

## **GEOINFORMATION TECHNOLOGY TRANSFER: THE REMOTE SENSING EXAMPLE.**

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**KEY WORDS:** Education, Technology transfer, User requirements, Remote sensing, Image processing.

### **ABSTRACT**

The study shows the conception, realization and results of the didactics remote sensing module applied at the integrated training program developed for the Program of Geoinformation Technology Transfer. This program was a part of the co-operation partnership between the Geoinformation Laboratory (Transport Engineering Department – University of the São Paulo) and the Water Sanitation Company in São Paulo State (SABESP). Considering that the remote sensing topic was only part of hole program the concepts had to be concentrated and comprehensive. The complete program includes 40 themes comprehending a large spectrum from geodesy to specific applications of geoinformation and analysis of water sanitation data. The fundamental concepts about remote sensing treated at the course were principles, basic concepts, and topics on new high resolution sensors and applications. An introduction to digital image processing was also presented. The educational material developed was converted in a didactic CD-ROM media involving a theoretical presentation arranged according to basic concepts and their respective graphical illustrations.

### **1 INTRODUCTION**

Technology teaching deserves an dynamic approach to incorporate the new advances, updating technical skills. The study presents the proposal, the realization and the evaluation of the results in a remote sensing module applied at the training program developed for the Program of Geoinformation Technology Transfer. This program was a part of a co-operative partnership involving the Geoinformation Laboratory (Transport Engineering Department – University of the São Paulo) and the Water Sanitation Company in São Paulo State (SABESP) (The general project concept can be viewed at Rodrigues, 1999). The remote sensing module was just a part of the program and the concepts had to be concentrated and comprehensive.

### **2 PROPOSAL**

The most general proposal of this project was to contribute in the generalization of the Geoprocessing understanding in a public institution, creating conditions to its implementation. The introduction of the geoprocessing technology in an institution, to be profitable deserves the development of technical skills and a general understanding of the new system in the organization. The technology transfer project aimed to prevent problems and to generate the conception of geoprocessing and remote sensing to the people that will not work specially with those techniques, but will be surrounded by them.

As an institutional project, the public attending to the course was from very different skills and from many municipalities in São Paulo State. They were mainly professional involved in urban and environmental, specially hydrology.

It was an informative course, aiming an equilibrium between basic concepts and the approach of many application possibilities. Besides there was the need to present the future trends in the remote sensing technology. Considering the need of updated data and the availability of new orbital platforms with a smaller spatial resolution.

The complete program included 40 themes comprehending a large spectrum from geodesy to specific applications of geoinformation and analysis of water sanitation data. The remote sensing module was presented in 22 classes and 5

Workshops (4 theoretical modules and 1 practical module) of 90 minutes. The fundamental concepts about remote sensing treated at the course were:

- Remote Sensing Principles, including descriptive and conceptual aspects, image generation and characteristics.
- Remote Sensing Topics, including the presentation of sensors and platforms, with examples and topics on new high resolution sensors and applications.
- Introduction to Digital Image Processing, presenting the fundamentals of digital image processing.
- Digital Image Processing, including the main digital analysis, and presenting examples.
- Digital Image Processing Laboratory, including practical exercises.

From the need to a verification on the students understanding and as a way to get closer to their needs, they proposed themes to be worked in the practical activities. From the suggestions received, one was selected to be executed in the laboratory activities.

### 3 EVALUATION

The students realized an evaluation of the classes and the courses according to the following criterion: clear explanation, doubt solving, interaction with the students, knowledge of the subject and support to students participation.

The general comprehension of remote sensing that a member of one institution that is implementing the use of GIS in a wide approach is different than the specialist needs. In this sense, the general presentation to the theoretical concepts and a introductory practical training is a tool to create a favorable environment.

Results from the general evaluation denote that

- Most students felt prepared to the course;
- More than 80% believed that the knowledge achieved could be used in their field;
- About 60% of the students found the course time enough and 30 % found it insufficient.
- A synoptic approach of the area was a positive aspect detached as much as the need for more practical exercises could be conceived.

The result of the students evaluation of the remote sensing modules can be viewed in the Tables 1, 2, 3, 4 and 5.

Table 1: Evaluation - Remote Sensing Principles Class

Remote Sensing Principles	Evaluation (from 1 to 5)
Clear explanation	3,84
Support to students participation	3,52
Doubt solving	3,72
Knowledge of the subject	4,04
Interaction with the students	3,42

Table 2: Evaluation - Remote Sensing Topics Class

Remote Sensing Principles	Evaluation (from 1 to 5)
Clear explanation	4,25
Support to students participation	4,15
Doubt solving	4,25
Knowledge of the subject	4,55
Interaction with the students	4,55

The evaluation of the teachers included the students heterogeneity and the lack of other similar experiences. The development of the course made it possible to obtain certain conclusions :

- The practical classes had a better result than the theoretical ones. The need to solve problems result in more questions and doubts solving;

- The rare documentation on training experiences that can be used as reference;
- The need to separate the students in more homogeneous groups.

Table 3: Evaluation – Introduction to Digital Image Processing

Remote Sensing Principles	Evaluation (from 1 to 5)
Clear explanation	4,15
Support to students participation	4,00
Doubt solving	4,10
Knowledge of the subject	4,40
Interaction with the students	4,10

Table 4: Evaluation – Digital Image Processing

Remote Sensing Principles	Evaluation (from 1 to 5)
Clear explanation	4,15
Support to students participation	4,05
Doubt solving	4,05
Knowledge of the subject	4,60
Interaction with the students	4,20

Table 5: Evaluation - Digital Image Processing Laboratory

Remote Sensing Principles	Evaluation (from 1 to 5)
Clear explanation	4,50
Support to students participation	4,50
Doubt solving	4,45
Knowledge of the subject	4,50
Interaction with the students	4,55

The educational material developed was converted in a didactic CD-ROM media involving a theoretical presentation arranged according to basic concepts and their respective graphical illustrations. The main question treated is the restriction of time for expressing a large amount of concepts and generic principles showing how different data and techniques could be used in specific problems as examples. The use of the products is still to be evaluated.

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