

COMPUTER SCIENCE EDUCATION
IN TAIWAN - AN AFIPS INTERNSHIP REPORT

by

Clarence A. Ellis
Department of Computer Science
University of Colorado

TR #CU-CS-019-73

June 1973

COMPUTER SCIENCE EDUCATION IN TAIWAN -- AN AFIPS INTERNSHIP REPORT

My first class of teaching, "Computer Systems and Languages," in the National Chiao Tung University held my first surprise. After the class, I said, "That's all for today; class is dismissed." Nobody moved from their seat! I realized that perhaps these people of Taiwan could not understand my English -- nobody had asked any questions during the entire class! So I said very slowly: "Class is finished; you may go now." Still nobody moved an inch. What was I to do? I simply left the class and then everybody followed. I found out later during my year in Taiwan that it is considered bad manners for students to leave the classroom before the teacher and that 90% of the students understood 90% of my lecture. The students in my classes were hard-working with a very strong background in theory and mathematics, but they had a noticeable lack of practical experience.

The school where I taught has more experience concerning hardware than most because they have built a small mini-computer and have complete laboratory facilities for fabrication of integrated circuits. National Chiao Tung University (NCTU) currently has another on-going project to build a modular scientific computer. Thus, they have a good set of electrical engineering courses implemented and plan to add more computer courses to form an independent Computer Science Department and degree in late 1972 or 1973.

Another school with strong computer offerings is the National Taiwan University which offers a computer science option within the Electrical

Engineering Department. The Digital Electronics Laboratory at Taiwan University has two major projects under investigation: 1) Time Division Telephone Systems, and 2) the building of a mini-computer.

The first independent Computer Science Department was established at Fong Ja College of Engineering and Commerce which also offers a wide selection of computer-oriented courses. A list of the computer-related course offerings of these three schools is given in the Appendix. No other schools in Taiwan currently have a Computer Science Department.

During my year as Computer Intern at NCTU, I was attempting to help strengthen their software course offerings. Taiwan has not yet reached any software crisis in that the number of people available who can program computers is sufficient to fill all positions. Traditionally, the Chinese business organizations are conservative in nature and have avoided overly ambitious use of computers. The applications are typically low-level and generally do not require sophisticated software development. The largest computer in Taiwan is an IBM 360/50. IBM is the leading computer manufacturer in sales in Taiwan followed by Control Data Corporation. Univac, Honeywell, and NCR are represented along with a number of other U.S. (and non-U.S.) mini-computer manufacturers.

Political events which occurred while I was in Taiwan (1. the withdrawal of Taiwan from the United Nations; 2) President Nixon's visit to Communist China) put me in a good position to observe rapid changes which occurred due to these events. There are approximately forty-four (44) computers in Taiwan and this number should increase rapidly because the

government, after the drastic change in the political scene, has been quite active in instigating policy changes. Whereas the government previously was a hindering force to those who wanted more computing power (all purchases of foreign machines had to be justified and could be vetoed by a government board; a high import duty was imposed on incoming computers), now more grants are being awarded for the purchase of computing equipment. Thus prospects for the future indicate healthy growth. Taiwan already has software houses, a half-dozen D.P. Schools, computer training courses and elementary computer courses in many colleges, real-time and time-sharing systems, and at least one government computer center is moving up to the sophisticated OS 360 operating system MVT.

In conclusion, the country has made strides toward academic excellence in computer-related fields and now ten colleges and universities have computers. The next phase is to realize that educated hardware and software specialists will be needed to lead the computer vanguard into the future. The need here is different from that in the U.S. because most people will need to do practical work of implementing and maintaining systems after their graduation. So emphasis on practical techniques, languages, etc. is necessary. Furthermore, I believe that with the equipment already available, and with the oriental mind-training, high-quality software and software research are viable products which Taiwan should move in the direction of developing.

APPENDIX

COMPUTER SCIENCE COURSE OFFERINGS IN TAIWAN

1. National Chiao Tung University - (Department of Control Engineering and Computer Science)

Introductory Programming and Computing (Basic, Fortran, PL/1)

Intermediate Programming and Computing (Assembly Language)

Numerical Programming and Computing (Numerical Analysis)

Non-Numerical Programming and Computing (Data Structures, Information Structures)

Advanced Programming and Computing (Algol, Software Design and Language Design)

Systems Programming and Analysis

Compiling Techniques

Operating Systems Techniques

Automata Theory

Switching Theory

Logical Design of Digital Computers

Digital Systems Lab

2. National Taiwan University - (Department of Electrical Engineering)

Fortran Programming

Introduction to Computing

Assembly Language Programming

Electronics I, II, and III

Electric Circuits Lab

Switching Circuits and Logic Design

Programming Languages

Data Structures

Computer Organization

Computer Technology

Computer Lab

Compilers

Automata Theory

Systems Programming

Systems Analysis

Numerical Analysis I, II

Principle of Computer Science I, II

3. Fong Ja College of Engineering and Commerce - (Department of Computer Science)

Introduction to Computing

Programming and Languages I, II, III, IV

Electronics (and Lab)

Circuit Theory (and Lab)

Switching Theory

Data Structures and Management

Systems Analysis and Programming

Unit Record Equipment

Computer Management Science

Computer Structures

Operation of Computers

Simulation of Computers