



Personalized instruction, models of chemical compounds (right), and television and tape recording aids have improved quality of teaching.

Chemistry's Still Not a Snap, But . . .

By Betty Brophy

A student taking a beginning chemistry course on the Columbia campus can no longer alibi for a poor grade by saying "the class is so large, I couldn't get any help." His only excuse this semester is that he didn't get around to visiting Room 306.

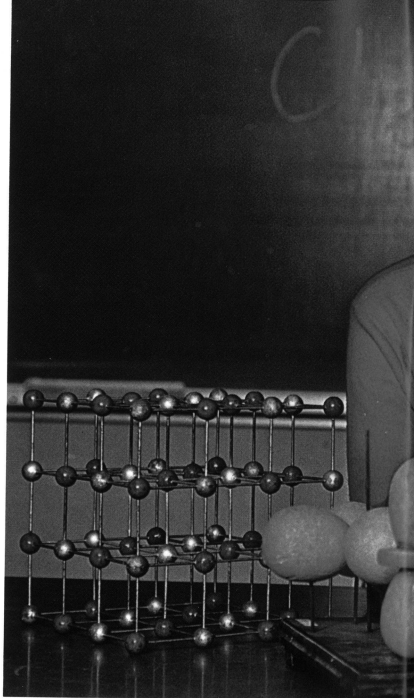
Room 306 (of Schlundt Hall, the chemistry department building) is just one important facet of a new program in chemistry using specially devised teaching aids.

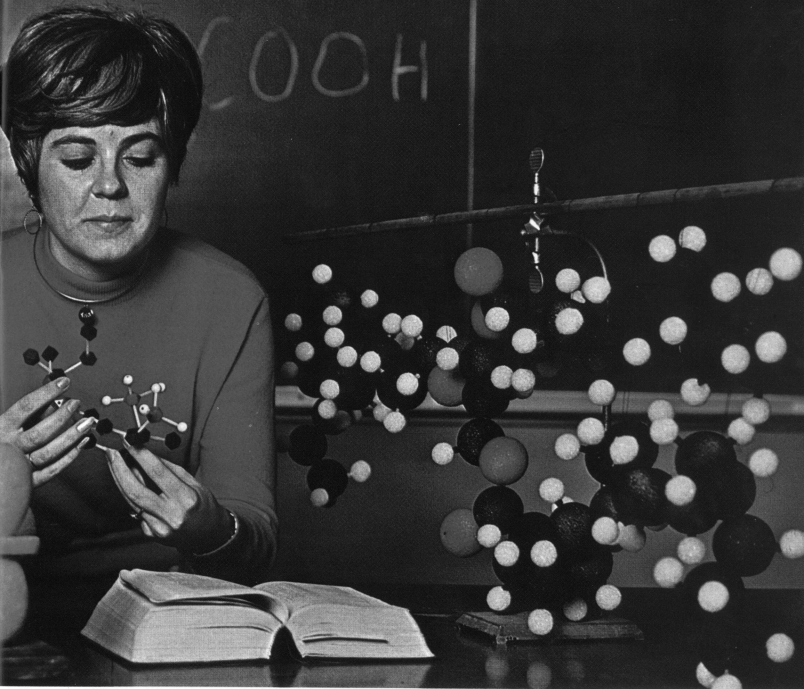
Dr. Henry Bent, 69-year-old dean emeritus of the graduate school and professor of chemistry, initiated the program along with Dr. John K. Garland, assistant professor, and with the aid and approval of department chairman, Dr. John C. Guyon. Although some of the ideas were put to practice as far back as two years ago, a University

grant for the improvement of undergraduate education this fall made most of the innovations possible.

Previously, students in introductory chemistry, chemistry for engineers, and general chemistry got through the courses with a textbook, a crowded lecture three times a week from a professor with whom he had only limited contact, and a lab held once a week with about 25 students and a graduate assistant.

They scribbled down every word verbatim from the lecture, often missing the most important points while writing the previous sentence. They strained to view an intricate experiment from 15 rows back, while the professor struggled with clumsy, oversized equipment in an attempt to enlarge the experiment. In lab, they often confounded the graduate



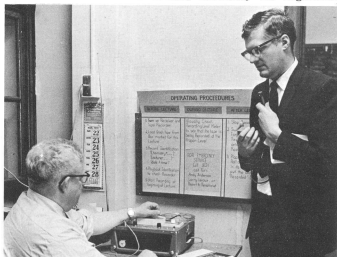


assistant with questions, while few ever approached the professor. Up to 10 per cent of the students received failing grades.

Now the student can listen to weekly lectures on tape at his leisure, adding to his notes. Experiments use small equipment enlarged by an overhead projector so that five inches become eight feet on the screen. Individual kits for building atom models are available, making it easy to visualize chemical changes and reactions. The professors hold extensive office hours, and taped copies of each lecture are placed in Room 306, where graduate students are stationed to answer questions.

Bent began making changes in the normal procedure when he held a training session for those graduate assistants before the fall semester, a re-

Dr. Charles Bickford, left, a retired commercial chemist, has designed equipment especially for classroom demonstrations. Dr. John K. Garland has added video tapes to supplement difficult material in his course, chemistry for engineers.



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finement of a program developed by Garland in 1968. The assistants saw films on classroom interaction and methods to influence people in general. They practiced speaking in the language lab, listening to their own tapes and criticizing themselves. Later, the tapes were switched and they criticized one another. Bent included himself in the process and found the criticism was constructive and "not particularly kind."

Practice discussion groups were also held. Each graduate student had three questions prepared: "one good student question, one completely foolish question, and one far too advanced for the course," Bent explained. The assistants had to practice thinking on their feet and dealing with every conceivable type of question. The session was videotaped and later viewed and criticized by the participants.

"Of course there are no controls for this," Bent commented. "We don't know what they would have been like without the training session, but we feel it had to help."

A variety of benefits have resulted from the new set-up. Now that the lectures are taped, students can listen to them throughout the week at the Arts and Science language laboratory and Room 306. Hearing the lectures again is of special advantage to students who are poor note-takers, students who must miss a lecture, and foreign students. All the students profit from the relaxed atmosphere and so does the professor. "Students no longer feel the compulsion to write everything down. For the first time, I find myself looking at faces instead of just the tops of heads," Bent noted.

Short, four-minute films precede lab periods, demonstrating laboratory techniques. These films save time for the lab instructor since they effectively demonstrate techniques in experiments that would have to be repeated by the instructor for many small groups of students.

One of the keys to carrying out the new procedures efficiently is Dr. Charles Bickford, a lecture demonstrator. Bickford, 67, has a doctorate in chemistry from Harvard and worked as a commercial chemist for Squibb Pharmaceutical Laboratories until his retirement. However, not wishing to retire from chemistry entirely, he came to the Columbia campus, where he works part-time setting up and removing

laboratory equipment used by lecturers, taping lectures, maintaining equipment, and designing and building new equipment especially for the classroom demonstrations.

Although Bickford's background far exceeds the qualifications for the job, he lessens the burden for the other professors appreciably. "We just tell him what experiment we're going to do, and he knows exactly how to set it up," says Bent. "We never have to worry about it." Having to instruct less qualified help would take away valuable time the instructors can use to answer student questions.

Since some courses involved are not for chemistry majors, they have often been difficult for many of the students, most of whom come from the Schools of Nursing and Home Economics, and the College of Agriculture, where basic chemistry is required. The courses are designed to cover "just the big ideas in the entire field of chemistry." A weekly quiz is not meant to be added punishment, but is a measure by which the student can see where he stands. Posting of exam answers an hour after the test is completed is a popular idea with students who like to see their mistakes while the material is fresh in their minds.

Potential engineers (other than chemical) take John Garland's course, which varies from the other courses in its offering of some of the basics of thermodynamics.

In addition to the teaching aids, used in Bent's class, Garland prepares video tapes which are shown during what was formerly a recitation hour. Half the group has a live discussion and half has the video tapes as part of the trial program.

During the recitation period, the students see a video tape prepared by Garland and the University's Instructional Television department (ITV), which is a supplement to the material being studied. Graduate assistants are present to answer questions, and Garland feels the new system has boosted the image of the graduate student.

"Instead of trying to feel his way through the material hoping to tell the students something helpful, the student comes to him when he knows what he wants. The grad assistant becomes the one who helps you when you're in trouble."

A written guide accompanies the tapes, which

many students say is an excellent way to remind them what they should be studying and help them see how much they know.

The introduction of video taping adds a new dimension for the professor as well as the student. "It's almost impossible for an experienced teacher who knows how to present material in a class to know how to effectively present material on tape," Garland explains.

For one thing, there's no place for the pause, a common lecture technique. "The student needs a slow, carefully-enunciated presentation. He favors clarity at the expense of variety."

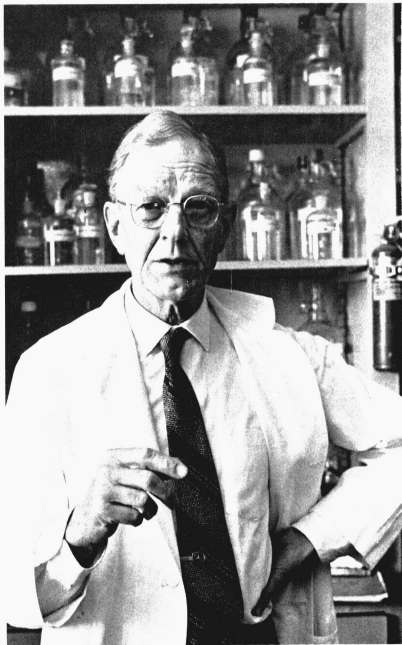
The well-produced tapes are hardly dull. The lecturer himself is only shown for about four of the 30 minutes. Materials and actual writing are pictured, and a split-screen technique is used to present two shots simultaneously.

Garland, who is leaving at the end of the summer to teach at Washington State University, does his best to see that the students are getting the most out of the sessions. Each week he gives a short quiz, and then asks the students questions about the presentations. Their replies are sometimes surprising. He was planning on alternating tapes of himself alone with those including an audience who asked him specific, pre-planned questions. The students found that audiences were not to their liking, so the idea was eliminated.

A more extensive questionnaire was also prepared by Garland, investigating what teaching aids the students liked best and how often they were being used. He found that the students were most pleased with the personal attention they received. Listening to the tapes was helpful to those who wanted to improve their notes, although the majority of the students found visual aids much more appealing than strictly audio devices.

Although the measure for success of the new program is rather amorphous, Garland predicts that one-third of his class will raise their grade one letter this semester. "The top and bottom grades will be affected very little by the new system," according to Garland. The top students will always overcome all obstacles no matter what, and nothing will make the lowest students try." But the D-C-B students have shown marked improvement and interest.

As Dr. Bent puts it, "Students rarely put more effort into a class than their teachers do." □



Dr. Henry Bent, dean emeritus of the Graduate School and veteran professor of chemistry, helped initiate new program.