

Implementation of a College Biology Course in High School

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SENIORITIS IS A well-known affliction that plagues many high school seniors. The condition is characterized by boredom, restlessness, loss of interest, and a constant search for "something interesting to do." One approach to coping with this problem has been to offer college-level courses to seniors, as has been done in the Syracuse University Project Advance Program (Chapman and Wilbur 1976; Wilbur and Chapman 1978). Project Advance enables high school seniors to take college courses for college credit at a reduced cost. The courses are identical in most respects to those taught on the Syracuse University campus, but they are taught in high schools by selected high school teachers. Currently, freshman courses being taught in the high schools include English, calculus, psychology, chemistry, sociology, religion, and biology. Thus far, 93% of students requesting college recognition of Project Advance courses have been given official credit and/or exemption from similar courses (Project Advance 1978).

This article describes the implementation of the introductory general biology course at Syracuse University in the high school and suggests guidelines for success in such high school-college cooperative projects.

The Syracuse University General Biology Course

The general biology course as it is taught at Syracuse University is an eight credit-hour, two semester course which has an enrollment of approximately 800-900 students each semester. The majority of the students are freshmen who are fulfilling a science requirement and do not intend to major in science, although the course also includes prospective science majors and pre-medical students. An audio-tutorial format (Postlethwait, Novak, and Murray 1972) is basically used, including individualized study with audio tapes and laboratory materials in carrels. A weekly lecture is given by the course instructor and group sessions of 25 students meet once each week. These sessions are taught by graduate teaching assistants who also assist in the audio-tutorial laboratory.

The course content includes modules on: *The Micro-*

scope and Measurement; A Visit to the Great Barrier Reef; How to Make Sense Out of the Diversity of Life; Evolution and the Past Diversity of Life; Unity of Life and Adaptation; Microscopy and the Electron Microscope; The Architecture of Cells; How Substances Get In and Out of Cells; Chemicals of Life; Proteins and Enzymes; Origin of Life; Cell Reproduction; Animal Development; Genetics; Energy and Life; Plant Structure and Function; Animal Structure and Function (Druger 1971-1978).

Grades are based on a point system. Approximately 70% of the total points are derived from three major multiple choice examinations per semester; 30% of the points come from work done in the group sessions such as essay questions, written assignments, and laboratory reports. A final letter grade is assigned each semester based upon the percent of total points earned by the student. Generally, 90-100% is an A; 80-89% is a B; 65-

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79% is a C; 55-64% is a D; below 55% is an F. These are the general guidelines, but there is flexibility depending upon the mean and standard deviation on the major examinations and special individual circumstances.

Implementation in the High School

Five high schools that expressed interest in the Project Advance Biology course were selected for the pilot project. Three of these schools were in the Syracuse area (Liverpool High School; Nottingham High School; West-hill High School), and two schools were in the New York City area (Manhasset High School; Xaverian High School). All of these schools had prior experience with Project Advance courses other than Biology.

Selection of teachers was considered critical to the success of the course in the high school. Teachers volunteered for the program, and they were approved by the school principal, the Project Advance administration, and the Syracuse University course professor. All teachers were experienced and had strong content backgrounds. Attitude, interest, enthusiasm, and a spirit of cooperation were also considered important. Moreover, it seemed essential to the success of the course that the high school teacher could relate well to the audio-tutorial format and to the University professor supervising the course.

A one-week training workshop was held for the Project Advance Biology teachers and their designated alternates in late June. In the workshop, the teachers reviewed laboratory experiments and discussed philosophy and procedures. In addition to the workshop, each teacher was required to write an adaptation plan specifying details of implementation in his/her school. The plan included information about facilities, equipment, scheduling, lesson plans, testing, grading, and administrative input and support. These plans were reviewed by the University professor and by a Project Advance administrator. Teachers received comments and suggestions concerning their plans. As a result of the workshop and writing the adaptation plan, the teachers had a good idea of what to expect and were ready to implement the course in their high schools in the Fall.

Support of the school administrator was considered a very important feature of the implementation. Budgetary and scheduling allowances had to be made so that the course could be properly implemented. School administrators were very cooperative and supportive. There were several obvious advantages to having Project Advance courses in a school from an administrative standpoint: the academic program of the school is enhanced; the courses are prestigious for the school; "senioritis" is curbed to some extent; students can earn college credit while in high school at low cost; parent groups are supportive of college-level courses being taught in the high school; the Project Advance teachers are stimulated and the enthusiasm carries over to other teachers.

University support of the Project Advance courses also played a positive role in the success of the program. The Project Advance unit at the University coordinates all Project Advance courses and serves as the formal link between the University academic departments and the high schools. Administrative matters are handled by the Project Advance staff, so that University faculty members can concentrate on the academic aspects of the courses.

To implement the course in a high school, physical facilities had to be provided that could accommodate an audio-tutorial program. At the University, two large laboratories with a total of 84 carrels are available for exclusive use of students in the general biology course. Each carrel is equipped with a tape recorder, headsets, a slide viewer, and microscopes. In addition, three classrooms are available exclusively for group sessions. In general, high schools do not have such facilities. Space is more limited, and a separate classroom cannot usually be reserved strictly for use in one course. This problem was resolved in a variety of ways by the schools offering Project Advance biology. In two schools, carrels were already available in combination with a classroom setting. In another school, a laboratory table that extended the length of one side of the room was partitioned into carrels equipped for the course. Thus, students could work individually in carrels at the same time that another class was in session. In two other schools, normal laboratory tables were used without carrels. Tape recorders, headsets, and other equipment were handed to students to be used in class, and were collected and locked away at the conclusion of the period. In all instances, the students were able to complete the work and the course ran smoothly.

Scheduling was another important concern. The audio-tutorial laboratories at the University are open seven days a week and four nights. Students are scheduled for 2-4 hours per week, but they are encouraged to attend laboratory whenever space is available. Also, students attend a weekly lecture and group session. In all, a student studying general biology at the University spends about 350 minutes per week working in this course, although the total varies depending upon the module being studied. Usually, the high school setting does not allow for such open access to the laboratory. Project Advance Biology teachers had to work out a schedule for their classes that would closely parallel that at the University. Guidelines indicated that about eight periods (40-50 minutes each) per week would be most desirable, including two formal group meetings and the rest of the time being devoted to the audio-tape modules. Inclusion of double periods was recommended. It was acceptable to schedule fewer periods per week, provided that the students had access to the audio-tape materials in addition to the scheduled times. Teachers developed schedules and arrived at formulas that were satisfactory for completing course requirements.

Scheduling varied considerably from school to school because the entire two-semester course was not adopted uniformly by all pilot schools. In one school, only the first semester of the course (plus some second semester modules) was offered during a single semester. In another school, the one-semester course was spread over three-quarters of the academic year. In a third school, the one-semester course was spaced over the entire academic year. In the other two schools, the full-year course was offered over two semesters. Teacher reactions indicated that the best format would be to have all schools offer the entire course as a two-semester course. This procedure was followed for all high schools offering the Project Advance biology course during the 1978-1979 academic year.

Although the core of the course in the high schools was taught using audio tapes and guidebooks developed by the University professor, the high school teachers made substantial contributions to the course through their regular group sessions and one-to-one contacts with students. Many of them provided a variety of supplementary materials. The teachers' sense of partnership, derived from making their own contributions to the course, was considered important to the implementation. Teachers were encouraged to reinforce the core by using their special talents and by incorporating supplementary materials that they had developed over their years of experience. In essence, an attempt was made to ensure that the course was cooperatively taught, the overall aim being to provide students with a superior course that would have a lasting impact.

Regular communication reinforced the cooperative high school-University relationship. In accordance with the general policy for Project Advance courses (Chapman and Wilbur 1976), the University professor and a Project Advance staff member visited each participating school once each semester. These visits enabled the University personnel to observe the course firsthand, review exams, papers, grades and course records, offer and receive suggestions for course improvements, and discuss problems and reactions of students, teachers, and school administrators. A group seminar was held where teachers shared their experiences and discussed problems and suggestions for improvements. Letters and telephone calls were also important avenues for communication. To reinforce the cooperative nature of the course, the high school teachers were given adjunct faculty status in the Science Teaching Department at the University.

Although a formal evaluation of the Project Advance biology course has not yet been undertaken, reactions from students, teachers, and administrators have been very positive. Students reacted favorably to module-by-module questionnaires on the course. An interview analysis of teachers' perceptions of the Project Advance Biology course revealed a positive reaction of the teachers involved (Spector 1977). Some comments

made by Project Advance teachers were:

The whole day is totally different. I took forward to the afternoons. I look forward to them (Project Advance students) coming in. It's just so different, it's unbelievable. ...One of the reasons why I was very happy with Project Advance Biology (is that) it was a different approach. This course has already succeeded in "turning on" some kids I never thought would be turned on to it...people who just plain don't like science...it's already turned them on. That to me is exciting. Just watching them is fantastic... I think it's an excellent biology course also. In other words, they are learning something as well as being turned on at the same time. How can you beat it!

Interest in Project Advance offerings is growing. The success of the biology course in five high schools has led to the implementation of the course in 12 high schools during the 1978-1979 academic year. All persons involved seem satisfied with the course thus far, and continuation of this cooperative high school-college project should enable many high school students to benefit from this opportunity in the future.

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