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Given: The Chance

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GIVEN: THE CHANCE

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Every student: the average, the below-average boy or girl who finds school work difficult but does not wish to "drop out," and the above-average or gifted individual whose natural curiosity and investigative desires become impatient with the ordinary day-by-day pursuit of knowledge, has the "chance" "to be me"; that is, to be him/herself, in a flexible, modular program of instruction.

This paper presents some practical suggestions for motivating the "educationally uninvolved" student on the one hand, and challenging the intellectually gifted student on the other. Teacher-planned, but student-oriented and directed, three courses geared to the pace of the individual student, are described. The net result of two of these courses as approached the past two years, is a reasonable degree of success leading to a strong acceptance on the part of the author of the basic philosophy of "Schools Without Failure." The third is a new plan to be introduced in the author's school in the fall of 1971.

Three years ago I wrote a paper for the Iowa Academy in which I advocated that single-topic units be the basis of independent study and research for the general student of biology, though the same could have been applied to any of the sciences or even to other content subjects.

At that time, our school was still on the traditional time pattern and I was supposedly teaching both the Blue and the Yellow BSCS versions of biology. Actually, I was using an innovative approach whereby I presented to my a unit topic, then allowed them to proceed more or less at their own rate. After completing one of these teacher-suggested units, we progressed a step further and allowed the students to select their own topic. I followed a similar program for the advanced senior group. The plan has since developed into a form of individualized instruction.

Before going further, perhaps I should explain that when I wrote "the Mini-bloc: Chance and Challenge for Independent Study," I made a special effort to relate this to the average student. It was my contention that students at both extremes--the very lowest and the uppermost levels had received a sufficient, if not an undue, amount of attention, and that the greater majority of students were expected to progress without the benefit of individual consideration.

The following year our school adopted the flexible-modular system of programming. This, plus a change in the science department personnel, allowed me to take the lower level sophomores for biology and to expand our advanced biology course for seniors. We do not have strict homogeneous grouping, but we do attempt to offer our students a variety of courses and electives to correspond to their abilities. Presently we have a biology course designed for the less-gifted student in addition to the BSCS Blue and Yellow versions.

For those of you familiar with modular scheduling and open labs, I need not explain that three preparations (7 sections) proved a rather heavy load to do justice to a "mod" program. Moreover, I was teaching a modified version of the BSCS/traditional approach, which required additional planning. It was in this area that I used the mini-bloc.

Teacher-planned, but student-oriented and directed, flexible scheduling has led the past two years to a reasonable degree of success--tending to strong support on my part of the basic philosophy of the proponents of "Schools Without Failure."

Given the chance, the students will spark their own enthusiasm; they motivate each other; they really don't need a teacher--that is, not the type of teacher who dispenses facts and bits of information every so many days, periods, or mods. The kind of teachers that today's youth need and are looking for--to help them pursue their varied interests at their own rate and ability, and according to their own scheduling of time--are teachers who understand that sometimes they (the students) will run; sometimes, crawl. In addition, students need the kind of teacher that will rejoice with them when things are progressing well. However, teachers are needed who will wait patiently and confidently for an individual student to "see through" an idea. Finally, students need teachers who will allow an "unfinished mess" to remain on the counter or desk top rather than insist that the room be cleaned after each lab.

This year, having been relieved of the BSCS groups, I have been able to devote more time to the preparation and the direction of individualized performance. With both groups of students,

that is, at both levels, I use basically the same approach. Might I say now that from both groups I have received similar results, allowing for differences of topic, ability, and to some degree, self-assurance and self-acceptance.

The modular system is no panacea for educational ills. Our two-year experience makes me see a need for making changes and revisions continually. At this point in time, I see a need to "shock" our teachers and our students into a far greater measure of independent work than either modular scheduling or a mini-bloc approach provide, though the latter serves as an excellent springboard for individualized instruction.

Granted: some students can go along at a normal pace. In a sense they have no problems. Other students, however, are not able to go as fast nor as well. These students experience feelings of frustration, a sense of inability; therefore, a degree of failure. Some work rather well, but cannot complete a given amount of work in a given amount of time, so that they steadily lose ground, and eventually, lose interest. Finished or not, too often they have been pushed into the next unit--on schedule.

Need for Individualization

We must face the fact that all are not born equal, neither in ability that moves them to do the best, nor in levels of achievement they may reach.

As far back as 1940, our community supervisor, well in advance of the times, repeatedly urged us to "make allowances" for individual differences among our students. Since that time, other educators have recognized this need and have directed us to gear our teaching toward this end. Somehow the message did not get through. Even the recent new approaches, including those entitled "enquiry" have widely missed the mark in satisfying individual needs of students. For some reason or other, it has taken these 28-30 years to really make educational inroads to individualized teaching.

In a study made utilizing two approaches in teaching BSCS biology, the group and the individual approach, it was found that the individualized class rated the teacher's ability to make the material understandable higher than the rating given by the students in the group approach (Fulton). Also, the results of this study support the other conclusion that students in an individualized (self-pacing) approach to science instruction, develop a better attitude toward science than do students in a group approach. I dare say these findings are not limited to the BSCS approach, nor only to biology.

An individualized approach to teaching science allows for a greater personal interaction between the teacher and the students. This makes more time available for the students who need extra help.

Individualizing Instruction Within a Group Structure

But, one of my purposes in speaking today was to share with you some of the techniques and practices that I have found most effective in my efforts to individualize instruction within a flexible schedule. Whatever their level of sophistication, investigations involve questions, problems, and puzzling phenomena that cannot be resolved without the use of science materials and equipment whether in the classroom or laboratory.

The value of unscheduled scheduling is the freedom of the student to do what needs to be done NOW. Varied processes are used as they are needed in the investigations or studies.

Let me digress here to say that we have formulated our own program for ninth graders to accommodate the varied backgrounds with which they come to us and to lay the foundations for the courses offered at the senior high level.

Basic techniques are taught through two introductory units--one called "The Tools of Science"; the other, "Measurement." The use of the slide rule is included in the latter. With the exception of the very few (20 or so out of approximately 200) all ninth graders go through the same program. Individual differences are allowed for in the nature of the assigned readings and in optional laboratory exercises. We have found this program of tremendous value to us at the senior high level.

Individually, students employ themselves in examining specimens or slides; investigating natural phenomena, recording data, viewing filmstrips, either singly through a previewer or in a group using the regular classroom projector in a section of the room reserved for that purpose.

Others, wishing to go ahead, come in to report on their progress, to take one of several tests

available over the unit studied, or simply to read. Giving students the option of choosing the specific topic they will study, has generally raised the whole level of participation and achievement. I say generally, because there are the usual exceptions.

To say that the flexible schedule method is easier than the traditional is to falsify the situation or the approaches that must be taken to make the system advantageous for the students.

Experience with the "mod" system has convinced me that the best teaching and the greatest learning take place when each student is progressing at his own rate on a topic that interests him. You may question: But don't they miss out on too much? Topics they do not choose? Subjects they claim not to like, so avoid? I answer "No"; not if the teacher assumes the role of guide. I am sure most of you would agree that the best teachers are those who inspire others to learn on their own. It is easy to teach facts, but a good instructor is one who merely sets the stage for learning. The traditional method does not give enough leeway for personal interaction between student and teacher. As a teacher in the mod system, I find a far greater demand on my time and energies than ever before. Individualized instruction is highly challenging; requiring, indeed demanding, a continual alertness to each one who comes into the classroom, whether scheduled or unscheduled. So, what do I I do? and what do I do by way of motivation? Let me give some practical approaches and methods. Perhaps the easiest way to make these useful is to enumerate them as so many do's and don't's.

1. In the very first meeting establish rapport; treat the group as perfectly normal. After all, though not perfect, they ARE normal. Low ability is not equated with abnormality.
2. Raise their self-esteem without reflecting their learning difficulties. Talk big. Whenever possible, find a similarity between their studies and those of the other divisions. In my situation, I have been able to make some comparisons to work done by the advanced senior class. (Example: chromatography; though certainly on a vastly different plane.) This is "big talk"; this makes them feel important--a part of the whole group, rather than a group set apart.
3. Allow freedom of choice whenever possible. For most exercises I type out and duplicate 3-5 different versions. For example, when preparing labs for testing food types, I plan 3-5 different papers all asking for the usual tests for sugar, starch, protein, fats, Vitamin C, etc., but each significantly different to instigate comparisons and exchanges during small group interaction.
4. Show enthusiasm at results, even though they are not exactly what you had expected. Or, are they? Knowing your group, you really DO know what to expect, so, if someone makes a slide--good by your expected standards--compliment him. If the structures show clearly, exclaim your delight, "Perfect!" "The best slide I've seen (and it may well be; if not the best you have ever seen, perhaps the best that day. You need not explain the depth of reasoning or judgment.)

If others are present, call them over to view the "masterpeice," or suggest to the student that he let others see it. This has several values. It uplifts the one who made the slide. It teaches others what to look for BEFORE they expose their lack of understanding; gives them new incentive to try again; saves them from embarrassment in calling you over to approve an "air-bubble" or a "scratch on the cover slip." It stimulates others. Peer approval is by no means dead or unwanted.

5. Frequent checking is a must for the low achievers. They look forward to having their work approved. A check on any one piece of work entitles the student to another. Yes, entitles is the word. If they are to progress at their own rate, they must be dealt with individually--whenever they are ready.

However, most of my checking is not for errors. Drawings are checked and credited when completed. A check then, means "Go ahead." Sometimes I must suggest what they ought to do next; more often, they ask, "Can I do such and such NOW?" Let them.

Motivating Devices

For those in-between times, when students are looking for "extra-credit" work (which I seldom approve as such, but allow occasionally as an incentive), or when there seems to be a "drag" in studies, I have on file a series of crossword puzzles. On a dreary day, or when tensions run high, I have the entire class work on these in groups of 3 or 4. Some enter into a spirit of competition which relaxes them. If the puzzle is an exceptionally helpful one, I allow them to take it with them to complete; sometimes I collect the papers, telling them that whenever they wish, they may come in to finish it and get extra credit. This gives me a chance to give those students individual attention; then,

too, because they like to work these puzzles, it is an invitation that brings them in for extra mods.

On certain occasions I collect the papers, then return them at a later date for completion. In the meantime they have had a chance to do more reading and questioning.

At times we allow a longer time for pursuing a topic. At the start of the second semester, I allowed one of my groups to read at random for two days during their scheduled classtime. Then I asked them to select a particular area of concentration related to body structure. This was interpreted to mean they could select to study any animal within the vertebrate group. Approximately two weeks were given to individual study, investigation, and dissection (for those who chose to do so). The oral reports presented were great--a personal triumph for students who typically met with little success or recognition. The worst I received in this venture of freedom was an attempt by a student who wrote his report, to read it. A simple reminder was sufficient. One boy became so fascinated with his topic on snakes, he held the attention of the class for 30 minutes.

And these are the students labeled "non-academic." They are NOT "non-academic"; for, given the chance, they have performed in a most academic way.

From indifferent nothingness, together we have forged a something. I have yet to get a less than adequare summary or oral report at the conclusion of a piece of work that a student has done on his own. So, . . . who cares if a written report on a filmstrip is entitled "PLASTIC Worms that Invade the Body" or "The Evolution of SECULAR Plants?" I accept these without comment.

Perhaps the initiative and enthusiasm generated by allowing students to select their own "research" topic will be our most lasting contribution. But once students have tasted success, we have accomplished a great deal. Whether low-level sophomores or advanced seniors, the students now explore questions and problems to which the answers are not readily available or known. In a sense, ALL my students do "research"--student research. Factual, or "memorized" learning is no longer sufficient for today's changing society. Today's fact may not be a "fact" tomorrow. Two centuries ago, Disraeli gave us the clue: "Experience is the child of thought, and thought is the child of action."

Quite frequently a student is slow, but when he has thought out his problem, planned his procedure, and completed his task, he is satisfied. For him this spells SUCCESS. As a teacher I must question the value of speed versus understanding and a sense of accomplishment. The attitude of the student cannot be neglected; attitudes developed toward subject and teacher may exert the greater share of influence on the learning environment.

One of the most rewarding evidences of success in my attempts to individualize instruction is the acceptance of students by themselves; the changeover of negative feelings about themselves to more positive feelings. So why not create interesting situations? Why not let the student learn what he enjoys doing?

Challenging the Gifted

My second aim as given in the abstract, was to present practical suggestions for challenging the intellectually gifted student. Earlier I had stated that I apply the same techniques for these students as I do for the lower achiever. So, with them, too, we begin with teacher-suggested topics.

The course as it is now, is comprised of four units: Chromatography, Complementarity of Structure and Function, Phycology, and Radiation--approximately one quarter allotted for each. This year we had two labs and two seminars per cycle of 6 days. Next year, only the two seminars will be scheduled. All lab work will be done on the student's own time.

To illustrate the operational procedures for a unit, let us look at Chromatography. We took several field trips during which time we examined various plants: their pattern of growth, their floral structure. This led into a discussion of taxonomy, which soon narrowed down to taxonomic studies through chromatographic techniques. I posed the question: Can we find relationships, or, what relationships among plants or plant families can we find by comparing pigment extractions? I asked them to consider possible projects or research studies along these lines and allowed them the remainder of the quarter (if need be, the the time may extend into the next quarter) to complete such a research study. The only direction I give is relative to the write-up of a research report. Actually I have incorporated this information into the manual prepared for use in our school. Several college texts and lab manuals are available for their use, but no definite or detailed directions are given.

Some of the ideas that were investigated on an individual research basis were "A Comparative Study of pH values and pigmentation in Zebrina in respect to light"; "Absorption Spectra of Chloroplast Pigments," and one that is being presented today at the Junior Academy "Analysis of Environmental Effects Upon Pigments in Tomatoes." Some made a study of colors using the same color but different species of flowers; others compared pigmentation within the species, but of varying, related colors, as purple, purple and white, white with purple markings, etc. The Spectronic 20 was of great interest and help in this unit.

For Structure and Function Complementarity, we use as a base the BSCS block, but expand it to include the cell, cell membrane, the endoplasmic reticulum, flight muscles of insects and birds, muscles and movement of bipeds and quadrupeds. Some 20 plus Scientific American reprints are studied in connection with this unit.

For the most part, the advanced group is expected to proceed on their own. Frequently, and this is usually the case, they come into the classroom, begin to work, so that we exchange little more than a greeting for an hour or so. I do, however, make it a point to inquire at least once how they are getting along. Most know what they need to do; they discuss freely among themselves, they plan to meet for group work, etc. The year has been one of great challenge for them and of pleasantness and happiness for me as far as their performance is concerned.

Science Experiences for Terminal Science Students

My last promise was to give some indication of our plans for next year. We have structured a course called "Science Experiences." Originally the plan was to offer this to terminal students at the junior-senior level only. However, requests from others persuaded us to include terminal science students as well as the overall terminal students. The class will be taught by four teachers and will comprise four areas of interest: Earth Science, Biology, Chemistry, and Physics--all on a level that the terminal student can handle. The schedule calls for two meetings per cycle of 6 days, each 3 mods or 1 hour in length. For these students we will prepare lab sheets of specific directives.

The need for such a course is based on four major goals: (1) to provide a credit course for those who need an additional 1/2 unit but who find other courses difficult; (2) to occupy or provide something for those students who have time on their hands; (3) to develop some technical skills and to encourage attitudes that will be useful to the individual without demanding performance that is beyond his ability; and (4) to introduce the student to a broader understanding of various sciences. Students who are more capable may contract for additional work and receive full credit or unit of credit.

In the past decade's song-hit, "I've Got to be Me," we find an expression of a sincere urgent plea of youth: "Help me become what I really am. I've got to be me. I cannot go beyond what abilities and talents are within me by nature, but help me develop those I have," cry the less-gifted segment of our classrooms; the unfortunate who feel alone and friendless. This the plea of the misunderstood; the yearning to be freed from pressures and the unpleasantness of repeated failures.

It is likewise the cry of the soul fettered down to earth who would soar beyond the immediate, tangible--into the unknown future: "I'm ready to go on; don't stop me," this student pleads. As never before the young people of today are pleading for understanding. They need our help. They seek it. In today's world and in today's schools, there are no back seats in which to hide. The stage is set and open to all--given the chance.

Literature Cited

Fulton, Harry F., "A Comparative Study of Student Attitudes Toward Science and the Ability of the Teacher to Make Material Understandable in Individualized and Group Approaches to BSCS Biology," School Science and Mathematics, Vol. LXXI, March, 1971, pp. 198-202.

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