

# Teaching Computer Science in Nicaragua

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The second half of 1986 we spent in Managua, the capital of Nicaragua, teaching computer science at the *Universidad Nacional de Ingenieria*. In the following we relate some of our experiences.

## COMPUTERS IN A DEVELOPING COUNTRY

Nicaragua is a poor, underdeveloped country with an economy severely crippled by a never ending war. Why would a country like that need computers? The person who is going to give a meaningful answer to that question should know about computers, their possibilities, their limitations, their pitfalls, their costs. He should also know about Nicaragua, the structure of its society, the mentality of its people. In short, it should be a Nicaraguan computer specialist. These, however, hardly exist.

Why is the question important? Why can't it just be left unanswered until more pressing problems have been solved? Twenty years ago in the Netherlands we did not have much of an idea what to do with computers (some would argue that we still don't) nor did we have sufficient specialists to manage their introduction and yet with trial and error but without any major disasters an information society has slowly developed. Why couldn't Nicaragua follow a similar course? There are two important differences: poverty and the low price of microcomputers.

Poverty makes a developing society very fragile: its resources are so scarce that no extras are available when anything goes wrong. The mishaps that inevitably accompany the introduction of computers can therefore have devastating effects on the society as a whole. If, for instance, the only refinery in the country suspends production for a week the effects can be felt all over the country.

On the other hand, the low price of micro computers and the presence of many western 'internacionalistas' accustomed to the convenience of a computer on their desk top, have caused an explosive growth in the number of computers in the country. (It more than doubled in the last two years.) Like people here some twenty years ago, Nicaraguans cannot wait to have the computer

solve all their problems. Local know-how is urgently needed to prevent unrealistic assumptions, misuse of scarce resources and a growing dependence on foreign technology and expertise.

#### THE UNIVERSITY

A similar shortage of trained specialists can be felt in other technical disciplines as well. This is usually the case in a developing country, but it is even more acute in Nicaragua, because after the revolution in 1979 ('El Trionfo' as they say in Nicaragua) most of the technical specialists chose to look for a well paying job in the U.S.A. rather than await their fate under a socialist-leaning government. This government soon decided to concentrate all higher technical training in a new technical university called the *Universidad Nacional de Ingenieria* or *UNI* for short. Some departments (e.g. architecture or industrial engineering) came from one of the other two universities, others (e.g. the computer science department) were newly created.

Working at the UNI makes one accustomed to scarcity: there is a shortage of everything except students. Most apparent to the casual visitor is the shortage of space. The university is housed in a former high school that was for the greater part destroyed by the 1972 earthquake, which wiped out most of Managua's center. Most of the university grounds are ruins. The parts that have been rebuilt serve several functions simultaneously. For instance, the room of twenty square meter we worked in is the office for 8 teachers, the library for students and staff, the room for meetings and sometimes serves as class room. A main attraction of this room is that it has a functioning air conditioner (if there is no power failure), which adds to the noise level as well as to the number of casual visitors. If a discussion becomes too heated (this is Latin America) people are sometimes asked to continue their discussion outside. There, in the corridors, students hold their meetings and study, usually in groups.

Classes are sometimes taught in the corridors or in make-shift class rooms in the ruins. The government has recently allocated some construction materials (very hard to come by) to the university to build class rooms: two rows of concrete bricks, a roof of corrugated iron and partitions of plywood. Part of the partitions are painted so they can serve as some sort of blackboard. There are neither window panes nor doors; the wind blows in freely (a good thing in such a hot country) and passers-by often stop and listen for a few minutes.

Furniture and supplies are hard to get. It is normal to share your desk: if you find yours occupied in the morning you try and find an empty chair and work from your lap. A blackboard eraser is a treasure that you do not easily lend out. There is no money to make copies or print course notes. An imported text book costs the equivalent of a monthly salary, far beyond what the average student can afford.

The most pressing shortage in the university is that of competent teachers. After the revolution many of the university's teachers either left the country or were called to higher posts. The present mayor of Managua, for example, was a highly esteemed physics professor. These vacancies had to be filled by

people who lack the necessary background to have a full grasp of the material they are teaching. Consequently, many of these teachers do not like questions and their classes are akin to a copying machine: the teacher merely dictates the course notes to the students. The average exam only tests the ability to reproduce these notes by heart. When we announced that ours would be open-book exams we caused some panic among the students: understanding would be tested and that requires a way of studying they were not accustomed to.

The official goal is that eight years from now all classes are taught by competent Nicaraguan teachers. In the mean time, most teachers are foreigners of many different nationalities. Most prominent are the Latin Americans, especially Cubans, but also sympathizers from Chile, Peru, Guatemala etc. A few are North Americans and the rest comes from a West European or a socialist country (mostly Russians and East Germans).

#### THE COMPUTER SCIENCE DEPARTMENT

The Computer Science Department at the UNI is virtually a creation of its current director, a West German formerly affiliated at GMD. He selected the students that were going to be the future teachers, organized the construction material to house the department, and most important, he organized an extensive support network in Germany, Switzerland, and the U.K., that has kept up a steady, although never sufficient, inflow of equipment and supplies. So far five microcomputers, three printers, 600 books and a small, but reasonably equipped, hardware repair shop have been donated.

The main task of the department is teaching. In the first two years the computer science majors follow a general curriculum, attaining a level roughly comparable to that of a European high school. In the next four years they follow a somewhat simplified version of the average computer science curriculum in Western Europe. The department also teaches an introductory computing course to students of other careers. These programming courses used to be taught exclusively from the blackboard. Now students flock around one of the donated micros in groups of eight. It is fun to witness their excitement when they have succeeded in running their first program, but, with some 500 students every year, it constitutes a major demand on the department's resources.

An important task of the department is consultancy. It happens more and more often that a foreign aid project donates a microcomputer to some Nicaraguan institution. The people there often run into problems after the foreign experts have left. Lately, these people are finding their way to the department for advice. This gives the students an invaluable insight into the kind of problems they will likely have to deal with in their careers.

#### THE STUDENTS

Admission to the university is based on the results of an exam, but favors students from agricultural areas and from poor families. The tuition fee (US dollar 0.40 a year) is affordable for even the poorest people. Financial support, however, scarcely exists and few families can afford to pay the living expenses of their children when they go to university. Most students, therefore, still

come from the urban middle class and combine their study with a full time job. Consequently, courses are usually taught at night. The admission policy does not favor women, nor does it need to: they already constitute more than half of the students. This high proportion of women (remember that this is a technical university) is largely due to the war: many men of this age are in the army or have left the country to avoid being drafted. The latter seems to occur rather frequently in the middle class.

Eventually, the annual inflow of computer science majors will be some 75 students. Now 25 are in their third or fourth year and half of them are employed by the university: if they resist the opportunities offered by the private sector they will be the teachers of the next generations. The students we had were bright and in theory they knew a lot; we have seen course notes of mathematics courses from the first two years and the range of subjects was impressive. The level of understanding they had attained was, however, very low: things we had to explain ranged from the meaning of 'if-and-only-if' to how to calculate the number of microseconds in a millisecond.

Nearly all of the students worked very hard. Some came in at 8 a.m. worked until 6 p.m. and then followed classes till 9:30. In the weekends they often came together to study in groups. Many of them already have a considerable teaching load: they teach the introductory course or one of the courses they received the year before. The brightest student even taught a brand new course, learning the material from a book while teaching it to the other students.



*The shack where the university staff can get a hot lunch consisting of rice, beans and sometimes meat. The political slogan commemorates the foundation of the Sandinista party 25 years ago by Carlos Fonseca. It reads: 'Carlos, 25 years later: here surrenders nobody'.*

## OUR WORK

Our main task was designing and teaching computer science courses for the third and fourth year. The courses we worked on were called (to give you a flavor of Spanish computer jargon): *Sistemas Operativos*, *Electronica Digital*, *Lenguajes Formales* and *Organizaci3n de Computadoras*. We wrote course notes in close cooperation with the student who is going to teach the course next year: we wrote a first version that resembled Spanish, she wrote a second version in real Spanish, which we finally checked to see if she had correctly understood the material.

Usually, students can read some English, but practically none of them can speak or understand it. Consequently, we had to teach in Spanish. We had studied Spanish for about a year before going to Nicaragua, and that turned out to be barely sufficient. In the first month we often had to fumble for words; later this language barrier became much less severe. Preparing the course notes beforehand helped enormously to gather the necessary vocabulary. However, inventing a nice example during the lecture continued to be hazardous and often we had trouble understanding a question.

Despite this language handicap, we felt highly appreciated and we have enjoyed our work tremendously. The scarcity created many problems but also a pioneer-like quality, that combined with all the youthful enthusiasm gave a unique atmosphere of hope, progress, and a strong sense of a new beginning. In Nicaragua they like to call it the revolutionary spirit.

## POLITICS

Nicaragua does not have a democracy of the kind we are accustomed to in Western Europe. Political parties with strong ties to the former Somoza regime are not allowed. There is no freedom of press: television and radio is government controlled and the only opposition newspaper was closed shortly after we arrived. The Sandinista party is in power and there is no doubt they intend to keep it that way. Yet, within these limits functions a democracy healthier than in most of Central America: the elections were widely considered fair and in the parliament there is a genuine debate. We have not seen any sign of political repression. The police was the friendliest and most polite we have ever experienced. Nobody seemed to be afraid to express discontent: people complain as openly and as frequently as in any western country. Nicaragua claims to have one of the best functioning and most liberal correctional systems in Latin America. We visited prisons and were impressed by their facilities and the relaxed atmosphere.

The war takes a terrible toll. Dozens of people are killed every day. The army has been able to confine the war to the mountainous regions in the North and the East, so people in Managua are not in danger. But even there the war makes itself felt every day: a machine gun is as normal as a bicycle in Amsterdam. In the streets you see quite a few eighteen year old boys in wheel chairs. Quite a few people we talked to, among them some of our students, had lost a close relative in the war. The victims are shown on television and in the newspapers.

Support for the Sandinistas is a lot less than it was directly after the revolution, but hardly anybody sees the contras as a viable alternative. Unless the U.S.A. sends its marines to Nicaragua for a full-scale invasion (as they have done sixty years ago) a military victory for the contras is out of the question. The war and the US boycott, however, slowly bleed the country to death. The inflation rate is 700 %. Prices rise every week, but in the 6 months that we were there the government salaries were not adjusted. Consequently, our salary dropped from 100 to 40 US dollar a month. Not a major problem for us, but for Nicaraguans it is disastrous. Basic commodities like rice, beans, oil or soap are hard to come by. Since salaries in the private sector are two to five times higher than those of the state, staying in a government job is a sacrifice that less and less people can afford. Many of them start spending part of their time marketeering on the black market, which brings productivity down even further.

#### CONCLUSION

In spite of these problems, most Nicaraguans have not given up. They are proud to have thrown out Somoza and they are determined to defend what they have gained. The blessings of the revolution may not come as easily as they once thought, they keep working on it with an incredible commitment. If you would like to share in that and you are able to teach computer science courses in Spanish for a minimum of one semester, we can heartily recommend the UNI as a most inspiring and gratifying work environment. We will be glad to act as intermediaries.