

1964

An Analysis of BSCS Biology in Use for First Time

George Chapman

Follow this and additional works at: <https://scholarworks.uni.edu/istj>



Part of the [Science and Mathematics Education Commons](#)

Let us know how access to this document benefits you

Copyright © Copyright 1964 by the Iowa Academy of Science

Recommended Citation

Chapman, George (1964) "An Analysis of BSCS Biology in Use for First Time," *Iowa Science Teachers Journal*: Vol. 2: No. 2, Article 4.

Available at: <https://scholarworks.uni.edu/istj/vol2/iss2/4>

This Article is brought to you for free and open access by the IAS Journals & Newsletters at UNI ScholarWorks. It has been accepted for inclusion in Iowa Science Teachers Journal by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

Offensive Materials Statement: Materials located in UNI ScholarWorks come from a broad range of sources and time periods. Some of these materials may contain offensive stereotypes, ideas, visuals, or language.

ARTICLES

An Analysis of BSCS Biology In Use for First Time

GEORGE CHAPMAN
Manchester

An analysis of the use of a particular program should examine the situation as it exists prior to adoption of the program. This is particularly true in an examination of a biology program.



Chapman

In the West Delaware County Community High School the laboratory was fairly new, with five sinks and a 3' x 10' lab table in the rear. Additional tables and chairs in the front of the room could be used as laboratory tables. Otherwise the equipment in the room was probably less adequate than that of the average high school. Because of this, extensive ordering had to be done in order to adopt the BSCS Blue version.

Since the text was to be adopted on a trial basis in only two of the six classes, ordering had to be limited and some expensive items eliminated. The most reliable list of equipment was found to be the one published by BSCS headquarters and available free of charge.

In ordering for only two classes it was necessary to have almost as much glassware and other permanent items as if the ordering had been done for all six classes. The greatest difference was the smaller amount of expendable material needed.

Many schools already have the basic glassware needed for the Blue version and this could perhaps be shared with the chemistry department. In this case since the chemistry laboratory was on another floor,

complete glassware was ordered for the biology laboratory. This amount needed totaled \$250 for glassware.

The emphasis in the traditional course in biology has been on knowledge of a body of facts. What these facts were to be depended on the teacher to a large degree. The idea of the "new" approach is that these facts are not as valuable to a student unless he can use them to reason to a conclusion or apply them to a real situation. This is what the good teacher has been doing for years. However, the laboratory exercises that most schools use do not help the student or the teacher in his pursuit of the spirit of inquiry. Most of the published laboratory manuals are workbooks in spirit. With a practical eye toward selling their books to the widest possible audience most authors have tried to make a laboratory book that will work in almost any kind of classroom situation. The result has been an over-emphasis on diagrams and pictures. The result is a general workbook tendency which does not encourage the student to think beyond a set of facts.

One of the main objectives of the BSCS laboratories is to achieve a situation where the student feels he is discovering something. At least some of the laboratories do not always have the same results. The student then sees that this business of science is not as cut and dried as he may have been led to believe in the past.

The laboratories have a close textual correlation for those who want to operate in this manner. The blue text includes references to the laboratories in the body of the book itself, making it difficult to omit the

laboratories without a good reason. The laboratories could also be adapted to a situation where the teacher wanted to keep a separate and distinct laboratory section since the laboratories themselves introduce and illustrate many principles. For instance, instead of covering the sometimes very complex business of blood types in the text itself, *Molecules to Man* includes this in the laboratory section. The material is then open for the teacher to do as much or as little with it as he wishes.

The chemicals required are somewhat different than those required by the more traditional courses. However, many of those used by Modern Biology are useful in BSCS laboratories. Half of the chemicals used for these laboratories in the 1960 edition of Modern Biology will represent about one third of the chemicals needed for the Blue version. Many of the remaining two thirds will be found in most chemistry laboratories. Most of any remaining equipment will fall into the category of live materials. Here source can be a problem. Many items required can be purchased locally at grocery stores and hatcheries. Items such as *Drosophila*, *Hydra*, *Daphnia*, etc. must be available when they are needed. This problem does not differ too much from traditional courses except the emphasis is greater on living materials in the BSCS and their need is more urgent.

The space problem involved in the BSCS course is no different than that of a basic course which has involved a lot of direction. It is necessary to have classes fit to the size of the room.

Time for teacher preparation is always a problem. The use of BSCS materials does nothing to relieve it. However, laboratory preparation is not as bad as many people have been led to believe. With several exceptions the laboratories in *Molecules to Man* take only an hour or so to set up

if the equipment is organized. Student help is valuable here. It gives the students a sense of responsibility in caring for the room and materials. Student help in washing dishes and keeping the laboratory clean as well as with watering plants and caring for the animals has proved to be good for them. It stimulates the interest of some students and is one way of providing for individual differences.

The objectives of the BSCS laboratories puzzle many teachers and have been a source of disagreement among those engaged in teaching biology. However, the goals of the laboratories should be examined in light of the total course into which they fit.

The students themselves want the laboratory section of the course to mean something to them or they feel they are wasting their time. This necessitates presentation beforehand of the objectives and whatever theory that may be involved in the exercise. Many students have also asked for the chance to express their ideas about the laboratories by doing formal write-up of each investigation. This is a time consuming task for them but they indicate that it makes the material more meaningful for them.

The text of the Blue version has proved to interest the students to a greater degree than traditional texts. The style of writing tends to tie everything together as a story. The themes running through the book help to make it easier to read than many other texts.

The general opinion of the students seems to be that the text is interesting and easy although some students find that it requires several readings to grasp the ideas. The reading level does not seem to be too difficult for an average tenth grader. Probably the hardest section of reading are the chapters dealing with the chemistry of ATP and DNA. These sections take much more time than

later chapters dealing with the various systems, found toward the end of the book.

The time problem exists with this text as with many others. As a result of the large foundation of chemistry that has to be laid early in the year, the first quarter of work is the most crowded, yet the most important. Luckily, it also seems to be the most interesting to the majority of students. Through the story of Oparin's heterotroph hypothesis the early biochemistry is presented in this version. This seems to keep the student from being discouraged by lack of understanding until he finally reaches a point where the material becomes meaningful.

The other three quarters of work are not as rushed from the standpoint of material to be covered. The third quarter has many laboratories suggested for use. The saving factor here is that the text itself can be considered in a shorter period of time.

One of the major problems which students face is one which any modern program, whether it be chemistry, physics, mathematics, or biology forces on them. This is the problem of being able to switch from a type of discipline demanding memorization of facts to one demanding an ability to reason with the facts. This sometimes makes many students uncomfortable. At least one pupil has remarked that he did not like BSCS because he would rather memorize and be secure in his knowledge. He did not like to be forced to reason. An examination of his grades showed this to be evident as he did well in courses where he could memorize and not so well in Modern Mathematics and BSCS Biology where he had to reason.

A consideration of testing in this new course should be made. The published tests follow a different pattern than those of Modern Biology and

other texts. They do not occur at the end of every chapter or two but rather only four times a year. These tests differ also in that their objective is to get the student to apply what he knows. In order to achieve this end the test may present a totally foreign experiment to the student and ask him to draw conclusions based upon what he should already know. This situation also makes students uncomfortable. Many remark that they have never had this material in the book but they soon realize that knowledge they should possess is sufficient to answer the question.

The infrequency of published tests demands that the chapters be tested by teacher made tests. This adds to the time demands of the course which are somewhat greater than the traditional. In preparing these tests it is important that they be consistent with the goals of the course. They should not test just knowledge but the ability to make relationships, formulate hypotheses, and in general test the spirit of inquiry hopefully instilled in the student.

There are many aids to a teacher of BSCS biology. The Pamphlet series published by Heath is one valuable example. It makes interesting and informative reading for the student. They are designed to fit into the material included during the year and they give greater dimension to this material.

The Biology Teacher's Handbook published by Wiley & Co. is another invaluable help. In it are sections on the philosophy of BSCS and forty-four invitations to inquiry. These are open-ended discussions which can be used during the year. They add substantially to the material in the text. Also included in this book is background material in physics, chemistry, and statistics as well as a short course in Biology Methods and appendices covering everything from republished research papers in biol-

ogy to culture media for microorganisms.

The first year's use of *Molecules to Man* has been successful because of its aims and ideas. The students are more enthusiastic than they ever have been before. More are interested in an advanced biology program than previously. The course then has proved successful and will be extended next year to all the biology classes at West Delaware

County Community School.

BIBLIOGRAPHY

- Biological Sciences Curriculum Study, **Biological Science: Molecules to Man**. Boston: Houghton Mifflin Company, 1963.
- Moon, Truman et. al. **Modern Biology**, New York: Holt, Rinehart & Winston, 1960.
- Otto, James H. et. al. **Biology Investigations**. New York: Holt, Rinehart & Winston, 1960.
- Schwab, Joseph J. Supervisor. **Biology Teachers' Handbook**. New York: John Wiley and Sons Inc., 1963.

Comparison of Performance of Eighth and Tenth Year Students with Concepts of General Biology

HERBERT P. BRIGHAM
Skokie, Illinois

The secondary science curriculum at the University High School in Iowa City, Iowa, is designed to include a required



Brigham

three year junior high sequence which consists of seventh grade chemistry/geology, eighth grade biology, and ninth grade physics/astronomy. In grades 10 through 12 there are three tracks for the various abilities. The upper track consists of chemistry, advanced biology, physics, and science seminar. The middle track consists of three single semester courses in earth science, biological science, and physical science. The lower track consists of a single year course in applied science. (Yager, 1961).

One of the purposes of the laboratory school is to experiment with curriculum design. Since the present curriculum has evolved with the first students in the seventh grade course in chemistry/geology progressing each year, it has been possible to compare achievement of var-

ious groups of students. This has enabled the completion of a series of studies concerned with grade placement.

Yager has reported the greater achievement of ninth grade students in general biology compared to tenth grade students. (Yager and Dessel, 1962). In another study he has shown that the retention of subject material by ninth grade students is as great as tenth grade students (Yager, 1962). These results have prompted other analyses of previous data from the past six years as well as having stimulated additional questions and comparisons with other grade levels such as grade eight. (Yager, 1963).

Establishing the changed curriculum as previously described has permitted a two year comparison of eighth and tenth year biology students. The last tenth year biology student who will not have had general biology in grade eight has now completed biology in grade ten. During each of the two years in question the same teacher was involved with the two grade levels in the same classroom with the same course outline. Different sections of eighth and tenth year students were instructed