

# **Human Resources Education in Computing at Simón Bolívar University, Venezuela**

*1972 to 1985*

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**Abstract.** In this work we describe the efforts of the Computing Coordination at Simón Bolívar University, Venezuela, for forming Human Recourses in Computing at graduate and postgraduate levels in the years from 1972 to 1985. We also consider the background given by the Scientific Computer Program at the Calculus Institute, Buenos Aires University, that begun in 1962 and by the Computation Licentiate Program at Science Faculty, Venezuelan Central University, that begun in 1967. We close considering the impact that programs and professors from Simón Bolívar University have at national and regional levels.

## **1. Introduction**

In this work, we want to emphasize the importance that the studies of Computing, designed and implemented in the Simón Bolívar University (USB), Venezuela, had for the development of the profession in Venezuela and the impact and influence that it had in those years in South American countries of Hispanic speech.

We will discuss the efforts at graduate and postgraduate levels in the years from 1972 to 1985. We select these years because the programs begun in 1972 at USB and stabilized with very good results in the middle 1980s, hence 1985.

We begin considering the background given by the Scientific Computer<sup>1</sup> Program at the Calculus Institute<sup>2</sup> (IC-UBA), Buenos Aires University, that started in 1962, but was official in 1964, and by the Computation Licentiate<sup>3</sup> Program at Science Faculty, Venezuelan Central University (UCV), that begun in 1967. We also consider the impact that the programs and professors from USB had at national and at regional levels such as at UCV, Guyana University, Venezuela, Latin-American Center for Informatics Studies<sup>4</sup> (CLEI), and Latin-American Informatics School<sup>5</sup> (ESLAI). We wish to emphasize that, unlike historians, the authors of this paper were active actors of this history.

## 2. Background

In this section, we give the facts that were at the origin of the studies in informatics at the USB.

### 2.1 Informatics at the Venezuelan Central University, 1960–1965

In 1960, almost all the computing facilities available in Venezuela belong to the oil industry. However, at the Faculty of Science in the Venezuelan Central University (UCV) (Caracas, Venezuela) there was some computing related activity, because there was a IBM 1620 installed since 1960 in the newly formed Department of “Numerical Calculus and Data Processing” (CNDP–UCV). It was dedicated to give support to some engineering activities and science research. The Department offered short programming courses but had no university educational project until 1966. At that moment, the Science Faculty received more than two hundred professors from Argentina.

### 2.2 The long sticks night

The IC–UBA, where the University of Buenos Aires computing facility was installed, was a center giving support to the degree of “Computador Científico” offered by the University since 1962<sup>6</sup>. The Argentinean University crisis occurred in 1966 when the Argentinean tyrannical government decided on the intervention of the universities. In particular, the Science Faculty was violently invaded by the army. This act was called *The Long Sticks Night* and it produced the resignation of most of the professors and technicians.

<sup>1</sup> Computador Científico

<sup>2</sup> Instituto de Cálculo

<sup>3</sup> Licenciado en Computación

<sup>4</sup> Centro Latinoamericano de Estudios en Informática

<sup>5</sup> Escuela Superior Latino Americana de Informática

<sup>6</sup> Was officially approved in 1964 and in the same year three students obtained their degrees.

The IC–UBA practically disappeared. Nicolás Babini refers to the fact that the process of building a corps of teachers and researchers was badly suspended by the massive group of people resigning to the University (see Babini (2003)).

In the same work Babini also signals that the winners were the universities that received the resigning people. Some of them where Asunción del Paraguay (Universidad Católica), Montevideo (Universidad de la República) y Caracas (Universidad Central de Venezuela) among others. Several of these professors were captured by the CNDP–UCV, allowing the expansion of human resources and promoting the offering of a degree in computer science.

### **2.3 Informatics at the Central University, Caracas, Venezuela, 1966–1975**

With the reinforced faculty, the CNDP–UCV began to offer in 1967 a scientific oriented degree named the “Licenciatura en Computación”<sup>7</sup>. Even if the pensum was programmed in 1966, using the experience of the IC–UBA, it was very similar to the recommendations of *Curriculum 68* (Atchison, Conte, Hamblen, Hull, Keenan, Kehl, McCluskey, Navarro, Rheinboldt, Schweppe, Viavant, and David M. Young (1968)).

The degree was offered by the Mathematics and Physics School, based on the Department of CNDP–UCV, but soon, as the degree became more demanded by students, the department became the “Computing Department” under the direction of Manuel Bemporad (see Bemporad (1989)). Afterward a School of Computing was created in the Faculty of Science.

The program was highly demanded, reaching in 1975 to a peak of more than 2000 students (Venezuelan population at the time was over 12 million inhabitants (see Faces-ULA)). But the students were more interested in obtaining a professional degree, rather than a science degree. In general, they start working after a couple of semesters of studying because of the rapidly expanding of computer personal demand.

Meanwhile the CNDP–UCV, tried to convince the Engineering Faculty at the Central University to start a program in Computing, closer to an engineering discipline, but the Engineering Faculty was afraid of the volume of students in the discipline. The CNDP–UCV also promoted in the Economics Faculty programs related to computing. Nevertheless, both efforts failed. From 1958, the Faculty of Sciences of the UCV, saw the population of registered students grow about 10.5 times, passing from the position 8th to 3rd in number of enrolled students among the faculties in the University (see Méndez (2001)), mainly by students enrolling in computer science.

<sup>7</sup> Was officially approved in 1968

However, unfortunately there were very few graduates. The main reason was that Caldera's government closed the UCV for a year and the students went to the labor market and were lost for the university. Another problem was the amount of time taken by the students in writing their thesis and most of them never finished the degree.

### **3. Informatics at the Simón Bolívar University Caracas, Venezuela (USB)**

The computing studies at the USB had three differentiable periods. In the first period, the undergraduate degree was very close to the one offered by the CNDP-UCV and there was a recycling master program. The second period corresponded to the establishment of an innovative Computer Engineering program and a Computer Science master program. The last one corresponded to the Faculty consolidation and program diversification.

#### **3.1 Informatics at the USB 1972–1975**

The Simón Bolívar University (USB) was created in 1967 as a Technological Institute and started its activities in January 1970 (USB) and in 1972 there where offered degrees in informatics (graduate and undergraduate degrees). The degrees in computing started in 1972 with the names of "Master in Computer Science" and "License Diploma in Computing", respectively. This university received an important group of engineering professors from the Central University that was undergoing a "renovation movement", movement that ended in 1969 with an intervention of the university by the government (see Méndez (2001)).

At that time, the only graduate degrees specialized in computers where degrees offered to graduates in other disciplines like physics, mathematics and engineering. These degrees were a kind of way to change professional orientation. The initial graduate program at the USB was of this kind.

In 1974, the undergraduate degree changed its name to "Computer Engineer", changing also the program orientation viewing the profession as a new engineering branch. This change was easily implemented due to the fact that the Simón Bolívar University has the matrix organizational structure (see USB).

### **3.2 Informatics at the USB 76–79**

#### **3.2.1 Engineering undergraduate program**

In 1976, a group of 44 students obtained their degree in computing engineering. At that year, the curricula suffered a major restructuring. One of the main reasons for these was that the changes in the area had such a speed that it was mandatory to give students a solid basic preparation that allows to rapid learning of new techniques diminishing the emphasis in teaching techniques.

The USB Computing Coordination felt that there was a need for having a very solid basic formation, allowing the professional to be able to quickly adapt to technological changes, for that the new version emphasized on finite structures as a requirement programming courses. These believe was sustained against the opinion of the people on the mayor computing centers that hired our graduates (see Aráoz (1989)).

With this in mind, during 1976, an important adjustment of pensa was made and it had great impact in the success of the later generations. This program is still valid with small modifications.

The important changes were:

1. Algebra and logic moved to the second year courses (first year was common to all students). This changes where looking to set these courses as the basic ones for any other computer course. Especially logic and algebraic structures were required for the first course that teach how to program.
2. More emphasis was set on algorithm analysis and data structures, replacing the data processing courses and graph theory (in a math oriented style).
3. A group of elective courses became mandatory: operating systems, comparative study of programming languages, and computer architecture.
4. In this program the students select a trio of specialized subjects from programming languages, operating systems, computer architecture, information system and teleprocessing, and they ought to take three courses (3 terms = 1 year) in each branch. This allows specializations at the undergraduate level.
5. Every computer course has a 4-hour theory and 3-hour laboratory per week, these laboratory give appropriate practice to students.
6. Replace the thesis by a half time, three-term project controlled on time and scope. This change reduced the graduation span.

The main idea behind the program changes was to give a solid basic formation in order to help them to be prepared to cope with the rapid changes in the discipline. The pensa changes set in 1976 where mainly driven by the changes suffered by the

discipline since 1966. A very similar style is seen in the *Curriculum 78* of the ACM (see Austing, Barnes, Bonnette, Engel, and Stokes (1979); Aráoz (1989)).

### 3.2.2 Postgraduate studies

At the graduate level the changes were the following:

1. Turn the degree into a real postgraduate one in computing with a research orientation, asking the students entering the program to have a degree in computing (or take remedial courses). The recycling task was left to other degrees (Like the one in system Engineering).
2. The course level changed drastically. All the students were required to take a group of basic courses:
  - Computability Theory
  - Computational Mathematics
  - Theory of Algorithms

Afterward a group of specialized courses, preparing the student for writing the thesis.

The areas were selected among the most demanded ones and those having a research group backing it. The areas where at the time:

- Computer graphics
- Optimization
- Numerical Analysis
- Algebraic Calculus
- Language Theory
- Computer Networks
- Operating systems

3. At the same time, the work started to reinforce the research groups to back up the Master program. Best students were sent to pursue doctoral studies in universities having agreements with the USB, mostly in USA and France.

While part of the faculty studied abroad, a “Project of Doctoral Studies” was developed, but was not implemented until the rest of the disciplines offered by the university developed doctoral studies.

### 3.3 Informatics at the USB 80–85

At this period the USB Computing Faculty has consolidated, being the large computer science Ph.D. group in Spanish–America, almost surely. The reason for this was that the USB Computing Coordination hoped to open a doctoral program in 1980 and had prepared for this for four years. However, the USB had no doctoral programs at that time, and therefore did not approve it. Nevertheless, most of the Ph.D. people in computer sciences that returned to the country worked in the USB and in addition, the Faculty came from ten different countries.

The USB Computing Coordination had strong ties with Computing Schools in USA, Europe and South America. This marked that in 1979 when the CLEI<sup>8</sup> was founded in Chile the only group (outside Chile) that was prepared for organizing a Latin-American Conference, with pre-published proceedings, in one year was the USB Computing Coordination. Other countries demanded two years.

In this period, the USB Computing Coordination started developing the concept of “Software Workshop”, as a way to have an activity longer than term laboratories. This was inspired in the “Architecture Design Workshops”. This concept was used in other centers.

## **4. Outside Impact**

### **4.1 Impact on other universities in Venezuela**

Most of the Computing Programs, either Engineering or Licentiate, created in Venezuela have a strong influence from the USB graduates and faculty. The CNDP-UCV formed its instructors<sup>9</sup> sending them to the USB Computer Science Master Program.

The University of Guyana, Venezuela, asked the USB Computing Coordination to design its computing engineering program. Here and in ESLAI (Babini (2003); Atchison, Conte, Hamblen, Hull, Keenan, Kehl, McCluskey, Navarro, Rheinboldt, Schweppe, Viavant, and David M. Young (1968)) we implemented the idea of the “software workshop”. Ours graduates and faculty worked in the careers at The Andean University (Mérida), Metropolitan University (Caracas), Orient University (Cumaná-Margarita), among others.

### **4.2 Impact to other Latin American countries**

During these years, the developing of Computer Science and Engineering Curricula and human resources formation at the USB was a very successful experience that has an important impact in the developing of the area in Latin America. The USB Computing Coordination actively participate in helping the computing programs in Latin-America, main contributions were:

- Founders of CLEI and organization of Panel 80.
- Design, teaching, direction and advising of ESLAI<sup>10</sup>. This was a very successful school organized by the Argentinean Government in 1984.

<sup>8</sup> Centro Latinoamericano de Estudios en Informática

<sup>9</sup> First level of teachers

<sup>10</sup> Escuela Superior Latino Americana de Informática

- Design of the engineering, master and doctoral pensa for the University of the Republic (Uruguay) and evaluation of the Uruguayan computing research system at Uruguay.
- Evaluation and advising of the UNESCO proposal for Computing Curricula in Latin America in 1976.
- Congress presidency and advising in computing to several Latin American countries.

## **5. Final Remarks**

In this paper, we have describes the three stages that underwent the developing of the informatics curricula at the USB until its stabilization. After 1985 doctoral studies were added to the graduate level, as the master program continuation. However, there are still missing postgraduate programs with a professional orientation and also recycling and update programs.

At the undergraduate level the curricula is almost the same, having minor changes due to new technologies. Given that for many years the student admission to the engineering program had a quota of one hundred students per year, the computer engineering undergraduate population accounts for about the 10% of the six or seven thousand undergraduate students at the USB.

The population that obtained the computer engineering degree until 2001, according to USB was about 2600, out 16500 obtaining a university degree at the USB. Graduates were easily absorbed by the industry (in Venezuela and abroad) due to their rapid adaptation to technological changes and the short period needed to become productive. We believe that solid basic formation is still a valid paradigm for the informatics' curricula design.

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