

# PRESIDENTIAL ADDRESS

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## Minicourses and the Audio-Tutorial System

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A student can select four variations of coffee from an ordinary vending machine, but when he enters the classroom he may receive instruction identical to that of several hundred other students. It is an obvious fact of life that people exhibit great diversity, interests and capacities, yet our educational system is made up of large blocks of content (courses) with little or no provision to break the lock-step of time, content or instructional procedure. There is some justification for the classroom approach however, since education is not just a dispensing procedure and the teacher is vital to the learning process. Many people can trace their excitement about a specific subject to the special way the subject was presented by a great teacher. Unfortunately these "great teachers" are rather rare and physical limitations permit only a few students to "sit at their feet." While it is true that the talent of these teachers has been made available to some degree through their writings, many good teachers never write for publication, and even so, the limitation imposed by the printed word negates the potential of the teacher for the clever use of tangible objects and sound.

Hopkins has suggested that the best learning situation is the "teacher on one end of the log and the student on the other." Hopkins assumed the teacher was a "good" teacher and, if one can assume the log was figurative, the concept serves as a proper model for the Audio-Tutorial (AT) system. The AT system used in conjunction with minicourses, while retaining compatibility with the conventional educational system, has great potential for providing students with improved access to "good" teachers and with some other important features such as greater individualization. This paper attempts to describe a pilot study currently being conducted at Purdue University.

### History of the AT System

At Purdue University the author began an attempt to provide a remedial program in a freshman botany course in 1961. The initial effort involved the production of a weekly lecture on audio tape. This was soon expanded to include: 1) tangible objects (specimens, experimental equipment, models); 2) printed materials (texts, study guides, journal articles); and 3) projected images (slides and movies). Ultimately the program was produced by assembling the appropriate items ("logs") and, while sitting among these items, recording on audio tape the conversation one would expect to use with one student while tutoring the student through a sequence of learning activities. The product, *i.e.* the tape and

other materials, was then duplicated as many times as necessary to accommodate all students. Because of student enthusiasm for the program the procedure was expanded to cover the content for the entire botany course. The course was then restructured to include three major study sessions:

1) Independent Study Session (ISS)

The audio tutorial program was placed in a learning center which was open from 7:30 AM to 10:30 PM Monday through Friday. The student could come in at his convenience and check into a booth. On his way to the booth he would pick up a mimeographed sheet of objectives written in behavioral terms. Other components needed to complete the program (except for the student's own copy of the textbook and study guide) were housed in the booth. Materials too bulky or too expensive to include in each booth were placed on a central table for common use by all students. The student placed the headphones in position and by listening to the tape, he experienced a simulated one-to-one tutoring by the instructor. The student could pace his study as he desired, stopping at any point in the program to use additional resources such as supplemental texts and discussions with the instructor on duty or with peers. Each student proceeded independently of other students and was free to omit any part of the study unnecessary to help him achieve the stated objectives for the week. The prep room was equipped with a table, chairs and a coffee urn to encourage students to take frequent breaks and to enter into discussions with peers over a cup of coffee. When the student was satisfied with his progress he was free to leave without regard to scheduled class time.

2) General Assembly Session (GAS)

This session was scheduled on a weekly basis and included 300 or more students. Activities in this assembly involved an occasional lecture, special films, major exams and other activities that could be done most effectively in a large group. Attendance was required only for certain special events.

3) Integrated Quiz Session (IQS)

This session involved eight students and an instructor scheduled to meet weekly for one-half hour. The primary purpose of the session was to exploit the principle that "one really learns a subject when one is required to teach it". For this session each student was expected to prepare a little lecture about each of the items (logs) used in the ISS. The instructor presented the items in the sequence programmed earlier and selected the student to lecture on a random basis. Thus all students were forced to organize the subject matter in their own minds and could not rely on superficial responses to instructor questions. In addition, this session provided:

- 1) direct feedback on the effectiveness of the components of the AT program;
- 2) an opportunity for each student to know at least one instructor very well;
- 3) each student to be well known by at least one instructor; and
- 4) an opportunity to take care of certain administrative details.

The AT system in this form has been adopted in a great many schools and in a broad spectrum of disciplines (one-third of the papers presented at the Second Annual Audio-Tutorial Conference held at Purdue in November 1970 dealt with subject matter areas outside the field of biology and several were concerned with programs below the college level). Obviously, its effectiveness corresponds directly to the ability of the "good" teacher to prepare the AT programs and to originate the necessary supplementary sessions. Many teachers report highly successful systems (1, 2, 3).

### Minicourses and Mastery

In 1969 when Dr. Robert N. Hurst joined the staff at Purdue University with the assignment to convert a zoology course (Biology 109) to the Audio-Tutorial approach, it was decided to reorganize the content of both the zoology and botany courses into smaller units of information called minicourses. Each minicourse would cover a reasonably coherent segment of subject matter (topic) and each minicourse would have a written set of specific objects suitable for testing the student's mastery of the concepts included. No rigid guide lines were established as to length or teaching strategy. Primarily, the limits of a minicourse were determined by good judgment much as one decides on how to divide a book into chapters. Approximately 30 minicourses were identified for each course and several of these minicourses covered subjects common to both zoology and botany. It was clear that if students were required to master the objectives in their first study of the common minicourses it would be redundant to involve them with the same subject matter a second time in the subsequent course.

As each student mastered the objectives for a particular common minicourse, it was recorded on his individual card and he was not required to repeat the minicourse study again. Thus, students entering the two course sequence through either botany or zoology and taking the common minicourse during their first enrollment accumulated some time which could be devoted to the exploration of their own interests through the study of optional minicourses during the second semester of their enrollment. The botany and zoology courses which had previously been two distinct four credit hour courses now became a "pool" of minicourses divided into four categories, *i.e.*,

- |                       |                         |
|-----------------------|-------------------------|
| 1) Plant minicourses  | 3) Common minicourses   |
| 2) Animal minicourses | 4) Optional minicourses |

Students entering the botany-zoology complex by the way of botany were required to take the plant minicourses and common minicourses and those students entering the complex by way of zoology were required to take the animal minicourses and common minicourses. Optional minicourses were selected by the student during the second semester of enrollment as needed to complete the requirement for the full four credit hours in botany and four credit hours in zoology.

Most of the objectives for each minicourse were written at the knowledge and comprehension level, and when a student achieved mastery for a given minicourse he had a C entered on his record for that minicourse. After completing the required number of minicourses at this level, the student was awarded a grade of C in the course for which he was enrolled. A student who had not completed the number of minicourses required for the course for which he was enrolled was given a grade of incomplete with the opportunity to complete the uncompleted minicourses during the subsequent semester. At that time, the incomplete would be removed and a permanent grade would be assigned by the Registrar's office.

Students who wished to earn grades of A or B could do so by completing additional activities requiring a greater knowledge and "understanding" of science, a greater time input and more creative ability. The A-B activities were administered on a point basis. Students receiving an A were expected to acquire 110 points, while those working for a B had to acquire 85 points. These points were earned by participating in a variety of activities including special examinations, outside readings, research projects, peer tutoring activities, library projects, and other ways agreed upon between the student and instructor.

After two years experience it is clear that it is possible to combine the Audio-Tutorial system with the concepts of minicourses and mastery to develop a learning system which provides a great deal more individualization and flexibility than the conventional lecture-laboratory approach.

#### Some advantages and disadvantages

A partial list of advantages is as follows:

- 1) The primary learning program (AT) can be prepared by a "good" teacher and all his skill in selecting and sequencing learning activities can be made available to each student on a simulated tutorial basis.
- 2) The rate and emphasis of study is directly under the student's control. He can stop at any point in the program to obtain outside assistance (instructor, peer, book or other resources) and can repeat or skip any segment of the program appropriate to his needs.
- 3) The system is designed for success. The expectation is that all students will achieve the objectives of each minicourse. The relatively small units of subject matter are less forboding than

a complete course and a sense of accomplishment is achieved with the mastery of each minicourse.

- 4) There is great flexibility for individualizing course content to the specific needs of students. Minicourses can be selected and combined in a variety of ways to accommodate major goals, interests, capacities and backgrounds.
- 5) Redundancy can be reduced and efficient use of facilities, staff and student time can be achieved.
- 6) Selection of media and instructional strategy is limited only by the creativity of the instructor and his facilities. The nature of the subject matter and objectives dictate the procedure and materials to be used.
- 7) Programs that only involve portable tangible items could be made available outside the Learning Center. Perhaps several minicourses constituting a relatively high proportion of a regular course could be studied at home and thus reduce the cost to both the student and the school.
- 8) The transfer of materials between courses and between schools could be accomplished more readily since each minicourse is essentially an independent learning system and could be easily combined with others to adapt to the local situation.

A partial list of disadvantages is as follows:

- 1) The development and testing of an AT minicourse program is time consuming and requires considerable skill and talent.
- 2) The system requires some psychological adjustment for both student and teacher. The student must assume a greater degree of responsibility for his own progress and make some decisions for himself. The teacher must become committed to "helping students learn" and accept less focus on himself and his role in the learning process. The teacher further must adjust to having all his efforts and objectives exposed to students and colleagues for review and criticism.
- 3) Many factors only tangentially related to the system may be frustrating and create unexpected difficulties which have undue influence on the success of the program. A change from the routine within routine surroundings is never easy.

### Summary

Although the pilot study using the AT system with minicourses and mastery concepts has been underway only two years, it is apparent that it is feasible and practical even in a conventional university setting. Its potential for individualization is well received by students, and the admin-

istration of the program can be accomplished by re-deploying about the same number of staff as required for conventional teaching.

The author's hopes for the botany and zoology students have nearly all been realized. Perhaps more important, however, is the potential the minicourse concept has for providing new ways of "going to college" and for assisting with equal opportunity education and continuing education. Alternatives to the existing educational system are necessary to accommodate the needs of a substantial portion of our population. Many of these people are unable to fit into the regime of "going to school" for a variety of reasons, but they still have a need and desire of expanding their education. Self-instructional minicourses in the format described in this paper can provide the necessary flexibility and portability with no compromise in the quality of instruction. The compatibility of the system with conventional procedures makes it feasible to intermix the two approaches with no loss or problem to the student. The major task now is to produce the quantity and quality minicourses necessary to accommodate the current needs and to devise the additional administrative procedures required to make such programs available on a broad scale.

#### Literature Cited

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