Science for Nicaragua Newsletter

Produced by the Nicaragua Committee of Science for the People

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Science for Nicaragua Update

by Michael Harris
SftP Nicaragua Committee

January 1987 marks the first anniversary of the SftP delegation to Nicaragua. Fascinated by what we had learned about Nicaragua's experiment in making science responsive to the needs of a developing country, and concerned that our country's foreign policy was interfering with that experiment, seven of us visited Managua in order to start a program of cooperation with Nicaraguan universities.

One year later, we can say with confidence that our project addresses a definite need here as well as in Nicaragua. We have received close to 200 inquiries from scientists hoping to teach in Nicaragua. Donations from nearly 100 professors from the Boston area and elsewhere helped our project get off the ground and have provided the means to send books and magazines to Nicaraguan university libraries. And we have come into contact with hundreds of other U.S. citizens -- doctors, artists, machinists, community activists, as well as academics -- who are also developing cooperative projects with their Nicaraguan counterparts as an alternative to our government's policies.

Science for Nicaragua is pleased to serve as the bridge between Nicaraguan universities and their friends in the U.S. This newsletter will keep these friends informed of our activities and of developments in Nicaraguan higher education. We hope it can also provide a channel to publicize the efforts of the many other individuals and committees within the academic community working with Nicaragua, and to communicate some of the excitement all of us feel at sharing in the shaping of an educational system whose openness and willingness to experiment have few parallels in the Third World.

The Convenios

On the basis of the experience of the first four participants, SftP and the Nicaraguan National Council of Higher Education (CNES) drafted a *Convenio de Colaboración*. This *Convenio*, signed in Managua in October 1986 by the Vice President Vladimir Cordero Ardila of CNES and Robert Van Buskirk of SftP, establishes the basis for our future cooperation "in order to promote the development of scientific education in Nicaraguan universities and to promote communication and interchange between the academic and educational communities of the two countries." This cooperation will be primarily, but not exclusively, in the areas of agricultural sciences, medical sciences, technology, natural sciences, and science education.

SftP has also signed a similar agreement with the UNI, Nicaragua's National Engineering University.

Donations of Reference Materials

Nicaragua's ambition to provide students with a scientific education as complete and rigorous as in the developed countries faces many material obstacles, but none is more serious than the nearly total absence of up-to-date reference materials. Nicaragua's situation combines the disadvantages facing all developing countries with the extraordinary hardships imposed by the Contra war and the U.S. economic boycott. As a result, the little hard currency Nicaragua obtains through the export of agricultural products is used almost exclusively for the simple purpose of survival. Expensive scientific books and journals can only be provided by gifts from abroad.

Our Convenios with CNES and the UNI commit SftP to provide educational and reference materials, as well as laboratory equipment, to Nicaraguan universities. A campaign carried out last spring at several universities in the Boston area brought us almost $2000 for this purpose. Some of this money has already been used to provide subscriptions to several civil engineering and mathematics journals, as well as to buy reference books for the courses taught by our instructors.

Last August, physicist David Chyba donated an enormous quantity of scientific magazines to our project. The donation includes 10-20 years worth of back issues of such popular periodicals as *Scientific American*, *Journal of Chemical Education*, *American Journal of Physics*, and *Sky and Telescope*. If you are interested in making a similar donation, we may be able to arrange delivery to Nicaragua.

SftP in Nicaragua

The first team of SftP instructors will soon be back in the United States. It is largely due to their efforts that we now have a functioning program, and we owe them a great debt of thanks. In the order of their arival in Managua, they are:

Wally Elliott, 34, an electrical engineer from Boston, MA. Wally taught digital electronics at the UNI.

Barbara Kritt, 29, a graduate student in sociology at the University of Michigan, taught statistics for one semester at UNAN-Managua (The National Autonomous University of Nicaragua). She spent the second semester working on demographic studies with INIES, the National Economic and Social Research Institute.

Manuel Toledo, 29, an electrical engineer from San Juan, Puerto Rico, taught microcomputers and digital electronics at the UNI, where he participated in the administration of the Department of Electronic Engineering.

Donna Perdue, 27, a Cornell University graduate student in plant physiology, spent a single semester training the professional staff of the School of Ecology at the UCA (Central American University). Her class also included students from the National Herbarium and the Department of Natural Resources.

Wally Elliott's experience at UNI is described in detail in this issue of the newsletter; we hope to print reports from the other participants in future issues.

Seven more scientists -- two physicists, an economist, a zoologist, a physiologist, a hydrologist, and an agricultural economist -- have already found positions in Nicaragua for the semester beginning in March. Looking further into the future, we have already received 12 serious applications to begin work in August of 1987.

Please read this section

Our project has grown much faster than any of us anticipated. That so many American professionals are willing to spend an entire year under extremely difficult conditions in order to support their Nicaraguan colleagues is tremendously encouraging. But the growing demand for teaching positions in Nicaragua threatens to overwhelm SftP's limited resources.

Each instructor we send costs us roughly $150 per month. That comes to $1500 for a ten-month academic year, or 5-7% of salaries for comparable positions in the U.S. A timely grant from the New England Biolabs Corporation has guaranteed support for the seven candidates scheduled to start teaching next March, and we can easily maintain our project at this level. With your help we can do much more.

Our second major fundraising campaign began in November 1986. Our major source of funds is the community of scientists and educators in the United States, many of whom share with us the desire for peace in Central America. During the next six months, our supporters on campuses around the country will be asking their colleagues, students, and professors for contributions to help us expand our program. We are also calling on our friends to support us in one of the following ways:

* **By making a financial contribution.** Some readers of this newsletter have already made substantial donations to this program. We ask that you consider giving once again. Others of you are receiving this newsletter because of your previous interest in teaching in Nicaragua. Although most of you have decided that you cannot teach in Nicaragua at this time, many others are ready to go down as soon as we can assure their living expenses.

* **By spreading the word about our program.** We see our work as a legitimate alternative to our country's destructive policies in Central America, and we think our colleagues should know about it. We would like to publish articles about our program in campus newspapers, discuss it on radio broadcasts, and hold public meetings to explain what we are doing. Returning participants in our program are an incomparable source of information about higher education, politics, and everyday life in Nicaragua, and they are eager to speak to college audiences about their experiences.

* **By working on our fundraising campaign.** Our first campus fundraising campaign was phenomenally successful. Ten hours of work by one or two people can net between $300 and $1500, depending on the size of the college. Plans are in the works to take this campaign to 15 more campuses this winter. To reach our goal we'll need to find sympathetic professors and students at 15-25 additional schools. Our network is especially weak in the Southeast, Midwest, and southern California.

Thank you for your support.

Announcements

* **Managua Conference on Women in Science** * The U.S.-based Kovalevskaia Fund, together with CONAPRO (The National Confederation of Professionals), is sponsoring a conference on women in science, technology and medicine in developing countries in Managua, August 24-28, 1987. Papers presented will discuss the experiences, prospects, and strategies of women in science in developing countries, with a focus on women in Central America.

The Kovalevskaia Fund is "a small nonprofit foundation whose purpose is to encourage women in science and technology in developing countries. It is named after the Russian mathematician, feminist, and socialist Sofia V. Kovalevskaia (1850-1891)." The Kovalevskaia Fund provided travel grants allowing Nicaraguan mathematicians to participate in the 1986 International Congress of Mathematicians, held in Berkeley, CA last August, and has also established an annual $1000 Kovalevskaia prize to be awarded to each of two Nicaraguan women in science.

The registration fee for the Managua conference is $50. Inexpensive accomodations in Managua will be found for all registered participants. The organizers are asking participants to register by February 28. Registration materials and further information on the conference are available from Prof. Ann Hibner Koblitz, Dept. of History, Wellesley College, Wellesley, MA 02181.

* **Science Teacher Training** * Victor López-Tosado of the Nicaragua Committee of SftP will be in Nicaragua during the first three weeks of January 1987. In addition to evaluating the first year of our program of cooperation with the universities, Dr. López-Tosado will begin to organize a new component of the program: the training of high school science teachers. To this end he will be meeting with officials of CNES, the Nicaraguan Ministry of Education, and UNAN-Managua, continuing discussions initiated during the visit of the SftP delegation in January 1986.

Dr. López-Tosado, a specialist in science and technology education at the University of Massachusetts at Boston, will also be studying the feasibility of the use of new technologies, such as computer and video, to improve the quality of science teaching in Nicaraguan universities.

* **Media Outreach** * Freelance writer Rob Wilson of Cambridge, MA recently visited Nicaragua with the objective of obtaining media coverage for the work of SftP and tecNICA. Articles generated by his visit should be appearing shortly in newspapers around the country. Please send us clippings from articles referring to our project!

The Berkeley-based group tecNICA has sent more than 200

technical experts to work on short-term projects in Nicaragua, and has chapters nationwide. For more information, call (415)-848-0292. Portions of Rob's report will be published in our next newsletter.

Materials Received

The following is a partial list of documents provided to us by CNES and the Nicaraguan universities. These documents, some of which will be reviewed in future issues of the Science for Nicaragua Newsletter, offer valuable insight into the process of creating Nicaragua's new system of higher education. We will be happy to provide copies of these materials at cost.

All documents are in Spanish, unless otherwise noted.

Universidad Nacional de Ingeniería "Simón Bolívar", Fundamentación y Propuestas de Desarrollo, Nov. 1984 (Founding document of UNI), 170 pp.

IV Jornada universitaria de desarrollo científico, Guía para la elaboración del protocolo, ejecución y redacción del informe final de las investigaciones científico-técnicas, CNES, Dirección de investigación y postgrado, June 1985, 7 pp.

Reglamento de la jornada universitaria de desarrollo científico, CNES (no date), 14 pp.

Formación del estudiante universitario a través del trabajo científico-docente, CNES, Dirección de investigación y postgrado, 1986 (discussion of science education and the Nicaraguan revolution), 12 pp.

"Gaceta" of the UNI, first and second issues (1985/86), 6 pp. ea.

Sistema de superación de docentes de la educación superior, CNES, August 20, 1986.

Teaching electronics in Nicaragua

by Wally Elliott

The digital design equations I had written on the blackboard were the same any undergraduate electrical engineering class in the U.S. might be studying. That's where any similarity with my U.S. classroom experience ended. As I faced my students I also faced an aerial view of the UNI (National Engineering University) below. The rear wall of our second story classroom was damaged in the 1972 earthquake, and has yet to be reconstructed. Stepping out of the classroom one had to avoid a hole in the floor two feet in diameter. (My students had actually chosen the room due its being better ventilated than many.) Everyone shared such daily reminders of the earthquake, the vivid memories of the civil war, and the constant turmoil caused by the assault on Nicaragua's borders.

The course was Digital Electronics 1, which is usually a junior level course in the U.S. After my first few days of teaching I was convinced there was something wrong with the syllabus I'd been given. Twelve of the students --exactly half-- had already taken Microcomputers 1, for which Digital Electronics is usually a prerequisite. These twelve made up the 1986 graduating class in electronic engineering, and I could see they had already learned the material. The other twelve were electrical engineering students, interested in things like power generation and transmission, and they were were having a lot of trouble keeping up.

Of course there was a simple explanation for this confusion. The UNI doesn't have professors for every course every year. Last year they had a vistor who could teach Microcomputers 1, and they didn't want to lose the opportunity to offer the course.

Fortunately, Manuel Toledo, another SftP project participant, was also teaching electronics at the UNI. We easily convinced the heads of the electrical and electronic engineering departments to split my course in two. Manuel would teach basic digital electronics to the electrical engineering students, and I would design a more advanced course as a sequel to Microcomputers 1 for the electronics majors.

A syllabus specially designed

Since my students had already studied Boolean algebra and truth tables, we jumped straight into designing digital circuitry using electronic logic gates. Then we spent a lot of time talking about design reduction theory. The textbook -- a Spanish translation of a standard U.S. text, of which the UCA (Central American University) happened to have a lot of copies -- pushed that topic, since it's important in industrial processes involving production of large quantities of a single circuit. I didn't think my students really needed to spend so much time on that topic, but most of them wanted an American curriculum; they wanted an education at a level comparable to what we receive in the U.S. or Europe.

The last topic covered by the first text was internal design of integrated circuits. We had one copy of a more sophisticated book, from which the students photocopied the chapters we were covering. Beyond those two texts we had literally nothing to work with. I was starting to teach some material from the second text, including some large scale integration, when I got sick and had to leave the country.

Students: strengths and weaknesses

I was amazed at how enthusiastic my students were. The twelve students I worked with were extraordinary. Many were well versed in circuit theory laws and could spot any errors I made during lectures. I had been warned that Nicaraguan students are weak in mathematics, but this group was about as proficient in using the building blocks of engineering math as students in the U.S. I did find significant shortcomings in two other areas, however. The first is a lack of hands-on technical ability to work with equipment. For example, I found out in the labs that they did not how to use an oscilloscope to solve the kinds of problems they're likely to face in practice. This is one area in which I think my presence definitely did make a difference.

The other weakness I noticed was an inability to employ their theoretical knowledge creatively to solve complex problems. They had no trouble on exams plugging numbers into problems like ones they had seen in class, but they often couldn't go beyond examples they had already covered. I agreed with some colleagues who attributed this to a lack of experienced professors. Most engineers with any experience are offered much higher salaries away from the university system. This leaves much of the teaching in the hands of recent graduates and a growing foreign faculty.

They also didn't like the idea of homework. One of the Nicaraguan professors was considered tough because he assigned

homework. He had been educated in the U.S. and had come to the conclusion -- which I agreed with -- that engineering students in the States develop their creativity through solving homework problems. But most of us couldn't argue with the students' main objection: most of them had jobs during the day and had to take classes at night, leaving them no time to work on homework on top of studying their assignments. Everyone agreed it was a serious problem.

How the UNI makes decisions

Foreigners from 29 different countries were working at the UNI during my stay. Most of the countries of Latin America were represented; there were also North Americans, western and eastern Europeans, and a physicist from India. I can't think of any other country in the third world that has attracted so much attention from foreigners.

Manuel and I were fortunate enough to be asked to take part in the reorganization of the UNI's electronics curriculum. The Nicaraguan government has prioritized the technical components of education in view of the serious shortage of engineers and technicians in industrial and public utility fields. This means a significant infusion of funds and an expanding student body and curriculum. For the first time, UNI is ready to decide what courses should be taught on the basis of their intrinsic merit, rather than the presence of a professor able to teach the course.

I spent eight hours every week in curriculum development meetings and informal discussions of the same matters with colleagues and students. One of my students was responsible for coming up with drafts of proposals for basic electronics coursework -- LRC circuits, DC and AC, etc. A Cuban colleague and I modified these drafts. We then took our version to a meeting with the heads of the electrical and electronic engineering departments, as well as a Dutch colleague who dealt with the lab aspects of the courses; these meetings discussed how the proposed basic electronics curriculum fit in with other courses. The department heads took the proposals that came out of these meetings to the UNI administration for final approval.

One of my main contributions was to argue for cutting down the quantity of topics covered in order to concentrate on more fundamental engineering concepts. I thought the students needed to spend less time on exotic components like thyristors and more on basic transistor theory. Both my experience as an engineer and my U.S. master's degree gave my arguments credibility among my Nicaraguan colleagues.

In retrospect, the amazing thing is that this process seemed so natural at the time. Not only were students, faculty, and administration working together to plan for the future of the university; even foreign visitors had a crucial role to play. I can't think of any better way to answer people who claim Nicaragua is not a democratic country than by pointing to this decision-making process.

While our stay in Managua was cut short by my illness, my wife and I did learn a great deal about what it's like to attempt to build a new society. Some of the strongest impressions we came away with were how strong the anti-contra feelings are, even among the middle class sectors, some of whom don't support the Sandinistas. Equally impressive is the level of optimism that persists amidst such difficult conditions. We came back truly convinced for the first time of the positive impact that foreign assistance such as the Science for Nicaragua project can have. We also find ourselves more dedicated than ever to assisting the Nicaraguan people in their attempt to achieve a more humane, just, and developed society.

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