Iowa Science Teachers Journal

Volume 7 | Number 4 Article 4

1970

A New Approach to Junior High Science ISCS - Intermediate Science Curriculum Study

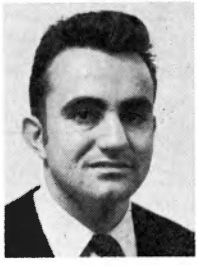
Louis A. Gatta
University of Iowa

A New Approach to Junior High Science
ISCS—Intermediate Science Curriculum Study

LOUIS A. GATTA
Coordinator, ISCS Iowa Test Center
Department of Science Education
The University of Iowa

What is the background of ISCS?
Why ISCS?
What content is included in ISCS?
How is ISCS taught?
What ISCS materials are available?
What can be said in summary?

Many research projects make it clear that children in the junior high school are capable of doing simple scientific work. By scientific work I mean the creating of a body of knowledge. If this is the case, our science teaching should reflect this. It should emphasize the processes and methods of science so the student at an early age can view science with fascination and intrigue while he is creating his own body of knowledge. Past junior high science curriculums seem to have failed to do this. The Intermediate Science Curriculum Study (ISCS) is an attempt to fulfill this need in science teaching at the Junior High school level.



Gatta

What Is the Background of ISCS?

For some years a group of scientists and educators at Florida State University has been deeply concerned about the kind of science education being given the nation's junior high school students. National authorities on the subject met several times to discuss ways of improving science teaching at this level during the period of 1961-63. As a result of these discussions, there came a rationale for developing and organizing improved instructional materials. During 1964 and 1965 smallscale writing sessions were conducted and pilot curriculum materials were tested in selected schools during the 1965-66 school year. Up to this time all preliminary work was supported by University funds. Then in June of 1966 the project came under the financial support of the United States Office of Education and this aid, supplemented in 1969 by a grant from the National Science Foundation, has permitted an expanded effort.

During the summers of 1966, 1967, and 1968, distinguished groups of scientists and educators from all parts of the country gathered in Tallahassee to design new instructional programs

for grades 7, 8, and 9. These draft materials were tested with many thousands of students during the 1968-69 school year. The outcome of all of this is the Intermediate Science Curriculum Study (ISCS) for grades 7, 8, and 9. This year the ISCS seventh-grade text is being tested by approximately 390 teachers in 22 states, working with over 39,000 students. The eighth-grade text is being tested by approximately 180 teachers in 15 states, working with about 19,000 students. Other teachers in numerous states are also testing the ninth-grade materials. The reactions of these teachers and students will form an important part of the feedback to be used in the final revision of the program.

Why ISCS?

It is during the intermediate years, namely grades 7, 8, and 9, that important and basic scientific concepts and attitudes are dramatically being formed. Yet the junior high school stands as a weak link in American science education between the rapidly changing elementary schools and the recently revitalized high schools. Although a small number of commendable projects have been undertaken to improve science teaching in the junior high school, virtually all of them have dealt with a single science subject or with a single grade. Until now, little progress has been made in the development of an overall approach to science instruction for this very difficult age level. The Intermediate Science Curriculum Study is an attempt to accomplish this. The long range goal of the ISCS project is to develop for grades 7-9 a coordinated science sequence that is scientifically accurate, consistent with good learning theory, and well adapted to the age level for which it is intended. Thus the ISCS materials aim primarily at giving the student a sequence of content and experience leading to a valid understanding of the structure of science and the way scientific knowledge is gathered. The program stresses inquiry and experimentation as well as the acquisition of basic ideas and intellectual skills that can be brought to bear on the problems the students face. All too often, it is not until the college and graduate level that a student in essence gets to "do" science instead of simply learning and regurgitating facts. We burden students with factual knowledge, but few students get to do science until they reach the level where they must write a master's or doctor's thesis. The student then finds he must not only solve problems, but discover the problems themselves. How much easier and more beneficial previous training in formulating problems, formulating hypotheses, gathering and analyzing data, and arriving at conclusions would have been. Again this is the attempt of ISCS. Just as a young athlete cannot truly learn the intricacies and really know how to play the game of football by simply reading books and listening to lectures, neither can the student of science truly understand and use science thoroughly without active participation. Vicarious experiences cannot take the place of firsthand experiences and participation in either situation.

What Content Is Included in ISCS?

The content for the seventh-grade course is organized around the twin themes of "Energy, Its Forms and Characteristics," and "Measurement and Operational Definition." It strives to teach the student to think in operational terms and to fully realize what it means to measure something so he can discover a series of relationships that lead him to the final understanding of the concept energy.

"Matter and Its Composition" and "Model Building" are the organizing themes for the eighth grade. Again through discovery he learns how a model he has developed is a useful tool in interpreting a wide range of physical, chemical, and biological phenomena.

The ninth-grade course serves to synthesize and extend the investigative experience and knowledge gained up to that point and to apply them to problems of practical and scientific significance. It is composed of a series of rather unstructured and discrete problem situations or "investigations" each designed to occupy the student for six to eight weeks. By utilizing his recently acquired tool kit of science concepts and investigative skills, the student will investigate problems with a minimum of guidance. Topics for the ninth-grade investigations will be drawn primarily from the earth and biological sciences. Besides core investigations, optional sequences will be available.

How Is ISCS Taught?

There has been some debate by scientific educators as to whether the "processes" of scientific inquiry or major science concepts provide the better basis upon which to organize instructional materials. The ISCS program presumes that both of these important aspects can and should be introduced simultaneously by allowing concepts to arise out of student investigation. In this program all students become involved in science. Each and every student becomes a participator rather than a spectator.

In order to achieve this, ISCS is working to build a practical program of more individualized science instruction. Each student works through the program independently at his own pace. In this approach, the learning pace is set by the student and the level of instruction is automatically adjusted to his ability. Since it is now widely accepted that youngsters vary tremendously, both in their ability to learn and the rate at which they are able to learn, this approach seems more realistic in an effort to reach all students than the conventional text teaching in which all students are treated alike regardless of ability and rate of learning. Thus in this program much of the student's work is independent with the teacher moving from individual to individual, giving clues, answering questions, correcting misconceptions, and extending concepts to new situations.

Similarly, the use of the same learning materials for all students does not support what we know about individual differences. To allow for this, two types of student materials are being developed. The primary sequence for each grade provides the basic "story line" that every student follows. "Excursions" are separately

bound departures from the primary sequences designed to provide greater challenge for the more apt student or a more appropriate path for the less able. Hence, by careful selection and use of "excursions" the ISCS teacher can design a multitrack program specifically geared to his own individual students.

Finally, since we know that we learn through all of our senses, the ultimate goal of the project is to further produce a multimedia instructional system for the intermediate grades.

What ISCS Materials Are Available?

At the present time, experimental editions for seventh, eighth, and ninth grades along with teachers' guides and student response books are available. These are publications of the ISCS program conducted by the Florida State University Department of Science Education and supported by grants from the U.S. Office of Education and the National Science Foundation. A hardbound edition of this experimental program is planned for publication by Silver Burdett Company and will be published in the summer of 1971. Accompanying equipment packages will also be available from Silver Burdett.

Summary

The Intermediate Science Curriculum Study (ISCS) initiated at Florida State University is an attempt to incorporate at the junior high level an individualized, self-pacing, laboratory-oriented, and sequential science program for seventh, eighth, and ninth grades. The content themes include "Energy and Measurement" (7th grade), "Matter and Model Building" (8th grade), and investigations in earth and biological sciences (9th grade). This program is currently being used by numerous schools throughout the United States in the experimental form. Will the ISCS program fill the void in science teaching which seems to exist at the junior high school level? Only time and continued research will tell.