

PHOTOGRAMMETRIC AND REMOTE SENSING EDUCATION IN
BRAZIL

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In Brazil, like in many other countries, exists the formal and informal education in the field of Photogrammetry and Remote Sensing. The informal education has played a very important role in the past and still exerts strong influence on the dissemination of the knowledgement in those fields. Besides the progress that informal education brought in one hand, the distortions of such system on the other hand becomes a barrier frequently difficult to overcome. The formal education also suffer distortion because the total system of education has never been studied and consequently no global proposition was submitted to the authorities in order to racionalize the education.

Informal education exists since the techniques of Geodetic Science have been introduced in Brazil, and its influence is very strong specially in Photogrammetry and Land-surveying. Many self-educated people became owners of progressists companies; founders of instituts and the promoters of formal education. It is easy to proove that at least 90% of the existing organizations were born thanks to the informal education.

Today the informal education plays a role in the preparation of technical operators. Those are prepared in the private companies where rarely regular courses can be offered. Due to personal effort, curiosity and even boldness, some employees learn to operate one or another instrument while working together with a skilled operator. The faults of such a system are evident:

- a) nonintegrated formation, e.g., only part of the process is learned;
- b) distorted formation, e.g., the process of learning is more by acceptance rather than understanding.

Those faults are open-doors for vicious procedures and barriers against technical improvements.

The formal education naturally followed the existing struture for other areas. However, due to the lack of a global planning the distortions appeared.

We will find secondary level courses oriented to land surveying. The greatest faults in such courses are:

- a) the lack of integration with correlated fields such as Photogrammetry, Remote Sensing and Cartography; and
- b) the kack of well prepared teachers and instrumentation for training.

At present the courses for Land-surveyors in university level are in my opinion the reason of the biggest problem because they are completely inadequate and in addition the difficulties they offer against corrective management are severe. They are inadequate because they are restrictively oriented to Land-surveying, and for such purpose only the undergraduate level is too high. Another problem they created was on definition of professional affairs which is established by the Federal Council of Engineering and Architecture (CONFEA). The definition of the professional affairs is made, based on the course syllabus... and they can be made beautiful, but realistic... So the differences in professional rights between the Surveying Engineers and the Cartographic Engineers are microscopic and very subtle in spite of the fact the Cartographic Engineering Programs being realistic from the point of view of the needs and the program actually offered during the lectures.

Programs on Cartographic Engineering are offered by Rio de Janeiro State University, Pernambuco Federal University, Paulista State University, Paraná Federal University and the Military Institute of Engineering in Rio de Janeiro. In addition to the Cartographic Engineering Program, the Paraná Federal University offers also advanced courses in Geodetic Science at the level of Master of Science and Ph.D..

The global analysis of the problem shows clearly the weak points. It becomes evident the necessity to formalize all the levels of education in Geodetic Science as the way to avoid vicious and limited formation of the professionals. Not less important is the need to reorganize the existing programs according to:

- 1) Adequateness to the academic level;
- 2) Needs of the labour market;
- 3) Academic level of the docents;
- 4) Instrumentation; and
- 5) Integration with correlated fields as Geodesy and Cartography.

The different categories of professionals should be:

- 1) TECHNICAL OPERATOR
The person prepared to be capable to operate, adjust and to do prevent maintenance of the instruments.
- 2) CARTOGRAPHIC ENGINEER
The engineer must be prepared to be capable to planning and conducting the job; to analyze results and to take decisions.
- 3) Master of Science (Geodetic Science)
The M.Sc. must be capable to compare and implement technologies and to lecturing.

- 4) The Ph.D.
 The Ph.D. to research and disseminate knowledge.

To achieve such a model, the education in this field in Brazil preferable would have to suffer the following alterations:

- 1) The undergraduate Course in Surveying should:
- a) be transformed in a Cartographic Engineerin Course if:
 - *the labour market allows it;
 - *the accademic level of the docents and instrumentation were appropriate;
 - or
 - b) be eliminated if one of the itens before is not fulfilled (or cannot be fulfilled soon)

2) The secondary level Course in Surveying should: be transformed in Technical Course in Geodetic Science, on the Federal Technical Schools and in cooperation with Universities where programs in Geodetic Science exists.

Such a program should include:

01. Eletronics in Practice
02. Fine Mechanics in Practice
03. Elements of Optics
04. Field Work in Geodesy
05. Field Wosk in Astronomy
06. Field Work in Surveying
07. Photogrammetry in Practice
08. Basics on Photointerpretation
09. Remote Sensing in Practice
10. Elements of Cartography
11. Computers (basics and programing)