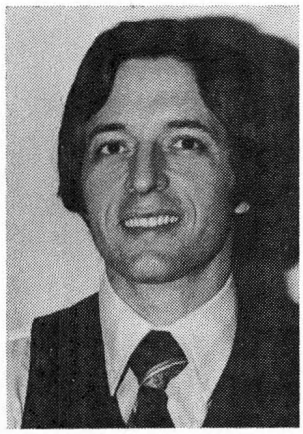
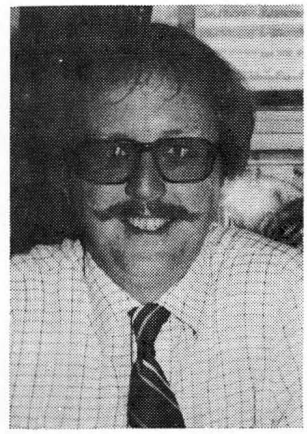
ChE curriculum

PRACTICE SCHOOL: THE INDUSTRIALIZATION OF CHEMICAL ENGINEERING SENIORS

THOMAS R. HANLEY and
JAMES M. HENRY
Tulane University
New Orleans, LA 70118

THE NEED FOR PRACTICAL exposure to current industrial methods and equipment is a continuing problem in the training of chemical engineering undergraduates. Universities have tried many different ways of making their engineering training relevant to industry's needs. Undergraduate laboratories in general are not capable of adequately preparing the new engineer for the scale and pace of industrial operations. Co-op programs at some schools are good in this respect. Established in 1951, the ChE Practice Division at Tulane University offers one method for the student to obtain this experience and relevant training. Practice School, as it is commonly known, enables second-semester seniors the opportunity to perform in an industrial environment under the guidance of both an industrial and an academic advisor.





Thomas R. Hanley is an Assistant Professor of ChE at Tulane University. He holds B.S., M.S., and Ph.D. degrees in ChE from Virginia Tech and an M.B.A. in management from Wright State University. Prior to joining Tulane in 1975, he served as a development engineer in the areas of polymer characteristics and space system lubricants at the Air Force Materials Lab. at Wright Patterson AFB. His areas of research interest include reactor mixing analysis, high temperature polymers, and biopolymer transport processes. **(L)**

Jim Henry received his B.S. in ChE from Rice University and his Ph.D. from Princeton University. He has been a faculty member at Prarie View A & M, Yale and Tulane Universities. Prior to his appointment at Tulane, he was with the Pittsburgh Energy Technology Center of the U.S. Dept. of Energy. His interests are in areas of energy and air pollution. **(R)**

During the fall semester the Practice School director solicits engineering problems from the local industry. Participating faculty and industrial representatives then select the needed problems on the basis of timeliness, company urgency, faculty interest, and probability of completion in the time constraints. Faculty and industrial advisors are assigned, and two-student teams are selected for work on each specific problem.

The 1977 Practice School utilized problems from E.I. duPont, Shell Oil, Shell Chemical, Monsanto, Union Carbide, and Chevron Chemical companies. The specific companies involved will vary from year-to-year. Past practice schools have utilized other local industry and a government research lab, as well as a local hospital to accommodate students interested in medical applications.

The arrangements with industry are entirely informal. Plant identification cards are issued to the student workers to allow access to operating areas, but there is no formal or monetary obligation or committment on either party. With the government lab a no-cost contract was obtained to allow the work, but otherwise arrangements were similar to those with industrial firms.

Eight semester hours, or half of the students' Spring semester course load, are devoted to Practice School. The remaining course work (a technical elective and a humanities elective) is scheduled to allow at least two full days per week for

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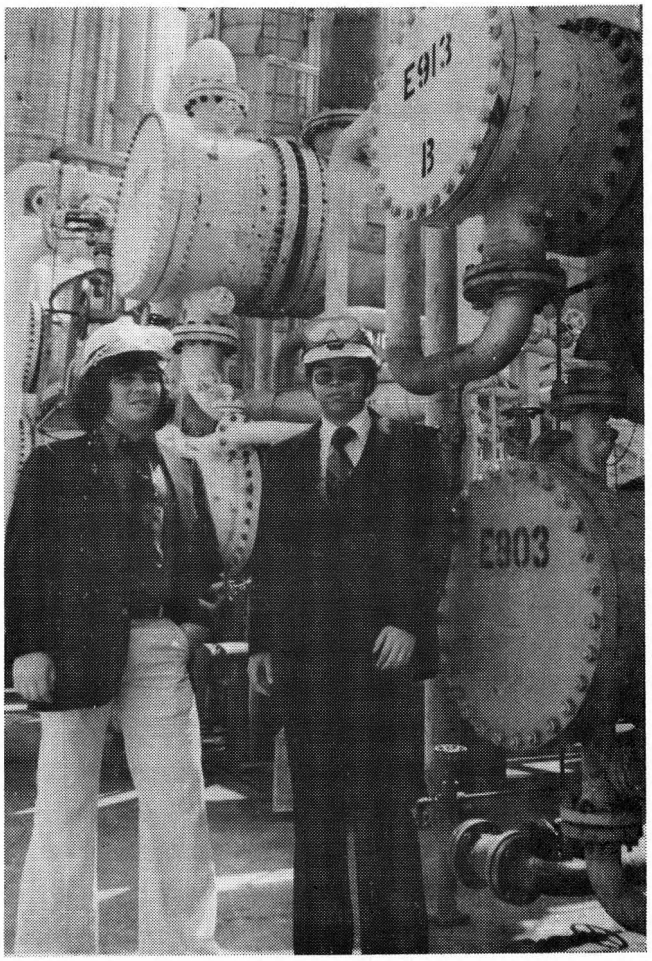

Students Marco Gutierrez (left) and Joe Powe in one of the participating oil refineries.

on-site industrial work. The student groups are encouraged to develop a schedule of plant work best suited to the needs and nature of the specific problem. Student work in the plant has varied from one-half to two days per week.

DIVISION OF RESPONSIBILITY

AT THE BEGINNING of the semester the academic advisor from the departmental faculty, the industrial advisor, and the practice school director meet at the plant site. The problem is presented, with the industrial advisor orienting the group. The industrial advisor also arranges future plant access for the students and explains plant safety procedures. The remainder of the industrial advisor's responsibility, in addition to day-to-day contact, involves providing access to company literature, other personnel, and, if necessary, laboratory and computer facilities.

The industrial advisor is encouraged to allow the student group to have a chance at coming to a solution themselves. This does not necessarily get the project accomplished in the shortest time, but is a beneficial experience for the students. If the project is proprietary, the students are advised of their responsibility to preserve company information.

The academic advisor assists the group in defining the problem and beginning the study. His main responsibility, however, is to coordinate with the industrial advisor and direct the student's efforts into productive channels. Since the group members spend the majority of their time at the university, the academic advisor will typically make several observation visits to the plant during the semester.

To supplement the industrial experience, lecturers are invited from industry to speak on practical engineering subjects. During 1977 two hours of lecture concerning practical process control and industrial safety were presented in Practice School.

Practice School generally meets in one three-hour session per week. The supplemental lectures and student progress reports are presented during this period. During the semester three oral reports, generally twenty to thirty minutes in length, are presented by each group to the entire class and the faculty. All presentations are critiqued, first by another student group and then by the faculty. A final oral report is presented at the company during the final week of the semester. Accompanying this oral report is a formal written report detailing the problem, the findings, and recommendations. The specific format of the academic portion will vary somewhat depending on the decision of the director. The format presented here is a typical one and is the one which was used in the Spring of 1977.

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Three grades are awarded. A four-hour grade is determined by the academic advisor, the industrial advisor and the director based on the overall performance of the group. A two-hour grade is based on the quality of the written project report as judged by the academic advisor and the direc-

Students Ray Hunting (left) and Randy Boudreaux in one of the participating chemical plants.

tor. Another two-hour grade is based on oral report grades and the semester exam. The semester exam includes questions on all projects and the supplemental lectures.

PROGRAM BENEFITS

THE BENEFITS OF SUCH a program to the student are numerous. Industrial exposure obtained certainly prepares the engineer for job entrance. Participation in plant activities, consultation with practicing engineers, and observation of company procedures provide a clearer picture of the industrial scene. As most of the seniors are in the job selection process during Practice School, this experience gives each student a better chance of making a personally satisfying selection.

The criticism by peers and faculty during the oral reports improves both the student's writing and speaking abilities. He also can observe other students' methods and incorporate their strengths with his own.

The greatest benefit to the student, however, is the problem-solving exercise. The group must define the problem and, in most cases, redefine the problem. Usually several solutions are proposed, leading the group to consider conservation, economics, environmental impact, timeliness, etc., in finding a "best" solution. Feedback from students, faculty and industry generally create confidence in each person's ability to produce in an industrial environment.

Fortunately, industry and the university also benefit. The company receives assistance, sometimes quite valuable, on problems which otherwise might be left until later. The company obtains exposure and closer working relationships with the academic sector. The company employees who come in contact with the students and faculty gain a greater appreciation for education and its problems. The faculty are exposed to current engineering problems which can do nothing but improve the quality and currency of instruction.

The Department of Chemical Engineering at Tulane is indeed fortunate to have the industrial cooperation to make such a program succeed. The faculty feels Practice School is an integral part of our undergraduate program and feels certain it will continue to improve and serve the engineering community. □

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The Department of Chemical Engineering has an opening for a full-time faculty member in the tenure system in Chemical Engineering. A Ph.D. in Chemistry with at beginning September 1979. Applicants should have a Ph.D. least three years industrial experience will also be considered. An enthusiasm for teaching and a strong commitment to research with the ability to develop an outstanding research program is expected. Michigan State University is an Affirmative Action-Equal Opportunity Employer and encourages applications from women or members of minority groups. Send applications and names of references to: Chairman, Department of Chemical Engineering, Michigan State University, East Lansing, Michigan 48824.

ERRATA

Models for Turbulent Transport Processes
James C. Hill, Iowa State U.
Vol. 13, No. 1, page 37.

The ChE Lecture by Hill ("Models for Turbulent Transport Processes") appearing in the Winter 1979 issue of CEE contains the following errors:

The left hand side of the equation immediately following Eq. (7) should be deleted. This should be followed by

$$\frac{D\epsilon}{Dt} = \text{same as Eq. (6)}.$$