solutions, given the environmental degradation suffered by the place they have visited.

### **3.1. Assessment of the resolution about the exercises on their field notebooks**

#### *a) Thematic maps*

In this point, we try to assess student's ability to transfer a series of abstractions mapping, which in a map, it can give us the keys to how the physical feature of the study area are disposed. The maps were three: boundaries of the study area, hypsometry and lithology. Looking at the results graphically, we see that two of the three maps have been completed with a great success and only one has been more deficient. The one which has obtained the worst results has been the map on which students had to draw the boundaries on the aerial image of the study area. However, despite of having the support graph, we can highlight some reasons for this fact like the one of association as a mountain area exclusively with the top, since most of the mistaken maps only circumscribe the area of study in this small space (nine of the thirteen wrong). Hence, we deduce that there is a lack of perception of stereoscopic vision on the territory (3D survey of the aerial image), looking at the pictures with low power of abstraction to draw limits which, in any case, they are already drawn in the other two thematic maps, resulting much simpler their design (more intuitive).

Another aspect to highlight it is the mismatch between students in the selection of colors for the symbolism of the legend and the absence of a clear conception of the use of standardized color intervals, that facilitates the perception of the associated information (eg, red color = high altitude, compared to yellow color = lower altitude).

#### *b) Photographs for homogeneous landscape units*

In this exercise, we wanted students visualize landscape and apply the knowledge they have learned and, with its power of abstraction, to make homogeneous landscape units of natural, urbanized, agricultural area. In this task, they are enhanced interaction skills of students and their ability to resolve what decision is the correct solution. We used two panoramic images taken of the views obtained from the top to the south and west sides.

The results were in both panoramic images presented, both in their degree of correction and the degree of separation of the units (few units = general; many units = atomization). It is also shown in the correction, that performing units, the number of people that generalize the units is bigger than the number which sprayed the landscape. This may be due to two reasons: the lack of understanding of the territory and, therefore, the generation of units that encompass several subunits, or, on the other hand, a loss in synthesis capacity and interrelation of the students.

#### *c) Inventories*

We have developed an inventory to be completed with common and scientific names of the most characteristic plant species of Mount Victoria. The aim with of this easy activity is students collect the names of species which were cited during the tour, using their skills in listening and quick transcription of data, while paying attention to

the speaker. In general, the results are more positive than in previous dynamics (better in collecting scientific vulgar names, more complicated due to its little importance in the current knowledge of the students).

### **3.2. Improvement measures to be developed in Mount Victoria**

The answers of active students in the experience to the question: What actions would you undertake in this area so degraded? It can be highlighted two fundamental answers followed by a third one. First of all, reforestation and cleaning the place are the aspects they consider vital. Secondly, students also think important the development of protective measures, emphasizing the construction of retaining walls, followed by the establishment of a daycare center to ensure the proper use of studio space.

The next aspect that stands out in their answers is accessibility, by means of improving roads and lanes that cross the mountain, and where interestingly, the "paved" of such roads appears in several responses. It should be noted, therefore, participating pupils see direct action on the part of human being, even in acts of deep draft, through the construction of infrastructure.

### **3.3. Personal opinion on field work profession developed and geographer job.**

The answer was unanimous and positive when we asked if they would recommend such activity. All of them without exception seem to have enjoyed the activity, using grades as "pleasant", "original" or "enjoyable", where even the "surprise" is one of the aspects that appears frequently, both by the fact that only one claims to know this place beforehand and to emphasize the spectacular views, as many claim ignorance about the professional profile of a geographer. As the only one aspect of improvement it is highlighted the temporal duration of the activity. Almost half of the students said they would have liked a longer duration to be developed with less hurry, since they "could not have got enough of it."

## **4. CONCLUSIONS**

In short, the experience has been very positive from different perspectives. On one hand, field trips are presented as an active learning methodology very appropriated, by the advantages became clear on the answers to the questions on the field notebooks: it is highly motivating. On the other hand, field works can also serve to create social awareness among students regarding realities they have to know and modify, in our case of environmental field and promoting critical and active thinking. Any work to be done in the close future as a result of this experience, and obviously more scientific, could take shape in two lines:

1. Extend this experience to a greater number of schools, working systematically with a questionnaire for assessing the broader activity, to obtain more complete results and extrapolated at the municipal, provincial or even, depending on the number and geographical spread of centers covered.
2. Make a chronological analysis, by recording enrollment numbers in the study of Geography at the University of Malaga, since the inception of the Plan Information about studying Geography, to assess the success of these measures in achieving the fundamental objective, and that is to encourage high school students to begin their studies in the discipline.



## **INTEGRATING GEOSPATIAL TECHNOLOGIES AND SECONDARY STUDENT PROJECTS: THE GEOSPATIAL SEMESTER**

Bob Kolvoord

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### **RESUMEN:**

El Semestre Geoespacial es una actividad de educación geográfica centrada en que los estudiantes del último curso de secundaria en los institutos norteamericanos, adquieran competencias y habilidades específicas en sistemas de información geográfica, GPS y teledetección. A través de una metodología de aprendizaje basado en proyectos, los alumnos se motivan e implican en la realización de trabajos de investigación en los que analizan, e incluso proponen soluciones, diferentes procesos, problemas o cuestiones de naturaleza espacial. El proyecto está coordinado por la Universidad James Madison y lleva siete años implantándose en diferentes institutos del Estado de Virginia, implicando a más de 20 centros educativos y 1.500 alumnos. Los alumnos que superan esta asignatura de la enseñanza secundaria obtienen la convalidación de determinados créditos académicos de la Universidad de referencia.

### **PALABRAS CLAVE:**

Sistemas de información geográfica, enseñanza, didáctica de la geografía, semestre geoespacial.

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**ABSTRACT:**

The Geospatial Semester is a geographical education activity focused on students in their final year of secondary schools in the U.S., acquiring specific skills in GIS, GPS and remote sensing. Through a methodology for project-based learning, students are motivated and involved in conducting research using geographic information systems and analyze, and even propose solutions, different processes, problems or issues spatial in nature. The Geospatial Semester university management not only ensures proper coaching, guidance and GIS training for teachers of colleges, but has established a system whereby students who pass this course of secondary education gain the recognition of certain credits from the University.

**KEY WORDS:**

Geographic information system, teaching, geographic education, geospatial semester.

**RÉSUMÉ:**

Le semestre géospatial est une activité axée sur l'éducation géographique des étudiants en dernière année des écoles secondaires aux États-Unis, pour l'acquisition de compétences spécifiques en matière de SIG, GPS et télédétection. Grâce à une méthodologie pour l'apprentissage par projet, les élèves sont motivés et impliqués dans la conduite de recherche utilisant des systèmes d'information géographique et analysent, et même ils proposent des solutions, des processus différents, des problèmes ou des questions spatiales. La gestion de Semestre géospatial par l'Université assure non seulement un bon encadrement, d'orientation et de formation sur le SIG pour les enseignants des collèges, mais a mis en place un système dans lequel les étudiants qui passent ce cours d'enseignement secondaire gagnent la reconnaissance de certains crédits de l'université.

**MOTS-CLÉS:**

Systèmes d'information géographique, enseignement, didactique de la géographie, semestre géospatial.

## **1. BACKGROUND**

In United States secondary schools, students in their final year, and especially in their final term, are often not engaged and focused on their schoolwork. They have completed college admission applications and tests and have little at stake in their academic performance. They are beset by a curriculum that focuses on high-stakes testing at the expense of more inquiry-based learning, which could lead to more engaging higher-order thinking and problem-solving. Teachers report challenges in motivating these students and they often come to university unready to engage with more challenging content.

Additionally, Geography has scant presence in high school curricula in the United States, and even less attention is given to geospatial technologies such as geographic information systems (GIS), GPS, and remote sensing, despite the fact that these technologies are predicted by the US Department of Labor (2007) to provide the fastest growing career prospects over the next decade.

While some emphasis has been given to providing professional development in geospatial technologies to teachers in the use of geospatial technologies, the implementation into the curriculum has been very limited (Kerski, 2001 and Baker *et al.* 2009). The reasons given are often related to lack of time, lack of expertise and technical issues. Whatever the reasons, despite a broad array of projects, few students have any detailed exposure to these cutting-edge tools.

In 2004, then Governor of the Commonwealth of Virginia, Mark Warner, recognized some of the challenges mentioned above, and suggested some possible solutions, focusing attention on the problem. While he placed a focus on Advanced Placement (AP) coursework, this attention provided an opening for us to propose a very different sort of opportunity, the Geospatial Semester.

## **2. CONCEPT**

The concept of the Geospatial Semester is simple. We work with secondary schools to provide a term- or year-long class in which students learn about and develop skills with different geospatial technologies, including GIS, GPS and remote sensing, and in which they engage in an extended locally-based project to apply those skills in answering spatial questions of interest. The class is taught by the secondary school teacher, with regular technical support and mentoring from university faculty. Students both earn high school credit and have the option (upon payment of a tuition fee) to earn university credit. The tuition is considerably discounted (70% reduction) from the standard rate.

## **3. OPERATION**

While the concept is simple, the execution and operation of the Geospatial Semester has its complexities. Interestingly, much of the complexity comes on the part of the secondary schools. We start by working with interested teachers and school district administrators. Once a school decides to participate, they must decide on how to offer the class (science, social studies, or technical education) and identify the teacher. Often, they must officially add the class to their Course of Studies and then recruit students to make sure there are enough participants for the class to be offered.

At the university, once we created courses and had them approved, we simply offer sections via our Office of Outreach. We visit each class and enroll students that wish to pursue the dual enrollment credit (this is not required for participation in the

Geospatial Semester) and then we continue to work with the teachers and the students through regular visits (every 2-3 weeks) and even more regular contact via telephone and e-mail. This kind of extended interaction between university faculty and high school instructor is very unusual, even in dual enrollment classes.

Once we've identified a new school/teacher, we work with them to provide professional development and curricular materials as the teacher starts to plan his/her course. A number of the teachers have prior GIS experience through university classes or work experience. We have developed a complete set of materials that teachers can use to master the technologies themselves as well as use with their students to introduce them to different facets of the technologies. We've also recently written a book "Making Spatial Decisions Using GIS" (1<sup>st</sup> and 2<sup>nd</sup> edition), published by ESRI Press, that is used by most classes as more advanced material.

We are currently in the 8<sup>th</sup> year of offering the Geospatial Semester. In the inaugural year, we offered it at just four schools and we have grown the program to approximately 20 schools and more than 500 students annually. A map of participating schools can be found at <http://www.isat.jmu.edu/geospatialsemester/map.html>

#### **4. EXAMPLES OF STUDENT WORK**

The quality of student work has been very high. While not all of the projects have been locally-based, a great number of them demonstrate both substantial GIS and cartography skills as well as interesting spatial analysis and scientific problem-solving. The students build their geospatial skills through a variety of exercises and small-scale projects early in the class and then they move to the project phase. For many students, this extended (many week) project is often the first time they have worked on any assignment requiring more than a few days. The teachers and the JMU mentors work with the students to help them explore project ideas and then shape them into GIS projects for which data are available and that can be done in the time allotted. The student project ideas are generally very innovative, but as veteran GIS users know, identifying appropriate and relevant data is the key to a good GIS project. It is here that the university mentors make a big difference. As the secondary teachers gain more experience offering the Geospatial Semester, they are much more able to provide more guidance to students regarding projects.

The figures below show a number of examples of the final project presentations of different students from urban, suburban and rural settings. Many more student project examples can be found on the project website: <http://www.isat.jmu.edu/geospatialsemester>.

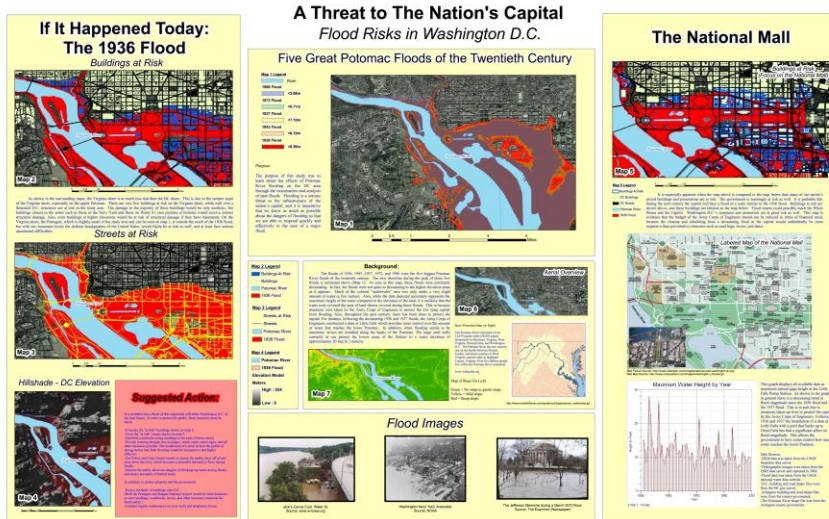


FIGURE nº1: This project from Washington-Lee High School in Arlington, VA explores how a flood of the same magnitude of the 1931 flood of Washington, DC would impact present day Washington. This project combines historical data with modeling and uses a very attractive visual display to convey the results. This project was a multiple-award winner at the 2010 National Conference for Geographic Education map competition.

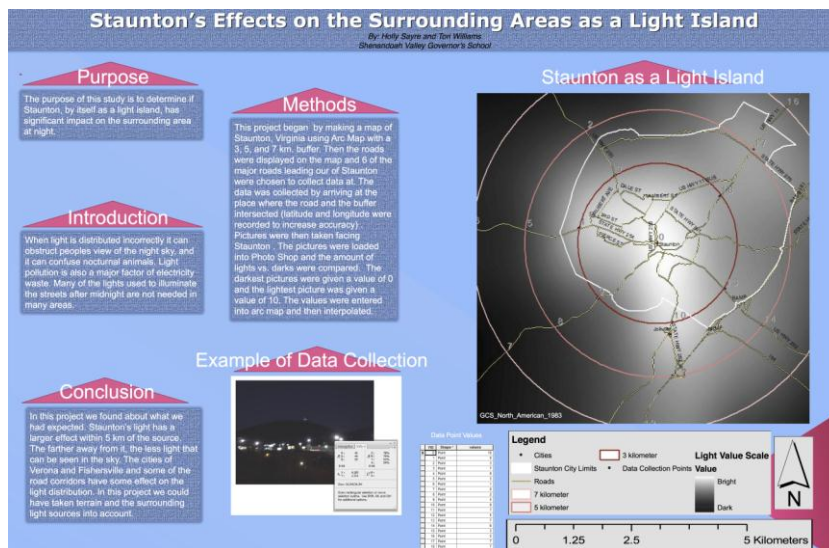


FIGURE nº 2: This project from the Shenandoah Valley Governor's School investigates the impact of ambient light from a small Virginia City. The students designed the investigation and took the data shown. One of the most intriguing aspects of this project was the ingenuity the two young women showed in determining how to take pixel brightness from a digital camera and turn it into a compelling spatial display. It also shows the value of raster interpolation to estimate the brightness between the measured values.

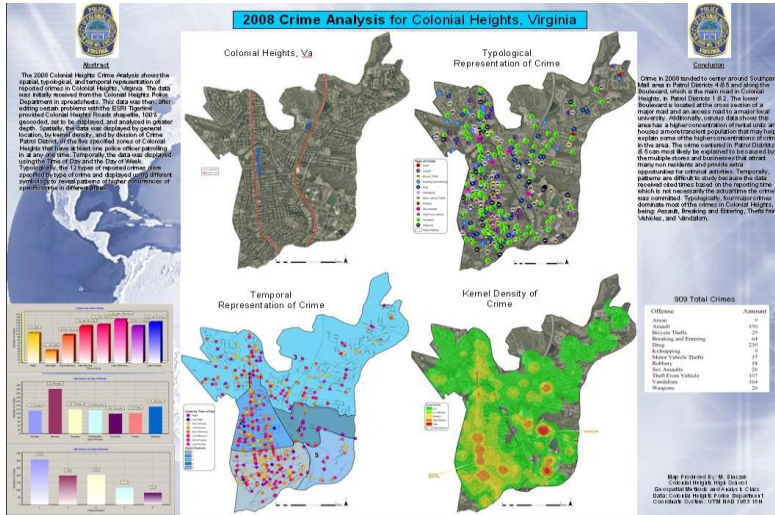


FIGURE n° 3: This project from Colonial Heights High School analyzes the prevalence of crime over a year in a small Virginia City. The students worked diligently to make sure that every crime that occurred was mapped. This project was comprehensive – every crime for an entire year was collected, geo-referenced and analyzed. The students gained a great deal of insight about their community as they identified locations and times when crime was most prevalent. It also represents the effort of an entire class of students over a multiple-week period.

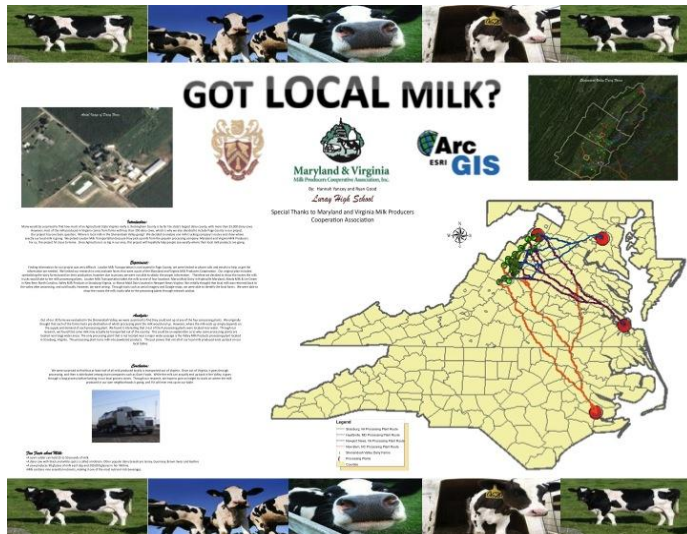


FIGURE n°4: This project from Luray High School in rural Luray, Virginia explores the ultimate destination of milk from a local dairy farm. The students were interested in investigating the locavore food movement and were curious about what happened to locally produced milk. This project exemplifies student research that is driven by curiosity. One of the students on this project lived on a dairy farm and she was able to capture that experience in developing a data set to learn just how far milk might travel from her cows (up to ~700 km away).



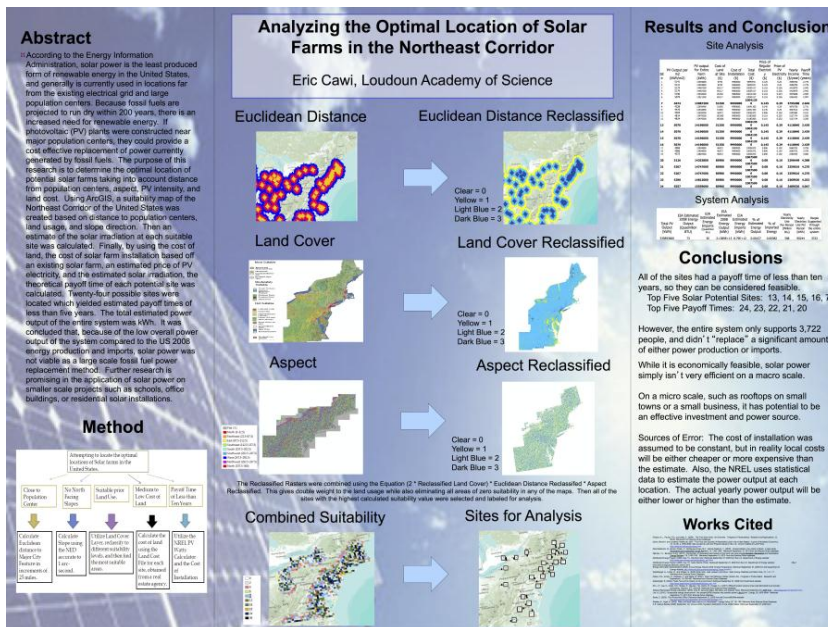


FIGURE n°5: This project from Loudoun Academy of Science in the suburban Washington, DC area investigates the optimal locations of solar farms in the northeastern part of the United States using multiple selection criteria. This project shows the power of GIS in site selection. In this case, the student was interested in alternative energy sources and how they might support large urban populations. The combination of multiple criteria into a single decision is a good analog to real-world decision making.

This array of projects demonstrates some of the possibilities that secondary students chose to explore. They are clearly interested in projects that tie to their communities and that are socially relevant. Other projects have included assessing the traffic flow around secondary schools, evaluating school bus routes, testing the efficacy of local hazardous weather warning devices (e.g. tornado sirens). Tying the projects to issues about which students care or that provoke their curiosity has proven to be key to the success of the Geospatial Semester.

## 5. SUCCESSES

From the examples of the student work shown in the previous section, students are clearly mastering the use of different geospatial technologies and the analysis techniques. As with any class, there is a range of quality of effort and output, but there is no question, in interacting with the students, that they have mastered the software. The more interesting challenge is helping them build the ability to pose and answer spatial questions that are amenable to analysis with GIS. We have been engaged in a

multi-year study exploring the quality of student projects using a rubric developed based on the 21<sup>st</sup> Century Skills thinking skills (Partnership for 21<sup>st</sup> Century Skills, 2004). Our results to date (Charles and Kolvoord, 2011) show that students demonstrate considerable ability in gathering data and creating maps, but struggle to reach higher levels of competence in spatial analysis. This will come as no surprise to anyone who has worked with secondary students. Their concrete skills can be excellent, but they can struggle as they move to more abstract thinking (note that this problem is also a challenge at university level).

The students are also engaged and actively participating. The quotes below are indicative of students' feeling about the experience.

*“Geospatial Analysis is unlike any other topic I’ve studied before, it’s applicable to almost everything inside and outside of school. It gives you experience with cutting edge technology. It’s great!”*  
Female Student, Fairfax County

*“When I signed up for this class, I thought I would be just another science class that our school would try to put a “fun” spin on, but this class is one of the most exciting classes I’ve ever taken. It makes you think, it challenges you to be innovative, but it’s something you can use. It makes the work more meaningful when you know you’re doing something that affects your life.”*

Female Student, Fairfax County

The quality of student work has also been externally validated as students have won recognition in state and national contests (for example, the project shown in Figure 1 won multiple awards at the 2010 National Council for Geographic Education Map Competition).

Another benefit of the Geospatial Semester is that students are introduced to central ideas in Geography to a much greater extent than the current United States curriculum generally permits. While the Geospatial Semester is not a Geography class, it engages students in geographic thinking and problem-solving and has resulted in many students considering Geography as a potential college major or GIS as a possible career path. The Geographic Science program at JMU has grown in parallel with the growth of the Geospatial Semester.

An unanticipated benefit of the Geospatial Semester has been the engagement of the participating teachers (Kolvoord, Charles and Purcell, in press). The current focus on high-stakes testing has led to a great deal of formula-based teaching (i.e. pacing guides, rigid curriculum structure, little opportunity to adapt to current events and student interest). The opportunity to teach a course like the Geospatial Semester has reenergized some experienced instructors and given them the opportunity to be creative and draw their students into open-ended inquiry. This has resulted in considerable satisfaction on the part of participating teachers, despite the effort



required. In fact, one teacher has delayed his retirement because he's enjoying teaching the class so much. The opportunity to learn and use a technology that is constantly changing is a welcome stimulus to many Geospatial Semester instructors.

## **6. CHALLENGES**

While it would be most gratifying if every student in every classroom were able to produce the quality work on display in the maps shown above, it must be noted that not every student remains engaged throughout the class. While the overall level of motivation is very high, some students don't perform as well as they might. In some cases, they've joined the class due to parental pressure or a mistaken idea of what the class entails. Some also lose motivation for personal reasons that have little to do with the class.

Teachers can also struggle with the class. Interestingly, we've found that it isn't prior GIS skill or knowledge that determines which teachers are most successful, but rather their experience with, or willingness to embrace, project-based learning. We've discovered that we can help shore up any GIS skill deficiencies much more easily than we can help teachers model and support project-based learning. As a consequence, we've had some teachers and schools drop out of the Geospatial Semester. We've also faced the challenge of teacher mobility. In the U.S., it is not unusual for teachers to either change schools or school districts, or to move into administrative posts. These changes can move a school from a successful Geospatial Semester offering to no offering at all. We're continuing to work with these districts to identify and support potential instructors.

We also continue to struggle with how much guidance and mentoring to offer both teachers and students. An important component of the Geospatial Semester is helping to build competence on the part of both the secondary teacher and the students. We are sensitive to not wanting them to be dependent on our consultation and help, but also wanting to make sure that we give them sufficient support to allow them to explore projects that have both challenge and depth. The support personnel at JMU are in regular conversation about the depth of mentoring offered in different classrooms. We also spend considerable time debriefing at the end of the year to consolidate successful practice and learn from our mistakes.

A final challenge has been following students after the completion of secondary school to determine what impact, if any, the Geospatial Semester has had on their choice of university program or career. We don't have any way to maintain contact with these students and as soon as they change an e-mail address, they are lost to us. In the future, we are anticipating a tracking system that will allow us to follow students from secondary to tertiary education in Virginia, but it doesn't yet exist.

## 7. CONCLUSION

The Geospatial Semester is finishing its 8<sup>th</sup> year. More than 2,000 students in schools around Virginia have participated in the project and the large majority of them have earned university credit for the experience. Students have demonstrated that they can master professional-grade GIS software and use it to explore locally-based projects of interest. Students remain engaged throughout their final year of secondary school and are introduced to content and career paths not ordinarily available to them. Participating teachers report being energized by the experience and are able to bring project-based learning opportunities to students in the midst of a mania for high-stakes testing.

We look forward to continuing to build the Geospatial Semester into more schools and mentoring student projects in GIS. If you would like more information about our efforts, please go to our website (<http://www.isat.jmu.edu/geospatialsemester>) or contact us.

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Nov. 2011.

## **THE SIGNIFICANCE OF ANDALUSIAN RURAL HOUSE AS DIDACTIC STRATEGY**

Ricardo M. Luque Revuelto

### **1. INTRODUCTION**

The traditional Andalusian architecture, in spite of his recurrent presence in some of the most commonplace imagery of our region, keep on being a great stranger, even though in recent times we attended an Andalusian Administration important diffusion of the same for part.

We thought than the first diffusion of the knowledge of the rural traditional Andalusian architecture must begin at the school like transverse element, to I deliver it of the different educational stages, so that the student body discovers and enjoys the rural patrimony, while you wake up to the need of your conservation and enjoyment.

### **2. THE IMPORTANCE OF THE RURAL TRADITIONAL HOUSE**

Before continuing defending a possible model of educational intervention in the sense right now exposed it would be convenient to appraise still plus the importance of the rural Andalusian habitat, so much from one point of scientific sight like didactic.

#### **2.1. Scientific interest**

From the point of view of the geographic science the traditional Andalusian house must be interpreted, first of all, like a testimony privileged that you talk to us about the riches and diversity of our culture in general and of the districts that fix her in particular. The dispersed houses that jut out for his volume or for his whiteness in the spaces of pasture, of olive grove or of still land form consubstantial part of the agrarian Andalusian landscapes so that their presence seems natural to us, as if they be a continuation of the cultivations of the trees of the relief, or. They stem from history, and of the physical and climatic characters of a territory that you have conditioned the ways of life of his inhabitants, drawing some agrarian anthological landscapes that

constitute, next to his habitat, a patrimonial legacy; Distinguishing marks of identity of Andalusia, the fact that they characterize of conclusive form the aforementioned community and the fact that they give eloquent testimony of his ways of life.

The rural house did not sole she is perfectly overlapping with the midway rather besides endow this with a unit and a particularity that does it noticeable. The uniformity in the constructive modes, the scarce variety of types, the duality of uses and of uses, agricultural and cattle, his contained dimensions and the omnipresent whitewashing of his walls indicate a geographic reality that is based on the common cultural wealth of the peasant to share and to exploit a fragile means, poor people in many instances and elk to us a hostile climate, the ones that you have the man than to establish an equilibrium with that you allow of sustainable form the necessary agricultural uses and cattle farmers for his sustenance.

But the rural house did not sole you have a geographic interest; it is a more ample depository of cultural and patrimonial contents. Like cultural component that the habitat is, constitutes a lively element and in permanent evolution and transformation, of the way than when his residents emigrated, or they went away to the city, they fell under many of these constructions. But you did not sole his walls and roofs disappeared, also the modes and social uses of the people that they were sheltering that made possible these forms of habitat, and the techniques came down.

## **2.2. Didactic interest**

From one point of didactic sight, the study of the rural Andalusian house proves to be so significant like from the scientific or cultural point of view. That way, a relevant presence in the curriculum for the basic character and organizer of the contents can be justified; A moderate level of abstraction and complexity; And, to a certain point, for a relation with the own personal experience.

From the academic point of view, a relative consent in assuming that the elements of the agrarian space -the rural habitat between them- are particularly appropriate for teaching from there perhaps, between other reasons, because his basic contents understand, in dose variables, conceptual elements and methodologies, thematic information and an introduction to the theoretic own formulations of geography, like the notion of structures or agrarian landscapes seems to exist his important presence in the curricula of geography beyond reforms and circumstantial changes-.

Next to the academic justification, reasons based in the educational and social relevance of the agrarian themes exist. Really, good part of the Andalusia they depend on the agrarian activity, that allows provoking with certain facility the interest and sensibility of the pupils toward so themes directly related with its own lives. As of the present moment, and right now for some decades, we attended however a new impulse of the agrarian or rural geography, that you have to see with the appearing of new

focuses landscape painters, conservationists without a doubt and of environmental sustainability, that way I eat of the emphasis on the preservation of the cultural worldly rural diversity that humanist contributes the geography.

### **3. RURAL HOUSE AND CURRICULUM**

Once the scientific interest of the themes related with the Andalusian rural habitat and once his possible didactic potential was seen was verified, it would be pertinent to ask us in what his contents in the prescriptive curriculums of Secondary Education and Pre-University Studies include a measure themselves -from the point of view of geography-.

Once the competitions on the subject of education were transferred, the present-day Andalusian educational system presents good opportunities for its inclusion in the curriculums of different matters within the area of Social Sciences, obeying the premises of the *significant learning* that expose the LOGSE or the related with the basic competitions that you propose the most recent test LEA.

Already in one-second level of concretion curricular we can tell apart components of the curriculum one insinuates in direct or indirectly to the rural traditional habitat well treat him of objectives, contents or criteria of evaluation -the one that the correspondent orders and decrees of the meeting of Andalusia contain-.

That way you develop a set of thematic nuclei for the matter of Social Sciences, Geography and History in the own teachings of the autonomous region of Andalusia for the Secondary Compulsory Education. We found a particular reference to the traditional architecture in the thematic nucleus in them, I number 2, relative to the cultural Andalusia patrimony, then of more concrete from you develop for the third course of her ESO at the block secondly (*Cost-reducing activity and geographic space*) Also at the block fourth (*Transformations and unbalance in the world present-day*) the conscience of the impact of the aforementioned activities stands out and you offer a frame for the conceptualization of the peculiarities of the same in the Spanish, European and worldwide space. I number 6 in the thematic nucleus (*Tradition and modernization in the Andalusian rural midway*) you refer to the survival of determined traditional aspects like the architectural that you live together in between loud changes traditional, owed to the modernization of agriculture and, in general, to the readjustment of the paper of the agrarian activity in the set of economy.

In Pre-University Studies, in Humanities's mode and Social Sciences, Geografía's matter of Spain includes also some plain references about the settlement and the rural traditional habitat. The thematic nucleus where they develop these contents is the number 4: *Territory and cost-reducing activities in Spain*. Like contents and it attempts relevant problems bringing closer the student body to singular problems in the relation between the territory and the cost-reducing activities. That way, taking into

account the relevance of the agricultural sector and cattle farmer in Andalusia, the study of his problems, attending to the differential features that can be appreciated in the several models of agrarian activity comes into question, that would keep of implicit form the differentiation of the several types of agricultural edifications in terms of the types of agrarian exploitations, introducing the differentiation between cattle country estate with houses, houses of work, haciendas of olive grove, etc.

The knowledge of the rural habitat, you include, therefore, a set of knowledge, procedures and attitudes that have necessary capacity in the different curriculum of the matters of Social Sciences, History to the sight of the premises exposed of the different educational laws and of preferring form in give them Geography, so much in the General, I eat in give it Spain and logically in the correspondents separated in the ones that you represent in good timing give it Andalusia. Besides, aside from the specific programs out of every subject of study, a chapter once the *Cultura Andaluza* was dedicated exists that it is necessary to treat transverse form in all of them, showing the cultural manifestations and the modes of life of the Andalusian town you be supposed to represent the patrimony lived and inhabited between.

#### 4. METHODOLOGY

It would be convenient, before continuing examining possible initiatives that take effect with a didactic intention, establishing a series of guidelines that we considered essential to the diffusion of the rural traditional architecture and then good may have him in the account like general criteria for his treatment like learning situations. These criteria become established putting in relation the orientations of the psychological investigation, the educational general intentions and the especial characteristics of the geographic knowledge that his educational capability in an integrative and expeditious space concept basis. The aforementioned criteria are:

- Counting on the knowledge of the person that is going to learn. This opinion supposes the assessment of the personal knowledge of the pupil like a previous step to the attainment of a most rigorous knowledge.
- Taking into account the nature of the proposed tasks: It's evident that any task must come into question from the simplest at the most complex, departing from simple reports to attain conceptual abstractions more complicated.
- Communicating and understanding this patrimony implicates some purposes that can be educational, cultural or social that requires to be placed to several diagrams: The of the formal or ruled education, the of the informal education, or the one belonging to the civic consciousness-raising.
- A methodology centered in the activity and the student body's participation, that you favor the rational thought and critic, the student body's individual and cooperative work, as well as the different possibilities of expression in consonance

with the development of the competitions referred to the reading and written, and oral expression will be fomented.

- Neither we can lose sight of the consideration of attention to diversity. They must umpire methods that the student body's different learning rhythms take into account, that favor the capability to learn for themselves and promote the teamwork.
- The technologies of the information and of communication must be a part of the habitual use like facilitating instrument for the development of the knowledge of the rural traditional architecture.

## **5. ORGANIZATION AND SECUENCIACIÓN OF THE CONTENTS**

We understand for secuenciation the distribution temporarily ordered of the contents to, I deliver it of the different educational stages, accomplished in terms of different criteria that they derive, and they get curriculares from the sources and beginnings in which the correspondent projects are based. The criteria for secuenciar the contentses depend narrowly on the epistemological bases of the disciplines that conform to the area of Social Sciences. From the perspective constructivist, learning you are based on concepts that we can name *structuring*, since they refer to the foundations and basic methods of disciplines, they make easy, and they enable the intelligibility of the facts and geographic processes. The criteria that come from this focus of gradual learning of structuring contentses are :

- The gradual understanding of the especial characteristics of geographic, knowledge especial attention to the paper of the sources (Polls, literary testimonies, oral sources).
- The processes of interaction between the society and the midway that they generate several geographic spaces (the agrarian landscapes, the human occupation to inhabit and to produce).
- The command of temporality and of the change in the concepts that they entail, you cut I eat: Order, duration, succession, simultaneity, rhythms and chronological measurement (transitions or changes of some societies to another one, of some modes of life to other ones).
- The use of explanatory factors in increasing progression as to quantity and complexity (I mediate physical, property, exploitation, systems of cultivation, social relations).
- The case study concrete, present-day and completely defined (regional models, typologies defined of rural habitat, crisis and disappearance of forms of rural habitat, protective models and setting in value).



The named OCDE's project *Definition and Competencies's Selección (DeSeCo)*, referent basic you define these as a combination of practical abilities, knowledge, motivation, ethical moral values, attitudes, emotions and other social and behavior components that are mobilized jointly to achieve an efficacious action of the comprehensive focus of the competitions; You receive treatment, for so much of a knowledge, knowledge doing and knowing how to be.

### **5.1. Proposal of concepts (knowing)**

On the one hand, we must face the need to exceed the reduced contents on rural habitat that they represent in the textbooks to some much deeper contents and that they integrate into in the thematic relative nuclei the rural space perfectly.

In addition, the following it so happened that we must give to confer the bigger interest to the Andalusian rural habitat involves increasing the power of his educational value. First from the consideration of the thematic spaces that they look implicated in his regional study: The scenic, the patrimonial, the economic, the social, the ecological. Secondly, from the consideration of the great educational value that they shut in the contents of geographic nature, and particularly the related with the facts of the habitat: Factors, so much physiques like humans that they concur in him; His principal components, with particular insistence in the scenic; The typologies of regional space in terms of the productive orientation of exploitations; And, finally, the correlated problems, the fact that you split of a diagnosis of pathologies attending to his causes and the fact that you come to an end with various orientations, catalogs and standards, so much I eat international of national space.

### **5.2. Proposal of procedures (knowing how to do)**

Procedures, like set of orderly actions that they guide the attainment of a goal, they capacitate to accomplish tasks, and they are useful for acquiring or to make various capabilities perfect: I eat to synthesize an extensive information, placing the habitat in a map, locating a determined type of construction chronologically or argument on the need to preserve the technical models and edification of the past. Enter the most outstanding procedures the related with data processing, the multi-causal explanation can tell apart and finally the related with the fact-finding techniques and investigation.

*Data processing.* The pupils as from Second Ciclo of Secundaria right now is able to read different scales maps, to tell the symbols apart, to locate the habitat on the space coordinate and to determine his extension relating to the relief, the hydrography or the uses of the ground, making a comprehensive learning possible and the establishment of causal relations to interrelate various reports. The job of cartography enables, as a final resort, the generalization of the facts once the rural habitat like the determination of different typologies of habitat in terms of the productive orientation

of the Andalusian districts was related his position depending on the characteristics of the physical midway or the density of the same relating to the previous factors or in connivance with other ones, like the structure of the property or the divided into parcels.

*The handling of sources.* The didactic treatment of the rural habitat would not be possible without the inclusion of a plan of adequate reading that you gather the contributions of the more important treatises, that way I eat of the most recent and innovative works, so much from one point of scientific sight like literary.

*The multi-causal explanation.* As the procedure proves to be indispensable to capacitate the student body in the understanding of complex, and essential realities for the knowledge of the themes related with the rural habitat. It is necessary to design specific activities that the complex interrelations of the peasant with the Andalusian midway explain for the progressive development of multi-causality; That they relate facts and phenomena that they cause to different space scales and storms to lay eggs of the manifesto the interdependence and evolution told a part of the rural house; That they integrate appropriate reports of several sectors; And that they debate on some candescent point, like the need of his conservation, exposing divergent views.

*Investigation.* The documentary sources and statistics related with the rural habitat are varied, significant and, enough there, very reachable through the Net. We can find information disintegrated on the inhabitants that reside in the *Nomenclátor* and in *Population's Polls* in dispersed in the middle rural; The space location of all the rural edifications picks up andaluzas itself in the *Nomenclátor Geográfico of Andalusia* and in *Cortijos's, Haciendas's and Lagares's Inventory of Obras's Consejería Public and Transportes* a study detailed of the most unique. The consultation, the selective compilation of information, the organization and analysis of the data will allow to the sketch of a hypothesis without a doubt, and you conjecture for various space spaces and storms, as well as the elaboration of the opportune conclusions and posterior communication of the results.

### **5.3. Proposal of to attitudes (knowing how to be)**

The commitment of the Geography with the society requires that a kind of learning increase the power of that I instruct responsible citizens, critics and sensitive in front of the problems and in front of the changing worldly present-day situations. We can accomplish the following enunciates in our case:

- Showing interest to know the agrarian Andalusian landscapes and the habitat to them associated.
- Developing a critical spirit in front of the contracts in the forms of habitat from the humblest edifications like the small huts, to the most elaborate like the big haciendas of olive grove,

- Sensitization in front of the scenic degradation and the banalization of the rural Andalusian spaces and of his most emblematic elements, particularly the habitat in them registered.
- Responsibility to the hour to verify and to manifest the continuous attempted murders that you suffer the traditional house, so much the one that locates itself at our towns like that one emergent scattered in the rural spaces.

## **6. THE WORK SCHEDULE OF THE PUPIL. A STRATEGY OF LEARNING**

Until now, importance has looked scientific and didactic of the rural Andalusia habitat, his relation to the curriculum, the methodology and a proposal of contents has been sketched. It is still pending to concretize these considerations of the professor about the aforementioned object of study in a logical sequence of learning, directed toward a concrete student body and pertinence to an educational determined stage. The aforementioned sequence can come into question in the shape of integrated project, I work interdisciplinary, like didactic unit or like a simple plan of activities. We will focus on the model of a didactic unit, granted that you constitute the paradigm of sequence of more complete learning and that better is adapted to the curricula of Teaching Secondary and Pre-University Studies here.

As a concretion of this proposal, these are the learning situations that the different kinds of activities with his correspondent resources, his temporalization and phase integrate themselves evaluator in:

- Activities of initial motivation, presentation of the unit and explicitation of previous ideas and pre-concepts. Califiatoria develops at the beginning of the unit, with a kind of initial evaluation, involuntarily. We will use preferentially visual resources like graphics, imagery concepts will make reference to the significance of the rural habitat within the agrarian Andalusian landscapes, that way I eat the factors that they concur in the same. The procedures will relate with the multi-causal explanation and the attitudes with the creation of a climate in the fact that it be appraised and show up interest to know the agrarian Andalusian landscapes, and the habitat to them associated.
- Activities of data processing, contrast of sources and construction of concepts. Constitute the unit's central and more important nucleus, and a kind of orientated evaluation in the assessment of the process of learning. The treated concepts will understand so much of the components like the typologies of the rural Andalusian habitat right now expressed previously. The related procedures will be the data processing and the use of various sources.
- Activities of generalization, application of what learned to other situations and argumentation of conclusions. Occupy last sessions of the unit, and procuration systematizing and generalizing the learnings accomplished, in addition to put conclusions or final reports of the opinions into account determined and pre-

concepts expressed in the previous ideas. The evaluation will be summative fundamentally. The concepts will relate with the correlated problems the rural habitat, his pathologies and attempts of conservation or revitalization. The didactic included strategies insinuate so much to the multi-causal explanation like to the investigation and fact finding geographic. The ones that collect especial relevance are now attitudes: Sensitization in front of the scenic degradation that they show good architectonic practices, etc. and the banalization of the rural Andalusian spaces, assessment of cases.

- Activities related with the treatment of transverse perspectives. The frame transcends the student body's formation strictly disciplining, from there the need to envisage other activities based in contents guided to his formation like citizen. Enter these themes; they can include themselves like related with the rural traditional Andalusian house the perspective of a kind, the education for citizenship, the Andalusian culture, the environmental education or the education for cohabitation and peace.

- Activities of reinforcement and deepening. Considering that we found ourselves in a comprehensive stage, we can foresee one loudly grade of diversity in the student body, so much from the point of view of the cognitive differences, of the academic differences, seemingly as of motivation and interest for learning; The establishment makes what determined activities of reinforcement commendable out of or basic for the pupils that they rank below the half a level of the classroom, and another one of the certain grade of complexity for the student body of tall level. It would in this sense be convenient to include in the development of the unit reading of texts and imagery of bigger or minor expositive clarity; Or the realization of more or less complex tasks, that they would go from basic definition concepts to the realization of a reasoned report, etc.

## **7. CONCLUSIONS**

In this work has exposed himself, a reflection and a didactic proposal of the possibilities that the Andalusian rural habitat for the teaching of Geography and of Social Sciences, as well as his faculties enclose stops to work procedures and skillful actions and motivating besides favorable attitudes toward his knowledge, assessment and conservation. Once the scientific interest of the themes related with the rural Andalusian habitat, and once his possible didactic potential was seen was verified, we asked ourselves in what they have included a measure in the prescriptive curriculums of secondary education and pre-university studies -from the point of view of geography-. Although the answer was nothing flattering, we defend that the introduction of the rural habitat in the study programs is priority and still very clear the possible inclusion in teaching would back up and pre-university studies insofar as his study would contribute to the development of the significant learning of the basic competences.

The situation of ignorance we met in, the ignorance on his importance for a good part of the rural world, the invisibility of his contents in the ruled education, the frailty of these constructions that only keep on when they are in use, and the cost-reducing limitations so much I eat of the individuals of administration, they are circumstances that they do us to put down the feet and discarding a possible global recuperation of the rural Andalusian habitat. However, and we must not invalidate the efforts in spite of the difficulties than from the several spaces of administration and from knowledge's several fields, particularly from the geographic science, they are done in this address, without losing sight of the extraordinary legacy that we have received from our ancestors, and that we have the great responsibility to get over the coming generations to it.

## **APPROACH TO THE CONCEPT OF SCALE IN THE EARLY YEARS OF PRIMARY EDUCATION. PRESENTATION OF A GAME TO WORK THIS CONCEPT FROM ACTIVE TEACHING**

María Jesús Marrón Gaité

The main objective of the present paper is to introduce a didactic game designed in order to help the students of early years of primary education the understanding of the concept of scale. Understand this concept prepares them to the correct interpretation, in further years, of this conventionalism in plans and maps. Empirical research we have conducted on the effectiveness of this material, testing in schools in the city of Madrid, has shown a high degree of usefulness for teaching and learning the subject. The use of this material in the classroom has been done from active teaching, giving a central role to the ludic methodology, and has allowed the achievement of meaningful learning by the students from their previous ideas and conceptual representations.

Through its use in the classroom we can bring a conventional and abstract concept to the cognitive capacity of these students, their interests and their motivations. Understanding this concept requires a series of conceptual assumptions that students do not have, as well as the performance of some operations of abstraction at which children of this age -six and seven years old-fail. With this game we try to enrich and accelerate the processes of teaching and learning of the subject, focusing the work on three key factors: a) enhance logical thinking of children through the inductive method, b) do so by using the playful methodology, which has an important role in active learning as a strategy particularly suited to this age and d) increase the creativity of these students.

We start from the consideration that a very participatory strategy, especially suitable to work the concept of scale \_ with elementary students, especially with the smallest-is to do it from the idea of size (that they already know) establishing the parallelism between size and scale. This allows to introduce children to the theme from the beginning of the first cycle of this educational level and achieve positive results. The practical implementation of the game that we have carried out in different primary schools of Madrid has obtained these results. With the game we try to introduce children in the development of spatial

understanding linked to the concept of scale, using sizes, shapes and colours. Through the game, children must reproduce a series of images, which are initially present in real scale and then at different scales. Shapes, sizes and colours are combined in designs of objects with iconic format, with which children are very familiar, and in different abstract forms very attractive for these ages. The activities, which arise through the game, have been sequenced with increasing degree of difficulty, rigorously established. Ultimately, the goal is to bring the child to the concept of scale through a procedure that, while he enjoys, forces him to think and helps him to comprehend.

This paper is structured in four sections. The first is dedicated to reflection on the difficulties the students have with the interpretation of cartographic conventionalisms, especially with the scale. In the second we address the importance of carrying out the teaching and learning of the subject from active teaching, with special attention to the ludic methodology. In the third we describe the game cited above. Finally, in the fourth section, we explain briefly the essential aspects of the research that we have carried out with the game.

The child has the first formal contact with the map in the third year of primary school, starting the second cycle of this level of education, working in the area of "Knowledge of the Natural, Social and Cultural Environment" different contents related to the local environment. Psychological studies on the subject show that at that age (eight years) the child has begun the stage of concrete mental operations (ranging from seven to twelve years). It has also increased the capacity to understand spatiotemporal relations with some complexity. It is assumed that the child is able to undertake the interpretation and understanding of simple maps and spatial orientation concepts related to plans and maps. However, it is quite common that students have serious difficulties when starting to use these tools, resulting in poor learning. It is therefore necessary to carry out an approximation to this issue, prior to the work with maps.

Cartographic conventionalisms that have more difficulty to students are, undoubtedly, the relief represented by contour lines, representation on the maps of everything as seen from above, the interpretation of the shading and the concept of scale. In other occasions we have addressed this issue and have offered various didactic materials that we have designed, aimed to facilitate the understanding of the relief represented by contour lines and to palliate the blur generates in the smallest students "view from up" in the maps. In this paper we address the subject of the scale and offer teachers interested in this issue, a particularly useful teaching resource to facilitate their work and the work of his students in the teaching-learning process of this concept.

Classic studies on the subject (Piaget, 1973; Chateau, 1973; Vygotsky, 1979) indicate that very few children are able to understand the concept of scale under the age of eleven, and often do not master it before fourteen. However, it is considered that it is possible small children understand the principles of relationship involved in

the concept scale if they are introduced into this issue properly. Our research experience has shown that using specific educational games is a particularly ideal way for it. In these games the students play to be builders of different elements (houses, boats, trees, etc.). It is important to do it by vertical elevation, which should be compared with its graphical representation horizontally, in order to understand that the transposition of planes does not prevent the representation to be true to the reality represented. In fact, this representation will initially be the same size as the reality represented, and afterwards will be of different scales.

We consider it is very important to perform these kind of activities before students begin working with maps and plans, allowing them to visualize the relationship between reality and its scale representation in a simple way. Through these activities children can capture by their senses the mechanism through which a real three-dimensional object is represented in a flat shape and with different sizes. They perceive it in a vivential way, and this allows them to have their cognitive structures to understand, in due time, the abstract concept of scale. This will be done in the first years of primary education, to immediately initiate students in working with plans and maps. Fundamental studies such as Bailey (1981), Bale (1996), Holloway (1998) and Gardner (2003), among others, recommend that children must see maps from an early age, although this first contact will be made by working with plans and large-scale maps. It is also recommended to link these plans and maps with simple aerial photographs of the area or with pictures taken from buildings or high relief points. This allows the child to easily associate the vision of reality with its representation.

The game that we explain in this paper is designed from the perspective of active methodology, in which the student can not be considered as a mere recipient of developed content, but, on the contrary, he/she has to participate actively in the learning process, both through individual actions or through participation in group activities and implementation of joint projects. Active learning promotes in student the interest in understanding the world and the things, helps them to transfer the content of academic knowledge to real life and encourages the development of intrinsic motivation. This increases the personal desire to learn, the enjoyment of autonomous learning and interest in learning to learn. All these aspects are of crucial importance, especially when working with very young students, just starting out in the acquisition of habits and attitudes, since these attitudes will shape their ability and motivation to learn throughout their lives.

Active learning, based on meaningful learning, attaches importance to practical activities and learning through discovery. Both should be basic strategies in the teaching and learning of all curricular disciplines and at all levels of education, and, as noted by Garner (2002), are key to develop children's multiple intelligences.



On the issue that concerns us, the aim is the students be able to understand the basic concept of scale experientially through the game we present. It is designed to perform a battery of practical activities, rigorously designed from an educational point of view. Its implementation provides students the understanding of the concept of scale from the previous ideas that are related to it, which are specified in the preconception they have about the different sizes (large, medium, small) and that beings and objects have in real life. The game is composed of activities in which each student reaches learning by discovery in a gradual and personalized way, according to his/her ability to understand concepts. They learn through personal experience and they integrate what they learn in their own knowledge structure, using mental representation levels they have.

Active teaching grants a capital value to ludic methodology, especially when working with children, and we are becoming teachers and researchers who are convinced of the important role can play the game as a motivator of learning and of its usefulness for make more simple academic disciplines by connecting them with the interests and motivations of the students. Play, in its various expressions, is an innate craving in humans. That is, the play is intrinsically motivated. As noted Saegesser (1991, 38), "purely recreational activities are determined by internal variables reflecting general trends in the individual." The main variable is the tendency to search for novelty or neophilia. This trend is especially important in phylogenetically highly developed animals and opposes to neophobia, which is the characteristic of animals with a very poor behavioral repertoire. Consequently, higher animals have an innate tendency to explore the physical and social environment. This is especially pronounced in humans, who are not dedicated only to explore the physical and social environment, but also the symbolic environment".

As a result of the expertise that the individual acquires of the environment (physical, social and symbolic) as his life progresses, the interest he has for the play change as well as his conception of play. During childhood and adolescence play is the activity that interests and amuses the individual, while it constitutes a fundamental element for the development of their potentialities and for the configuration of his adult personality. "A child who do not know play, will be an adult who do not know think" (Chateau, 1973, 4). Through play the child acquires knowledge, develops skills, acquires skills, releases tension, develops creativity and spontaneity. The ludic activity plays a key role in cognitive and emotional development of the individual, and it is essential for socialization, both individual and collective".

Therefore we believe that "the great educational and motivator potential that play has, should not be ignored nor wasted by teachers, but, on the contrary, they should consider play as a key teaching resource, which if is used properly, and in combination with other activities, will allow students to learn through highly motivating situations. Through games, specifically designed according to the characteristics of the topic to be studied, it is possible to introduce positive stimuli in the class, attracting the interest of

students for those curricular contents, which necessarily have to address and, especially when contents are bored or especially difficult to assimilate "(Marrón Gaité, 1995, 81), as the concept of scale. From this perspective, we have designed the material presented, which facilitates learning the concept of scale through play.

The game that we report has been created thinking in cognitive ability of children in the first year of primary school from three key assumptions:

- 1) The need that exists to make easier to assimilate for a child between six and seven years old, the conventional and abstract concept of scale, which is included in a complex instrument: the map.
- 2) The active methodology is crucial to enhance the teaching-learning process of any academic discipline and to achieve meaningful learning.
- 3) Active teaching is a crucial resource methodology in ludic, especially when working with children, because the world of children is closely linked to play, and through it is easier to arouse their interest in the issues they should study in their curriculum and it is easier to motivate them positively to learning.

This is a didactic material for children between six and seven years old. Using this material in the classroom, the students can improve their logical reasoning and their abstraction capabilities, which facilitate the understanding of the concept of scale, through the link to the concept of size and by using shapes and basic colours. Using this material children can achieve the full conceptual and formal concatenation between the way these children have to work at the beginning of primary education and how they do it at the end of the next level. This results in a perfect adaptation of children to new ways of assimilating the content they must know to get started in understanding the concept of scale. Hence, the material should start to be used at six years, although until eight or nine the child does not hear the term scale, which was phased in, initially, only subliminally.

The learning objectives that students should acquire are:

- Be able to perform different constructions with vertical elevation and identify them with its graphical representation horizontally at different sizes.
- Relate the concept of scale with the concept of size, because the knowledge that children have about the concept of size helps them to understand the concept of scale. The aim is to support new content related to the scale on the cognitive structures linked to it, in order to advance in their understanding.
- Understand that scale reproduction of beings, objects, abstract forms or real territories by various methods corresponding to the representation of these realities with sizes increased or decreased proportionately, without affecting the accuracy of the information.
- Getting to graph various spatial realities at different sizes.

- Develop the ability to understand the abstractions related to this topic through sensory experience.

To achieve these objectives, the activities will be conducted through play, with the slogan "playing with the scale", so that the children perceive them as rewarding tasks, highly motivating. Activities can be done individually or in teams, so that collaboration among members of the group promotes cooperative and solidarity learning. With this idea we design the research we have conducted for the validation of this game. This research showed that:

- 1) The students in the experimental group understand better and faster than students in the control group the principles of relationship that are included in the concept of scale.
- 2) These students learned with a much higher level of motivation than the control group, because doing so through playful activities was highly rewarding.
- 3) The teachers who participated in the research found that this material is a valuable tool to optimize teaching of this topic.