ChE laboratory

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AUDIO-MODULE EXPERIMENTS

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IN THE TEACHING of undergraduate chemical engineering laboratories innovated thinking into the modernization of equipment and operation is essential to stimulate the interest of the student and faculty alike. In this search for improvement, care must be taken not to overstructure the system which may stymie the creativity of the student or to understructure the system which may entirely frustrate the student. In an effort to achieve the above mentioned objective one suggested course of action would be to compile a laboratory manual to guide the student in the laboratory experimentation. Proceeding along these lines one may be met with only mediocre success for a number of reasons. One of these reasons for moderate success is that students seldom read the manual before attending class, and on many occasions the manual is not even brought to class to consult during the laboratory period. The reason for this may be the student's laziness to read because of the requirement of concentration.

To overcome this dilemma the audio-module experiments were developed based on the premise that it is easier to listen than to read.

The audio-module experiment is a three-sided enclosed booth having all the necessary equipment, services and reagents for enacting the experiment. The unique feature in the module is the tape recorder with instructions, trouble shooting, and suggested analysis for the experiment. The tape recorders are of the cassette type which facilitates usage.

Three audio-module experiments have been constructed and employed. These experiments are in the areas of diffusion, calibration and fermentation reaction. Photographs 1 to 3 show the details of these experiments.

These units have now been in operation for a half of a year with favorable student reaction. Often this is the first time students come in contact with chemical engineering equipment and experimentation and the audio description helps

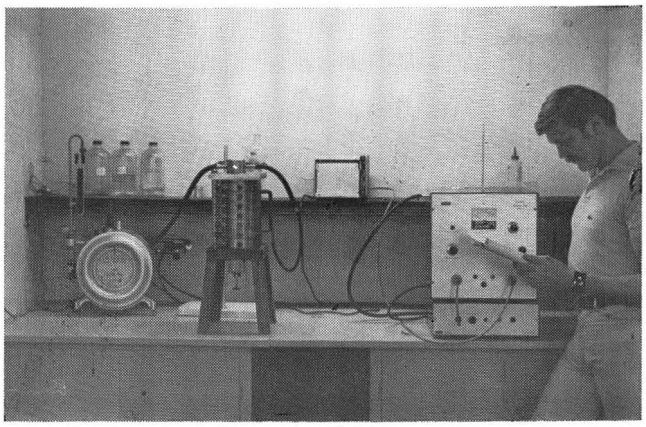

Fig. 1. Audio Module of Diffusion Experiment.

significantly. The students felt that a considerable amount of time was saved in familiarizing themselves with the equipment by use of the module. Ideal usage of the modules is now being employed in the first courses in chemical engineering where the unit on calibration of instruments is of special utility. The cassette tape permits repeating the tape contents with ease to clarify a particular point when necessary. The concern that the tape does nothing more than repeat the operational procedure of the laboratory manual did not matter to the students but seemed to serve as a reinforcement to the manual. By using the human voice via the tapes emphasis can be placed on critical points by intonation patterns of the voice and a more personal touch can be given to rather mundane business of procedure and description.

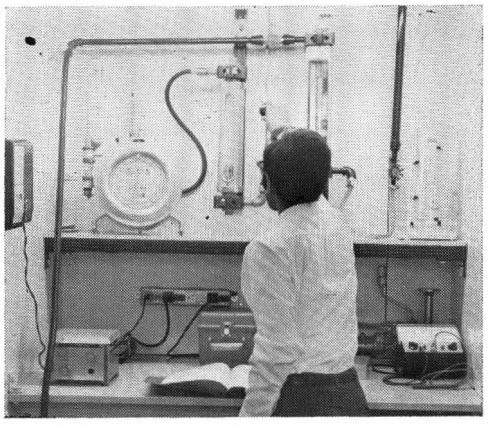

Fig. 2. Audio Module of Calibration Experiment.

. . . it is easier to listen than to read.

FUTURE WORK ALONG these lines is planned. An audio-module unit on the aspects of report writing is being constructed. This unit will be located on a desk top enclosed on three sides with its own tape recorder and containing samples of previously written and corrected reports. This will serve as a guide to the students in preparing their final laboratory reports.

The coupling of the visual to the audio section of module is also being developed. The visual part will consist of a 21" x 21" screen box containing a Kodak Carousel projector whose slides will be synchronized with the tape recorder in a compact arrangement. The added visual media offers a more complete educational tool. More complex

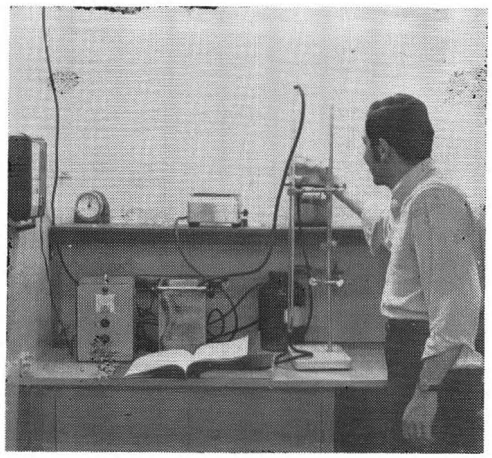

Fig. 3. Audio Module of Batch Reactor.

operating procedures can be covered by the audio-visual module. Several of these units can be placed on carts and wheeled to the appropriate experiment using the designate cassette tape and slide tray of that experiment. Photographs 4 and 5 show the audio-visual module.

By compiling these audio and audio-visual modules one will find that his experiments will become even more organized and efficient than they were in the past. Utilizing these units makes one consolidate the equipment and anticipate the needs of the student for successful completion of the experiment.

The overall usage of the modules presents an exciting aspect in scheduling of student laboratories. At present most laboratories are scheduled aa particular times in a fixed block of time. Ultimately the laboratory by use of the modules would be accessible to the student any time he desired to perform the work. A technician would need to

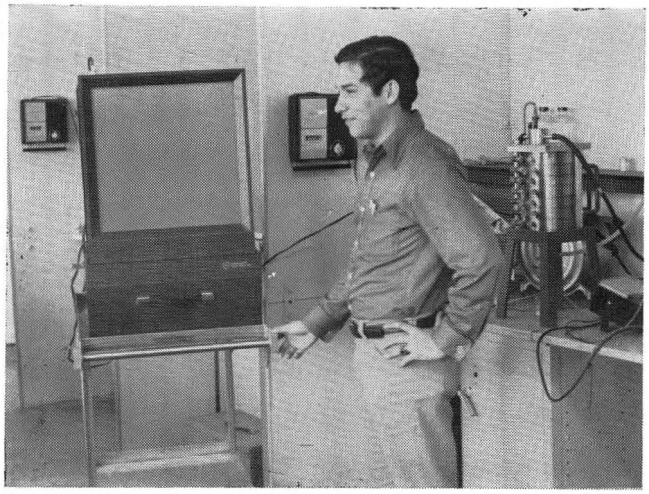

Fig. 4. Audio-Visual Module.

be present to take care of difficulties that may arise but in general these laboratories would be self-operating and give considerable flexibility to the present scheduling system.

Projecting even further, a closed circuit TV camera could be operated between the laboratory and the professor's office, and its usage could be employed when difficult problems would arise.

During the summer of 1970 the tapes for the audio experiments were translated into Spanish with the help of colleagues at Universidad Tecnica Federico Santa Maria in Valparaiso, Chile. Some interest in employing these modules has been expressed by a few professors of chemical engineering at Latin American universities.

These modules thus present an efficient manner of laboratory operation at a relatively low investment cost.

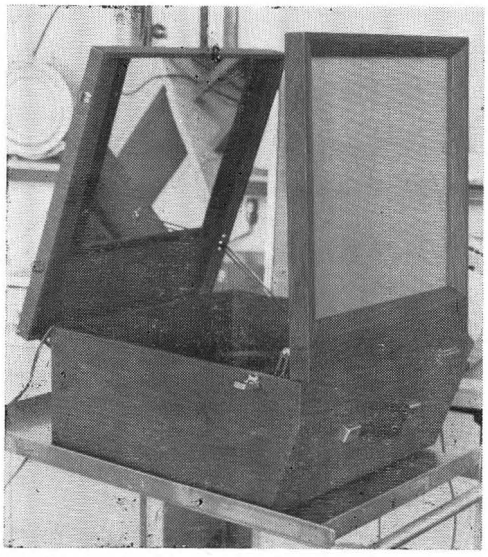

Fig. 5. Projection Screen.