

Summary

Agricultural curricula often must change in response to the changing needs of the students, both in their backgrounds and likely job opportunities. At the University of Maryland, backgrounds have changed substantially within the last ten years and the jobs in which students will be working are changing. It will be necessary to design and modify programs to offer the student a more satisfying and rewarding college experience.

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Modular Instruction For A Horticulture Service Course

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Abstract

Large enrollment service courses pose numerous teaching problems. A package of instructional modules was developed for a horticulture service course, Indoor Plants, to improve the efficiency of departmental resources while providing quality instruction for a diverse clientele.

As at other colleges and universities, the number of horticulture majors at Virginia Tech has increased dramatically in recent years. This increase has been accompanied by an equally impressive increase in the number of non-majors in horticulture courses. A number of departments, Virginia Tech included, have developed service courses designed to provide basic, practical instruction for non-horticulturists. Service courses as such have been somewhat controversial in academe (1). The authors believe that service courses have a place in horticulture curricula, although admittedly such courses should not be developed and taught at the expense of departmental required courses.

The Virginia Tech Horticulture department offers four service courses ranging from Home Vegetable

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Production to Basic Floral Design. One of the most popular service courses is Indoor Plants; quarterly enrollment often exceeds 200 students. Approximately 95 percent of the students are non-majors and 90 percent from outside the College of Agriculture and Life Sciences.

Table 1. A comparison of exam grades of four sections of "Indoor Plants" Horticulture 2080 taught by faculty and GTA's and using a new teaching strategy.

Course Sections	Plant I.D. Exam Average	Quiz Average	Final Exam Average
#1 Faculty	96.1 ab ¹	79.7 a	85.8 ab
#2 GTA	98.3 a	81.8 a	87.9 a
#3 GTA	93.8 ab	76.8 a	83.6 b
#4 GTA	92.9 b	81.1 a	82.4 b

¹ Mean separation in columns by Duncan's Multiple Range Test; 5% level.

Even though Indoor Plants was a very popular course, flaws became apparent. Most students were not prepared for the vast amount of memorizing required to enter a totally new discipline such as horticulture. The popularity of the course required the department to offer multiple sections which imposed a serious drain on faculty teaching time sorely needed in advanced horticulture courses. We decided to redesign the course with the following goals: 1) retain a high level of student interest, 2) ensure the relevance of course objectives to student needs, (3) develop more effective instructional techniques, and (4) make more efficient use of faculty teaching time.

A needs assessment was conducted to determine the horticultural knowledge of entering students, the learning characteristics of the various groups enrolling in the course, and the attitudes of the students toward existing and potential instructional methodologies employed in the course. Analysis of pre-tests established an average entry knowledge of subject matter which aided in the restructuring of course content and in setting levels of difficulty. Analysis of class rosters and student interviews established a profile of the students, including majors, backgrounds, experience with plants, and purposes for enrolling in the course. Questionnaires and interviews of the students indicated their positive and negative attitudes about individual instruction methodologies and instructional strategies. As a result of the needs assessment the following principles for change were adopted:

1. Course content should be directed toward non-majors. Horticulture majors should be discouraged from enrolling in this course.
2. The class should be taught in multiple sections of fewer than 40 students meeting twice a week for one hour and fifteen minutes each.
3. The course must be redesigned to enable graduate students to replace faculty without loss of teaching effectiveness.
4. High student interest should be emphasized but without relaxation of course content rigor and maximum challenge.
5. Hands-on experience, demonstration, and discussion should be emphasized as instructional methodologies.
6. Instructional objectives should be published to ensure a direct relationship between objectives and evaluation.
7. Texts and materials should be of minimal cost.

After formulating our course goals and principles for change, we set about developing a teaching strategy. In consultation with the University's Learning Resource Center, we decided to develop teaching modules. The intent was to design modules for use not in a solely auto-tutorial fashion but rather as aids for self-study of lecture information supplemented by various forms of in-class instruction. Currently available texts and books were found to be either too expensive or inappropriate. We thus decided to produce our own specially designed and written printed modules. With the aid of a teaching-learning grant (about \$900) and departmental matching funds, we developed thirteen modules. The book, **Modular Instruction** by James D. Russell with forward by S.N. Postlewait (4) was a valuable reference. A set of learning objectives was developed for each lecture unit following the guidelines of R.F. Mager (3). Course content was reviewed with respect to lecture objectives; and topics were either eliminated, expanded, or added depending on needs presented by the objectives. The thirteen lecture modules plus two plant identification manuals together total over 500 pages and include over 100 professional illustrations. Slide sets, demonstrations, discussion topics, and hands-on exercises were selected to complement each module. Sample exam questions were included in each module as study aides; additional sources of information pertaining to the module topic were also provided. Tests were constructed to measure the attainment of course objectives and the tests in turn evaluated to assure they were satisfactory for this purpose.

The Indoor Plants course package including study guide, learning modules, plant identification manuals, slide sets, projects, and tests were designed to provide content uniformity among various sections of the course and to permit any fairly knowledgeable horticulturist to teach the course. Horticulture graduate students now teach the course under faculty supervision.

The new teaching strategy utilizing the instruction modules was fully implemented in Fall 1979. Four sections of 35-40 students each were offered. One was taught by a faculty member and three by graduate teaching assistants. The University's Learning Resources Center personnel helped develop evaluations of the new strategy. In addition, W. James Popham's **Evaluation Guidebook** (2) was a helpful, practical guide for educational evaluation.

To evaluate the new teaching strategy, we sought answers to the following questions:

1. Did knowledge acquired by students meet their expectations and ours?
2. Was student performance and attitude uniform between course sections?
3. How did students rate the new format in comparison with the traditional formal lecture format?
4. Did the modules and manuals perform as designed?
5. What changes or modifications would improve the new teaching strategy?

Was student learning successful under this new teaching strategy? Results of pretests administered to similar clientele in 1978, prior to course changes, indicate that approximately 2 percent of the tropical plant nomenclature and about 7 percent of plant culture and usage may be known prior to entry into the course. Similar posttests administered under the new strategy showed an average 93 percent knowledge of tropical plant nomenclature and an 82 percent knowledge of plant culture and usage information. These results are comparable to those under the traditional lecture format teaching method and indicate no loss in quality using the new strategy.

Analysis of test scores and course evaluation responses were performed to determine the degree of course uniformity between sections using the new strategy. There was no significant difference observed in the average quiz scores between sections of the course (Table 1); however, there were slight differences in plant identification exam scores and final exam scores. There was a high level of uniformity in response to course evaluation questions (Table 2). All of the instructors were perceived by students as knowledgeable and able to communicate well, to stimulate the interest of students, to administer the class, and to grade fairly. There is little doubt that the GTA's were successful instructors under the new teaching strategy. In written comments and in oral interviews, none of the students taught by the graduate teaching assistants expressed any dissatisfaction with the GTA's teaching performance of the course as a whole.

In questionnaires and interviews, students reported that the lectures and instructional booklets were very effective components of the course. The average value ratings of lectures and instructional modules were similar. Visuals and modules that accompany lectures are highly valued by students. Approximately 95 percent of students buy the learning modules (sold at cost) even

Table 2. A comparison of key responses on a standardized student evaluation of four sections of "Indoor Plants", Horticulture 2080 taught by faculty and GTA's and using a new teaching strategy. Response Scale: 4 = highest, 0 = lowest

Course Sections	Instructor Knowledge of Subject	Instructor's Communication Ability	Instructor's Ability to Stimulate	Instructor's Class Administrative Ability	Instructor's Fairness in Grading	Text Suitability	Effort Needed to Succeed in Course	Overall Instructor Evaluation
# Faculty	3.6 a ¹	3.5 a	3.4 a	3.5 a	3.5 a	3.3 a	2.1 a	3.6 a
#2 GTA	3.5 a	3.4 a	3.3 a	3.3 a	3.6 a	3.6 a	3.2 a	3.3 a
#3 GTA	3.6 a	3.5 a	3.5 a	3.2 a	3.4 a	3.4 a	2.1 a	3.5 a
#4 GTA	3.5 a	3.6 a	3.5 a	3.5 a	3.6 a	3.3 a	2.2 a	3.6 a

¹Mean separation in columns by Duncan's Multiple Range Test, 5 percent level.

though they are available on free loan from the college library. However, students prefer live plants for studying plant identification, for lab demonstrations, and for lectures on plant groups. Overwhelmingly, students preferred the new teaching strategy over the old with most indicating the value and helpfulness of the stated learning objectives and sample exam questions provided in each learning module.

Pre- and posttest results and individual questions on tests and quizzes suggest that in general the printed modules and manuals perform well. Results of testing of material covered in modules or manuals, but only peripherally covered in class, indicate that students were able successfully to study material on their own and to learn from this self-study material.

Analysis of tests and quizzes in comparison to learning objectives and sample questions as well as student evaluation, questionnaires, and interview responses have indicated a few specific weaknesses.

1. A few errors and ambiguous areas in module texts have been pinpointed.
2. While learning objectives and testing are generally in agreement, discrepancies exist.
3. Students find illustrations in modules useful but not as valuable as photographs, slides, or live examples.

Grade Recording And Statistics Program For Microcomputers

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Introduction

The calculation and dissemination of grades to students and administrators can be a time consuming component of teaching. If a computer program is used effectively, it will not only reduce the time involved in calculation of grades, but it will also reduce the time involved in disseminating the information since the grades can be printed by the computer's line printer. If grades are disseminated periodically, it will virtually eliminate student inquiries concerning grades and increase the effectiveness of the non-teaching function of the professional. The purposes of the grade recording program described in this paper are threefold:

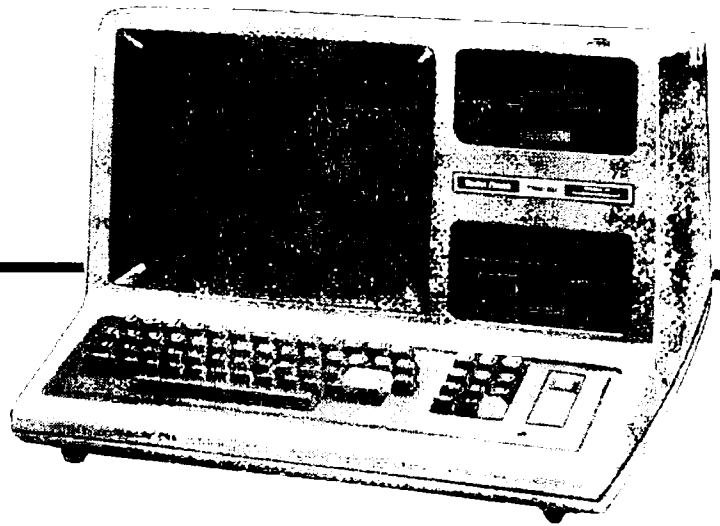
1. To minimize the amount of professional (teacher) time used to calculate student and course grades.
2. To allow the student to verify the grades recorded for each assignment.
3. To inform or update students of their course grade throughout the semester.

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While minor flaws were discovered in the new teaching strategy, overall, this format using graduate teaching assistants and printed modular learning aids is successful. Student learning and acceptance of this new strategy was highly uniform between sections. The success of this project establishes the feasibility of using GTA's to release faculty members to design and teach more advanced courses. To assure the quality of instruction, faculty will supervise the course each term and revise materials as required. It is expected that students will benefit from the availability of advanced courses made possible by this use of GTA's while students enrolled in this Indoor Plants course will be assured of uniformly high-quality instruction.

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The grade recording program is written in the BASIC programming language compatible with the TRS-80 Model II Radio Shack microcomputer. The TRS-80 Model II uses an eight inch magnetic diskette. For the grade recording program, a line printer is used to display the student scores and grade statistics.

The grade recording program is interactive; that is, program options are selected from a list and information is typed on the keyboard and stored in response to questions from the computer. The program is written to allow nonprofessional and nontechnical personnel to enter all the necessary grading information from the teacher's written records. Thus, in the author's opinion, the grade recording program is complementary to the written grade book and not a substitute for it.