

Student Achievement Through Individualization

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MY FIRST OPPORTUNITY to develop an individualized program came in the spring of 1972 with an introductory genetics course. Although several attempts to obtain seed money to develop an audiotutorial course had failed, I determined to make such a system work for this course without financial support, provided I could get student support. My 14 students overwhelmingly voted to support me in my first attempt. We had no money to purchase hardware or commercial software, no learning center facility—just a normal locked-in time scheduled class room and six hours per day student federal work study secretarial help that was shared by nine instructors. In addition, I was teaching a plant taxonomy and a general biology course. I often thought to myself, "If the students and I can make this individualized audiotutorial course a success, there is no reason why it couldn't be done anywhere else." In spite of enormous obstacles, the project started with great zeal spring quarter 1972, and has been carried on through this spring quarter 1975.

Individualization of Course

I told my students, and enjoyed doing so, that I would do my best to see that none failed this course. To help ensure successful student achievement I used at least the following guidance factors:

1. *Allowing time to vary.* Each student was permitted to achieve specified instructional objectives at his own rate of speed.

2. *Allowing students to use varied media and modes.* Each student was permitted within the limits of our physical facility to choose the learning method which best suited him personally. Lecture presentations, small group instruction, and independent study sessions were available to all. In addition, a few media modes were available on an individual student basis.

3. *Giving individual attention.* The individual's unique qualities were given full attention on a one-to-one student-to-teacher basis.

4. *Allowing variable repeatable testing.* Each stu-

dent could take at least two different exams over the same material. His highest score was used to compute his course grade.

5. *Allowing students "A" and "B" points beyond a "C" mastery level.* Each student was required to maintain a 60% "C" mastery level and allowed various methods to achieve the "A" or "B" learning level. The major ways students could earn "A" and "B" grades were (i) putting together model kits and passing oral and written tests on them; (ii) studying additional chapters not covered in the course on genetics and taking a written exam on them; (iii) passing an exam on the first try with greater than 85%; (iv) writing a term paper under instructor guidance; (v) doing a genetics research project under instructor guidance; and (vi) writing a minicourse on genetics.

6. *Allowing students a voice in their education.* Students wrote down any suggestions, criticisms, or problems they wanted solved and put them in a student voice box signed or unsigned. These comments were always covered during the next large group instructional period. Personal problems were discussed in a confidential private interview.

The first year all cassette recorders and many cassette tapes were generously donated by students, and students willingly helped make duplicate tapes with their own recorders. By the spring of 1973, through a student money-making project, Peter A. Nyberg and I were able to purchase nine cassette recorders and some 2 x 2 slide projectors. However, students still provided their own personal cassette recorders in most cases. *The Science of Genetics*, by George W. Burns (1969) was used as a student study guide. Instructional objectives were developed for the first 13 chapters of the textbook, and each student received a copy of these as he progressed through the course. In addition a course syllabus was prepared which outlined the genetics course individualized system. I purchased my

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Table 1. Distribution of grades earned in introductory genetics at Dixie College, spring quarters 1970-74.

Year	A	B	C	D	F	Inc.	Total Class	G.P.A.
<i>Lecture course</i>								
1970	4	5	3	2	2		16	2.44
1971	7	6	13	9	11		46	1.76
Total for lecture	11	11	16	11	13		62	1.93
<i>Individualized system</i>								
1972	2	5			2	4	13	2.55
<i>Inc. changed to A-F</i>								
1972	3	5			5		13	2.08
1973	5	3	4		2		14	2.64
1974	9		1				10	3.80
Total for individualized	17	8	5		7		37	2.76

own cassette recorder, with which I made my tapes. With no recording room available, I recorded my cassette tapes in my office late at night and early in the morning when there was no noise. Each chapter's instructional objectives were covered on one side of a C-60 tape. Effort was made to limit the tape discussion of each chapter to less than 30 minutes. Instructor counseling was made available any time the student needed help.

Results of Individualization

Table 1 summarizes the grades earned during the last five years of introductory genetics at Dixie College. It should be noted that this course is frequently taken the last quarter of a student's junior college experience. Students who received incompletes or F's after 1972 never finished the class either because they were no longer enrolled at Dixie College, had poor grades in other classes, or were prevented through discouragement from successfully completing the course. This individualized program does not assure successful completion of the course, but it does assure that if failure occurs it is *the student's decision to quit and not the administrative grading system he is under.*

Table 2 shows that the number of students earning "A's" is over 25% higher in the genetics individualized system than the lecture course taught by the same person. The number of students earning "A's" and "B's" is over 30% higher in the individualized course. Over 40% of all students taking the class received "A's" on the three-year average, which is considerably higher than many conventional courses.

Further, less than 20% of the students taking audio-tutorial genetics during 1972-74 earned less than a "C" grade, while most conventional courses would fail considerably more. Adjustments, new hardware-software, and improved procedures caused significant student achievement. From 1972 when audio-tutorial genetics was first initiated to 1974 there were 23.1%, 35.7%, and 90% respectively of the stu-

dents in each successive class who earned "A" grades.

Major Outcomes

The major goal of this project was to produce significant student achievement. I feel that students did become highly motivated to learn under this system. The three-year percent average of students receiving "A" and "B" level of knowledge and comprehension was 67.5, which indicates to me that the individualized system has significantly improved the former course.

The following generalizations are based on student evaluations:

1. Students greatly appreciated being able to study at their own rate of speed rather than having to go as fast or as slow as the rest of the class. In addition, students who became ill or injured expressed gratitude that they could return and take up exactly where they had left off or continue their studies on the sick bed. Student freedom and flexibility was considered by students to be one of the strongest points of the course.

2. Instructional objectives which let students know exactly what it was they were to learn was considered by students an outstanding feature.

3. Immediate knowledge of the test results coupled with practice sessions was felt by most students to be two outstanding elements of the individualized system.

4. Three other things which students listed as very strong points of the individualized system were (i) instructor willingness to help students; (ii) peer student tutoring program; and (iii) "A"- "B" level points being allowed to students.

Individualized Benefits

I believe that the individualized genetics program has offered many benefits to the student. Students developed a sense of responsibility for their own learning. They were immediately immersed in the learning process so that their active involvement increased their commitment to the learning task. Self-discipline was enhanced as a natural outcome.

Students developed a sense of self-achievement. Many learned for the first time that they could find things out on their own and pass exams! Because the burden of learning was placed on the students, they found out the why and how of problems rather than simply memorizing the answers.

Students became more confident in the validity of

Table 2. Comparison of grades earned in the genetics lectures course and the genetics individualized system, spring quarters 1970-1974.

	% A's	% A's and B's	% D's and F's
Lecture average (1970-71)	17.7	35.4	56.4
Individualized average (1972-74)	45.9	67.5	18.9

their own ideas and in themselves as individuals. They were able to go into greater depths in areas of their own interest and they were not forced to study material that was already familiar to them.

The system allowed students to master each gradual sequenced step before proceeding to the next. As a result, there were fewer failures.

Such a system can also be of benefit to a departmental budget. Ours is inexpensive compared to the sophisticated media approaches presently being developed, and its low cost and simplicity would allow it to be adapted to a wide range of teaching situations. The time involved in the preparation of instructional objectives, tapes and other materials was great, but more time is involved in minicourse development involving the preparation of student study guides.

I feel this individualized system will cost less, can teach more students per instructor using less building space, and is more efficient in teaching students than the traditional approach. I am excited with the great potential impact individualization has on student achievement. Student evaluations of the course also indicated that this was one of the most rewarding they had ever taken.

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OBIS . . .

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record student involvement during 5 of the 9 lawn activities for 4 of the leaders. This technique, utilizing still photographs taken at predetermined intervals with a wide-angle lens, allowed for the quantitative determination of in-field behaviors. For each picture, the percentage of students actively engaged in the activity was determined. An average of 90% of the students were actively involved in lawn investigations when the pictures were taken.

Conclusions

The OBIS development and evaluation resulted in significant changes in the lawn activities. The activities developed to investigate the role of man in the lawn community were not successful or particularly

motivating when used with youngsters, so these activities were dropped. This is not to say that an OBIS activity cannot or will not center on the role of man in the lawn community but only that this specific activity failed. On the other hand, the idea of population census using a quadrat census technique (Bean Bugs) was both educational and fun.

General comments from the evaluation of the lawn unit follow:

1. Many community groups have difficulty arranging ten weekly visits to the lawn.
2. Groups would prefer to visit a variety of sites.
3. Groups desire the flexibility to select activities that are consistent with group size, weather conditions, and availability of transportation.

These are some of the reasons that the OBIS format was changed from a unit approach to a single activity approach.

An effective curriculum development project requires three main components: ideas, trials, and evaluation. Ideas can come from any place at any time and do not require the structure of a project for their origin. However, for an idea to be made available to a broad audience, the idea must be formulated into an activity and tried repeatedly with youngsters. During each trial the effectiveness of the activity must be evaluated on the basis of certain questions. Is the activity idea clear to the instructor? Does the instructor have all of the necessary materials and knowledge to convey the idea to the youngsters? Is the idea actually conveyed to the youngsters? In the case of OBIS, activities are designed to be both educational and fun. Unlike typical school programs, OBIS activities must compete for time with sports, crafts, recreation, and social events. Therefore, OBIS materials are evaluated for enjoyment, usability, and educational soundness.

Evaluation, from a curriculum project's point of view, is a vital tool which must be a dynamic part of staff activities to be of maximum use. The evaluation described here is not a meter-stick by which we measure how superior our approach and materials are to the products of another project but rather an internal set of checks and balances by which we screen and scrutinize our products to insure that they are the best we can produce. We hope that any individual or group of researchers undertaking the challenge of turning ideas into curricula will find our methods useful as a model or at least a point of departure for designing development evaluation schemes.

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