

an ICX_{er} in PESHAWAR

By Louis R. Weber

"WE so often tend to think of economic growth, to which we are all devoted, as an end in itself. It's not. It's a means to an end. The end is human betterment, human welfare, . . . greater intellectual freedom; greater opportunity to develop the individual and dignity of the individual, that man can become more creative; that his talent which his Creator has given him can be utilized. . . . We are trying to make a tangible advance down the road which leads to a finer human person in Pakistan—in the villages, in the cities, in the towns. . . ." These remarks by Director James S. Killen at the end of a 4-day All Mission ICA conference in Karachi in April 1959 more than justified our having joined four months earlier the Colorado State University Party at the University of Peshawar, a university which only came into existence in 1950.

The Inter-University Exchange Program (ICX), financed by the International Cooperation Administration (ICA), Department of State, was entered into by Colorado State University in August 1954. Since then our party has helped equip and assist the new College of Engineering, Agriculture, and Home Economics. When our coordinator, Dr. Walter R. Horlacher, dean of the Graduate School of Colorado State, asked me if I would like to go to Peshawar as professor of physics and adviser in basic sciences, I felt that it would be an excellent opportunity to renew a previous experience¹ and add all the encouragement I could to an undeveloped country. Through the generosity of our University officials as well as my associates in the Department of Physics, my wife and I found ourselves in the Frontier Province of West Pakistan in January 1959. Peshawar Vale is almost completely surrounded by mountains, with the Hindu-Kush on the north, the Khyber Pass and the Kabul River, an invasion route for over twenty centuries for Cyrus, Alexander the Great, Genghis Khan, and others, only a few minutes away by car.

The University of Peshawar is being built on a spacious campus three miles from the 4000-year-old city of Peshawar, most probably Paskapuros, mentioned by the Greek historian Herodotus, which now has a population of over 200 000. The University has

about 2500 students and offers the MS degree in physics, chemistry, mathematics, and botany. It examines and awards degrees for the BS in its constituent Colleges of Engineering, Agriculture, Medicine, Forestry, Home Economics, and Islamia (Arts and Science), and performs a like service for ten affiliated colleges scattered from Dera Ismail Khan to Abbottabad in the Northwest Frontier Province. (Similar roles are performed by the University of the Panjab and the University of Karachi in the former Provinces of Panjab and Sind, respectively.) Most of the staff members have the MS degree from universities such as the Panjab or Aligarh with an average of one in each department who has obtained the doctorate, in the majority of cases from a European or American university.

Most of my work was connected with the University and one of its oldest constituent colleges, Islamia. With the major emphasis of the ICA and ICX programs in the fields of agriculture, extension, food technology, dairying, and business it made it possible for me to establish most satisfying relationships with the heads of these science departments and their staff members.

Under our contract, my specific duties ranged from assistance in instruction and instructional equipment to the selection of participants for training in the United States and guidance to such personnel on their return.

To get acquainted with the problems, I visited the departments regularly, attended meetings of administrative officers and department heads with regard to budget and staff, and visited classes. I sat through about eighty complete periods in as many days and established good relationships so that for the most part I could make my visits unannounced. When I had not visited a certain class for several weeks, the instructor chided me good-naturedly that I was neglecting him and we made a definite date. Fortunately, high respect is here accorded one with age and experience, and my gray hair and friendly interest made me welcome everywhere. Most of the instructors invited me to take the class during the last ten or fifteen minutes.

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¹ L. R. Weber, *Phys. Today* 6, No. 9, p. 4 (September, 1953).

Islamia College, at right, is the College of Science and Arts of the University of Peshawar. Below, physics unit of the University's science block has view of the Hindu Kush mountains in the background. The opening to the historical Khyber Pass, seven miles away, can be seen on a clear day.

Photos by the author.

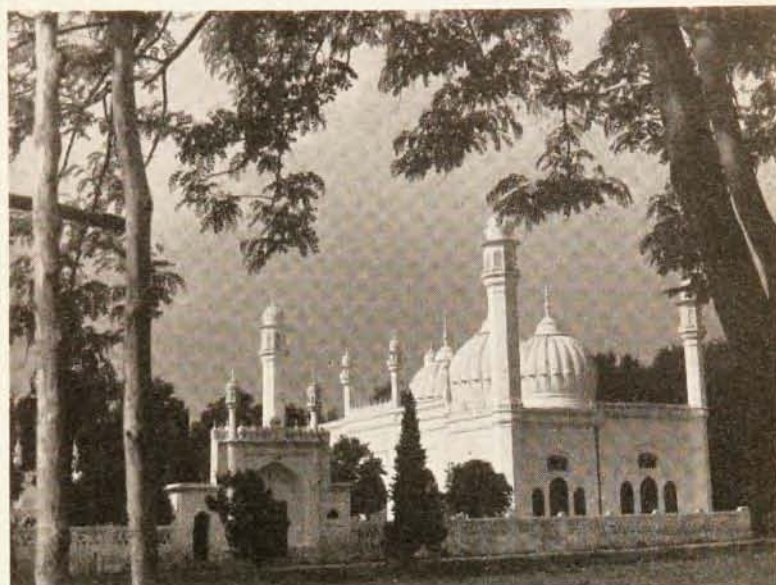
During this period, I generally directed questions to specific students about the lecture or, since I believe this to be the weakest part of our teaching both at home and abroad, added some simple demonstration or illustration.

Not knowing beforehand what the lecture content might specifically be, I generally had to rely on simple and easily available objects for demonstration purposes. In one undergraduate chemistry class, finding neither a block nor a book near the lecture table to demonstrate a molecule rotating about its major, minor, and intermediate axes, I used a student. It is my feeling that this attitude, which someone referred to as that of the "friendly stranger", made its value apparent in my next visit—not only in the fact that the instructor asked more questions of his students, but in the closer attention and improved participation of the class.

In my own classes in the United States, I have always tried to maintain personal relationships with students, but this has become increasingly difficult as classes have become larger. One year, in a class of 100, I talked with each student for one minute during a two-hour written examination. In Pakistan, I was pleasantly surprised to find that each student, in addition to his written examination and laboratory (practical) examination, is also given an oral or *vive voce* examination of five to ten minutes by both internal and external examiners. I have participated in some of these and have found the examiner, for the most part, understanding and sympathetic in manner.

THE undergraduate laboratories are overcrowded. It is not unusual to have 50 or 60 students in rooms that were designed for 15 or 20. This condition puts a severe strain on laboratory equipment which can be improved and added to in spite of the aid already received. In addition to the cost of equipment, Pakistan has the difficult problem of adequate foreign exchange. At this point, ICA, the Colombo Plan, Ford Foundation, Asia Foundation, and others have been most helpful in bridging the gap.

Department heads, when submitting their list of equipment needs, can never be quite sure that the necessary foreign exchange will be available. Consequently, important items are often reordered without knowing the disposition of the first order. This sometimes results in duplication of equipment and may



partly explain why we found in the Department of Physics a Knudsen gauge, a Phillips ionization gauge, two Pirani gauges, and the glass parts for three McLeod gauges but no vacuum pumps requiring these gauges. Most of these pieces were collected in one storeroom with the hope that several research laboratories would eventually share them.

Once I needed a tube tester for a European tube. No one knew where to find one. But while discussing the general problem of equipment with one of the busiest professors and administrators on the campus, he recalled that one had been received a year or two ago under the Colombo Plan. When we found it practically unused in its carton and discovered that it would take 17 different types of tube bases, both European and American, I felt like the archaeologist John Marshall must have felt as he uncovered the Buddhist culture at Taxila where Alexander rested his army 2000 years ago.

It is rather disconcerting, after equipment has ar-

rived, to find pieces damaged by rough handling while being transported or while being examined by customs officials who may not appreciate the care required. For example, an excellent Hilger spectrophotometer had its power unit dropped with sufficient force to cause a permanent distortion of several centimeters in the chassis loaded with choke coils and transformers. Fortunately, a four-unit resistor was broken in such a manner that the unbroken part could be measured and an improvised unit added. After some realignment of the optical system, the complete unit functioned properly.

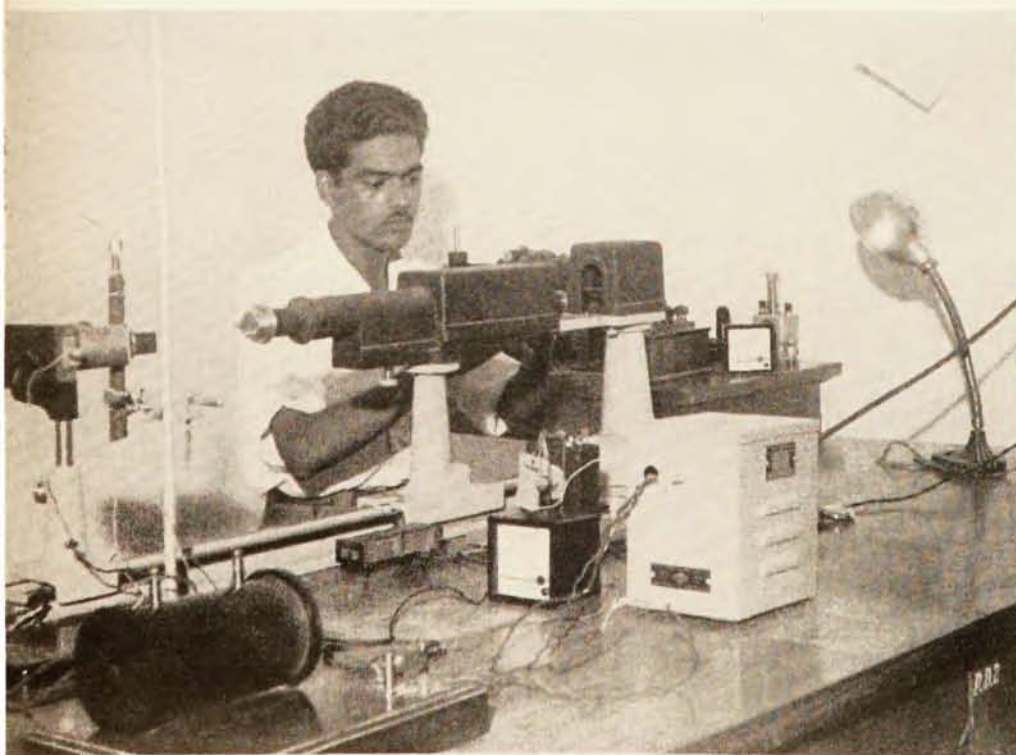
Physicists are generally expected to tackle problems involving nonoperating equipment. Many of the scientific personnel hesitated to work on such apparatus, hoping a factory representative might show up eventually. As a result almost every laboratory had equipment that had been in disuse for one or two years. These instruments were generally brought to my attention, and when I produced a screw driver from my brief case the staff member, encouraged by my presence and suggestions, frequently took it from my hand and proceeded to make the adjustment himself.

Although the equipment in the Department of Physics is reasonably adequate in optics, electrical measurements, and atomic physics (e.g., constant deviation spectrometer, Fabry-Perot and Michelson interferometers all by Hilger, thermocouple potentiometer, and scaler) it possesses no audio oscillators and only one dc power supply to cover the range from 0 to 300 v. We made arrangements to take care of these needs since they could not be included in the foreign exchange.

Having brought some transistors, thermistors, and a klystron with me, we added laboratory studies in electronics and microwaves for the coming year.

ANOTHER great problem was the lack of textbooks. Discussing ways of procuring or supplementing expensive volumes was one of my advisory functions, since a book costing 15 or 20 rupees (\$3 to \$4) is prohibitive for the average student. Yet the libraries are hardly used by the students even though the various organizations mentioned above are to be commended for their aid in keeping the shelves stocked with the best books in each field. (We in the United States do not always realize that from the first grade on the student has been conditioned to the use of the library.) However, the librarians are optimistic. They are improving library reading rooms and stacks, paying particular attention to lighting and air conditioning, and consult the teaching staff as to the part the library can and should play in their courses.

The strict adherence to the syllabus, and the fact that evaluation of the student's knowledge is dependent almost entirely on the final examination at the end of the year, have discouraged many advisers. However, one must remember that only sixty years ago, the Pathans, one of the tribes making up a good number of the staff and students here, were fighting those in the next valley, thirty miles north of Peshawar, with homemade guns. Every man was a soldier and, as Winston Churchill² reported in 1899 as a reporter with the British forces, "They live in squalid loop-



Qamral-ul Haq Khan, a graduate student in physics at the University of Peshawar, prepares apparatus for study of the Zeeman effect. In final examination for the MS in physics he had the highest standing in the First Division.



The 1959 final class for MS in physics and guests (with garlands) are feted by the previous (first) class at the close of the university year. Seated from left to right: Abdul Majid, chairman of Islamia College Physics Department; Mohammad Jan Khan, reader; 4th from left, Abdul Hashim, registrar of the University of Peshawar; Mrs. Weber; A. Majid Mian, chairman of the University of Peshawar's Physics Department and principal of Islamia College; the author, L. R. Weber; and on far right, M. Ahsan Khan, a junior lecturer who was selected for further graduate work in the US.

holed hovels, ignorant, fierce as a tiger but less cleanly . . . wives and womankind have no position generally but that of animals. . . ." It is truly remarkable that these same Pathans have built this fast growing University of Peshawar.

The students as well as the staff members realize that the present educational set-up needs modification and, at the time I left, a Commission was about to make a report on the subject.³ The best elements of the major educational systems now used in the world will probably be chosen.

ONE of the most satisfying and probably one of the most important aspects of our program so far has been the selection of participants to study in the United States. Having kept my eyes open for promising young men during my classroom visits, it was a simple matter to encourage certain individuals to make application for the available scholarships. Two young men who lectured to graduate students, one in physics and one in physical chemistry, impressed me

particularly. They not only knew their subjects well, but they had a good sense of humor and used splendid English. Of course I was delighted when they made an excellent impression on the selection committee, of which I was a member, and received appointments to start their journey westward only a few weeks later.

Pakistan, the most populous Moslem country, is divided into two parts separated by 1000 miles. It is young—thirteen years—and yet old: Buddhist universities flourished here 2000 years ago. It is headed by a benevolent dictator, President Ayub Khan,⁴ who seems to be for everything good and against everything bad and who wishes Islam to be a dynamic movement committed to make Pakistan a living example of brotherhood. Pakistan has men of science who, at the March 1959 meeting of the annual Pakistan Science Conference, hoped that young scientists would be exposed to a substantial measure of the humanities and that with faith in God and humility in thought, the nation could march forward and be worthy of its destiny.

I feel privileged to have been associated with men dedicated to such high purposes.

³ W. Churchill, *The Story of the Malakand Field Force* (Longmans, Green & Co., 1899).

³ Since the writing of this article the Commission's report has been made and intense efforts are being made to have some of the major reforms effected with the 1960-61 school year.

⁴ Within the last year the government has been organized under a basic democracy system with Field Marshall Mohammad Ayub Khan elected as its first president.