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Biology or Chemistry? Which Should Come First?

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BIOLOGY

OR

CHEMISTRY

Which Should Come First?

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With the many changes that are taking place in our science curriculum, many of us tend to forget the necessity of analyzing the sequence in which these science courses are offered. Of particular importance is the sequence of chemistry and biology offerings to the student and our reasons behind one sequence over another. Many



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school systems have offered and are presently offering sequences which place biology before chemistry. These school systems are alert to the new science curricula and are offering many of the new courses to their students, but they still have not taken an analysis of the reasons for offering one science course in preference to another.

It would appear that a reasonable offering to the student would be chemistry before biology. First of all, chemistry would seem to be more concrete than biology and would be easier for the student to grasp. Secondly, few writers have developed a chemistry course with biology in it,

while on the other hand, most biology courses use chemistry as a basis for the understanding of plants and animals. Biology uses chemistry and builds on fundamental chemical concepts that would be easier for the student to grasp if he had some chemistry. Third, many biology teachers have to teach basic chemistry to students who have not had any chemistry. Biology teachers talk of spending from one to two weeks teaching a basic chemistry course before they can proceed into a discussion of biology. It would seem to be much easier for the student and for the biology teacher if students have already had a basic chemistry course. A biology teacher who has students who have had chemistry can spend less time on chemistry and more time on enriching his course in his teaching area of biology.

At University High School, Iowa City, Iowa, the science curriculum has been developed so that students have chemistry before biology. As an example, all junior high school students are required to take Matter (a chemistry orientated course) in seventh grade, Life (a biology course) in eighth grade, and Energy-Space (a physics and astronomy course) in ninth grade. Eighth grade students are being given the Blue Version of the Biological Sciences Curriculum Study (BSCS) approach to biology. In analyzing the Table of Contents of the BSCS Blue Version textbook, one immediately notices that in Unit Two,

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The Evolution of the Cell, chemical fundamentals are introduced to the student. The list begins with Chapter Five, The Forerunners of Life, and includes: the chemistry of matter, the atomic theory, the chemical composition of water, simple gases, organic compounds, etc. Chapter Six, Chemical Energy for Life, uses some of the fundamental concepts of the chemical bond. Additional chapters build on the chemical fundamentals presented to the students in these two chapters. One also notes that in the laboratory section of the BSCS book, investigations 11 and 12; the Electrolysis of Water and Acids, Bases, and pH; are chemistry experiments. Other investigations in the laboratory section build on other fundamental chemical concepts. Furthermore, Section III of the BSCS Teacher's Handbook for all text versions is devoted to an explanation of the physical-chemical background needed and presented in the BSCS course.

Now let us look at the areas a seventh grade student in Matter has covered after he has finished the year course. He has acquired basic knowledge in making measurements; studied gases and liquids; and has studied the fundamentals of chemical reactions including acids, bases, salts, pH, and the use of indicators. He has done some work concerning the model of the atom and has developed a good idea of chemical bonding. In addition the student has been exposed to basic organic chemistry and to such areas as amino acids which are

extremely important in the BSCS biology course. Other fundamentals from temperature reading to basic mathematical calculations are developed in this seventh grade course, can be developed further in the eighth grade, and can be used as aids instead of part of the course content.

One argument for teaching chemistry after biology seems to be that chemistry is a college preparatory course. One should remember, however, that the sequence of courses should be fitted to best suit the students. If a student's learning and teaching can be made easier serious consideration should be given to the development of a science curriculum in which a chemistry course proceeds a biology course. In addition, students should be advised about the advantages of having chemistry before biology. Furthermore, teachers in chemistry should cooperate with biology teachers to make sure that chemistry students who plan to take biology the following year are adequately prepared as a part of the total science program.

LITERATURE CONSULTED:

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Yager, R. E., Editor, **The Secondary Science Curriculum**, University High School, State University of Iowa, Iowa City, Iowa, May, 1964.

Nominations for the "Outstanding Biology Teacher Award of Iowa" are now being accepted. If the instructor has not been nominated before, send a request for the required forms; should the teacher have been nominated in the years past, the nomination forms need not be filled out again. In either case, send requests to Mr. C. L. Christensen, OBTA State Director, Rockwell City, Iowa 50579.