

# **Development of a Convenient Curriculum for the Enhancement of Surveying Studies in Morocco**

**Mohammed ESSADIKI, Morocco**

**Key words:** Surveying studies, Education, Curriculum.

## **SUMMARY**

The School of Surveying was established in 1970, and up to 1989, the surveying curriculum was four years study leading to an “Ingénieur d’Application” that means Practical Engineer diploma, which is similar to the bachelor degree. In 1989, regarding the new government and customer needs, the curriculum was reviewed for being six years of studies leading to “Ingénieur d’Etat” diploma equivalent to a master degree in surveying.

Recently, we are in the process of reviewing and reforming our curriculum. This initiative focuses on a new educational profile to be in accordance with the new reform in our Universities and with the international curricula. The duration of studies will be five years, instead of six years. It will be provided on two levels: two basic year studies, and three professional years.

The main objective of this study is a development of a convenient curriculum for the enhancement of surveying studies in morocco, using new technologies and in accordance with the demand and the new reform in our Universities.

# **Development of a Convenient Curriculum for the Enhancement of Surveying Studies in Morocco**

**Mohammed ESSADIKI, Morocco**

## **1. INTRODUCTION**

The education in Surveying is provided within Institute of Agronomy and Veterinary Medicine Hassan II, denoted IAV, which is a polytechnic institute with five schools educating in different fields: the school of Agronomy, the school of veterinary medicine the school of rural engineering, the school of food technology and the school of Surveying.

Recently, we are in the process of reviewing and reforming our curriculum. This initiative focuses on a new educational profile to be in accordance with the new reform in our Universities and with the international curricula.

On the other hand, new technologies are revolutionizing the way we view the world around us and are changing our expectations of environmental information and understanding. The combination of remote sensing and other Geographic Information (GI) technologies, such as global positioning systems (GPS) and Geographic Information Systems (GIS) allows us to know the geographic spatial location of these and other spatial phenomena and how they interact.

As a result of advancements in these geographic information technologies, more spatial information is available now than ever before, more methods for analyzing these data are being developed and disseminated, and our ability to make sense of the spatial data is ever increasing.

To reflect these advancements, the current curriculum needs to be enhanced by updating the techniques we teach students for collecting and analyzing spatial data, and developing course materials that will lead to the full implementation of these new GI technologies in courses across the curriculum.

The main objective of this paper is to highlight the new curriculum for surveying studies in Morocco.

## **2. BACKGROUND**

The School of Surveying in Morocco was established in 1970 and funded within the framework of a Canadian cooperation. From 1970 to 1989, the surveying curriculum was four years study leading to an “Ingénieur d’Application” that means Practical Engineer diploma, which is similar to the bachelor degree. In 1986, regarding the new government and customer needs, the curriculum was reviewed for being 6 years of studies leading to “Ingénieur d’Etat” diploma equivalent to a master degree in surveying.

In order to be in accordance with the new reform in our Universities and with the international curricula (Bologna Declaration), the duration of studies became five years instead of six years, since 2005.

Up to now, more than 800 surveying engineers are graduated from the School of Surveying. More and more, the graduated engineers open their own enterprises (private sector). Otherwise, they work with the state or private companies in various domains (agriculture, roads, cadastre, urbanism, etc.).

Since 1996, the profession of Surveyors is organized under the National Order of Surveyors (ONIGT).

## **2.1 Admission requirements**

Admission to the School of Surveying is open to candidates of “baccalauréat” (High school diploma) from any nationality; priority is given to applicants from Morocco and 10 to 20% from Arab and African Countries.

The selection of candidates is very tough: 400 students only are chosen from 10 000 applications. The duration of the former educational system was six years. The first year is a common year for all students who will choose their preference at the end of the year (agronomy, veterinary medicine, horticulture, food technology, rural genie or surveying).

The School of Surveying accepts around 30 students from the first preparatory year (APESA: Année Préparatoire des Etudes Supérieure en Agronomie) for the second year and a very few students who have DEUG from universities and succeed the Competition Exam. At the third year, around 10 students are received from candidates who passed with success the National Common Competition of the two years preparatory for the engineering schools (Math sup and Math spé).

## **2.2 The former curriculum**

Initially, the School of Surveying has been focused on producing surveyors for public activities with a basic four years program. In order to improve the quality of surveying education and to answer the need in public and private sectors, the education program passed from four to six years since 1986.

Until early 1990s, the education program was more dominated by conventional methods, and was carried out the needs of the agriculture Ministry, in general, and Land registration, cadastral and Cartography Administration, in particular.

Since the mid of 1990s, the demand for Land surveyors was more and more diversified. Moreover, the development of the new technologies in the field of Surveying pushed the School of Surveying to review their programs and curricula, each time it was necessary.

### 3. THE NEW CURRICULUM

The discipline of Surveying has grown rapidly in the last decades. On the other hand, new technologies are revolutionizing the way we view the world around us and are changing our expectations of environmental information and understanding. The combination of remote sensing and other Geographic Information (GI) technologies, such as global positioning systems (GPS) and Geographic Information Systems (GIS) allows us to know the geographic spatial location of these and other spatial phenomena and how they interact. All these technologies are called Geographic Information Science (GIScience) Technologies.

Moreover, since September 2005, the duration of studies in the School of Land Surveying is five years, instead of six years. For these reasons, we started the process of reviewing and reforming our curriculum a few years ago. This initiative focuses on a new educational profile to be in accordance with the new reform in our Universities and with the international curricula. This will be provided on two levels: two basic year studies, and three professional years.

The first basic program is shared with all schools of the IAV institutes. At the end of it, students are required to choose their option according to their desire and ranks. The second basic year is reserved for fundamental courses in mathematics, physics, statistics, electronics, computation, and foreign languages as well as communication.

The three last years of the professional program encompasses courses specifically conceived to meet the requirements of the market. All courses can be divided into seven distinguished axes:

- Geodetic sciences and surveying concerned by all courses in the domain of geodesy and topography (land surveying),
- Cartography that includes all courses used for mapping and photogrammetry,
- GIS and remote sensing with all courses of geographical information systems, database development and design, and remote sensing,
- Cadastre and land systems that contains land consolidation, cadastre, rural and urban land management,
- Computation and adjustment with all courses concerning the geodetic adjustment and computation applied in surveying and mapping,
- Technical and Professional Training that enables students to practice within private or public companies for a period of time varying from two weeks to two months,
- Support subjects that include all courses of legislation and law, economics, business management, ecology, hydrology, and languages.

### 3.1 Methodology

The adopted methodology to review our curriculum was to build on existing resources and to develop a new curriculum using the following approach:

- 1- The first step was the evaluation of the existing curriculum of six years studies, by emerging its weak and strong points.
- 2- The second step was based on a bibliographic research (library and internet), and the development of a new teaching materials that introduce students in diverse disciplines to emerging Geographic Information Science technologies. These teaching materials will aim to give students exposure to, and critical perspectives on, new computer-based technologies for acquiring, managing and visualizing environmental information.
- 3- The third step was the internal discussion with colleagues and the administration of our Institute, mainly on “modules” and “credit” that will be integrated in our curriculum for the first time.
- 4- The fourth step was the evaluation of the draft of the curriculum with faculty members of the Department of Geodesy-Topography, and the Department of Cartography-Photogrammetry of the School of Land Surveying and make modification when it was necessary.
- 5- The fifth step was the evaluation of the curriculum by the National Order of Surveyors which represents the all surveyors in public and private sectors, and Land registration, cadastral and Cartography Administration.
- 6- The sixth step is to organize seminars, in the perspective of giving more explanation, enhancing the curriculum and having more suggestions.

### 3.2 Field works

An important component in the former Surveying Education Program was training and field works. These field and training works allow student to strength the theory and the practical knowledge acquired during their studies. Each year, students have a field work with different aims:

- The first year: students are sent to France for more than two months to practical initiation training in Farms. The student learns how to work individually and it's an opportunity to learn French also.
- The second year: two field works are programmed. The first one which is called “découverte de la nature” lasts 10 days. Groups of ten students are formed and try to discover a rural region with its entire component (geology, topography, ecology, biology, sociology, etc.). The second one is called “Ruralisme”: groups of three students leave for two weeks in very far villages.
- The third year: for two weeks, students are initiated to prepare a surveying project in a given region of Morocco.

- The fourth year: the field work is a professional one; it consists of making a synthesis of various disciplines (geodesy, surveying, photogrammetry, cartography, etc.), it lasts 4 weeks.
- The fifth year: two weeks are spent by students in a Regional Cadastral.
- The beginning of the last year: for two month, students choose a private, public or semi-public sector to practice surveying with real project, to learn management, and how to integrate in team works.

All these training and field works were maintained in the new curriculum Surveying Education Program. The only changes will be the methods of collecting spatial data using the new technologies.

In parallel, a lot of studying visits are organized for students at professional and specialized administration in the field of surveying.

To reinforce the education program, a series of professional seminars are prepared by professionals from private or public sectors, in the purpose of presenting various aspects of the profession.

### **3.3 Research and final projects**

The research activities are divided mainly in three parts:

- Research conducted by students during the last year of studies (the sixth year in the former program);
- Research leading to doctorate diploma;
- Contractual research.

The new program preserves all these three research activities. However, the research conducted by students will be in one semester only. It will be more a practical final project than a fundamental research.

### **3.4 Significance**

The School of Surveying already supports a strong curriculum in Geographic Information Science (GIScience), which lies at the intersection of these geospatial technologies and the concepts and theories relating to their applications. However, techniques for analyzing remotely sensed data and collecting spatial data via GPS are developing rapidly in both the academy and in industry.

In recent years, the School of Surveying has made some important investments in infrastructure that have vastly improved our GIScience curricular offerings. Despite these investments, there still is a missing component in our curriculum.

The new curriculum will allow developing the ability in students to appropriately and critically evaluate environmental data in the process of making personal or professional decisions. The revision of the curriculum will reflect these advancements in order to give our students the tools that allow competing in the job and academic arenas.

The integration of these developments in the application discipline's curriculum and not simply into the disciplines where the basic GIScience is being advanced (i.e., Cartography and Computer Science), could be a great benefit for them.

#### **4. EVALUATION AND DISSEMINATION**

To assess the effectiveness of the new curriculum and the course materials developed, students, faculty members will be subjected to evaluations. This will be anticipated by the assessment of the faculty in the School of Surveying.

Students will be asked to complete course evaluations in the middle and at the end of the term. Faculty Members will be consulted regularly throughout the term and asked to provide appropriate evaluations. The teaching materials will also be evaluated through a series of questionnaires targeted at both the students and faculty.

The faculty questionnaire will solicit the instructor's opinion of the effectiveness of the modules and their impact on student learning, and they will be asked to evaluate how the addition of the new technology changed his/her course.

The organization of seminars will allow to enhance the curriculum and to modify it based on evaluations and suggestions.

#### **5. CONCLUSION**

The new educational profile is done in accordance with the new reform of our Universities and the international curricula, and was built on existing resources.

Moreover, this curriculum is designed to equip graduates to face the challenge of modern Surveying practice, to be aligned with the new developments in the field of surveying and to answer to the need of governmental and non-governmental agencies.

#### **REFERENCES**

Essadiki M. et Tahiri D. (2005) « Projet de restructuration de la formation d'ingénieurs topographes » Filière de Formation en Topographie, IAV, 2005.

Fajemirokun F.A. & Badejo O.T. (2004) « A new curriculum for surveying education in Nigeria » 3rd FIG regional conference, Jakarta, Indonasia, October 2004.

Essadiki M. et Tahiri D. (2003) « Programmes de Formation en Ingénierie Topographie » Filière de Formation en Topographie, IAV, septembre 2003.

## **BIOGRAPHICAL NOTES**

### **Mohammed ESSADIKI**

2001 : PhD Diploma (Docorat d'état) from IAV Hassan II, Rabat, Morocco

1987 : Master of Science Diploma from ITC, Enschede, The Netherlands

1986 : Postgraduate Diploma in Cartography from ITC, Enschede, The Netherlands

1979 : Surveying Engineer Diploma from IAV Hassan II, Rabat, Morocco

1979 up to now: Lecturer and Professor of Land surveying and Cartography at IAV Hassan II

Principal areas of interest: Cartography, GIS and Land Consolidation

### ***Membership***

Membership of the “Ordre National des Géomètres Topographes” of Morocco

Membership of the “Association Nationale des Ingénieurs Topographes” of Morocco

## **CONTACTS**

Dr. Mohammed ESSADIKI

Professor

Institut Agronomique et Vétérinaire Hassan II

Filière de Formation en Topographie

B.P. 6202

Rabat

Morocco

Tel : + 212 37 68 01 80

Fax : + 212 37 77 81 35

Email: [m.essadiki@iav.ac.ma](mailto:m.essadiki@iav.ac.ma)

Web site: [www.iav.ac.ma](http://www.iav.ac.ma)