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Creative Biological Investigations at Bettendorf Middle School

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With the development of the Middle School in Bettendorf, Iowa, a science program was constructed to meet the needs of these junior high age children. The seventh grade biological program is presented with many of the investigations that are used at this age level.

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With the completion of Bettendorf Middle School in 1963, a new concept of education was established. The middle school is an intermediate school, a school between two schools. The middle school serves grades six, seven, and eight. The middle school is not a "watered down" high school, but is an entity within itself. It tries to take into account the needs of the junior-high age children and to use and anticipate the abilities of these children. Courtyards, both open and enclosed, act to increase the noninstitutional atmosphere, as well as to provide space for a wide range of activities. Today our school with an enrollment of over nine hundred students serves as a model for the development of other middle schools in the nation.

A mainstay of this school is its science program. Students are not grouped according to ability nor do they choose science programs. Each student takes three full years of science enabling him to gain the insights and background to make future decisions on a firm basis. Each student is given the opportunity to learn about the world of science. Our science program is divided into three areas. In sixth grade, students are given a broad background in science with emphasis on the matter-energy concept. In seventh grade our students are introduced to life science and in eighth grade the students explore the physical environment. All instructional lev-

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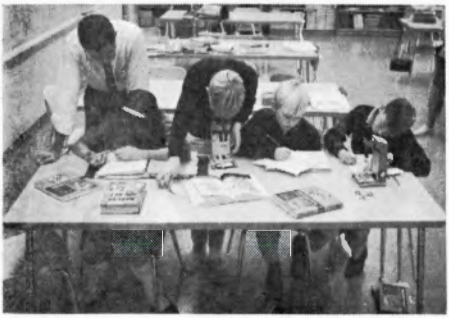
els are geared to: (1) develop the student's natural inquiry for areas of science, (2) develop the scientific approach to problem solving, (3) prepare the student for future science courses and for future life, (4) develop the student's ability to think critically, and (5) develop understanding in science rather than rote memorization. Teachers are chosen with broad scientific backgrounds and are expected to have a knowledge of the psychology of children in this age group. Teachers are allowed, as well as encouraged, to depart from the traditional teaching techniques.



The emphasis in seventh grade is mainly biological, with considerable time spent with student planned and carried out investigations using organisms such as brine shrimp, Drosophila, Daphnia, insects, and plants. Through this involvement, the student attempts to apply and use what are termed the "scientific attitude" and the "scientific method." A wide range of preserved specimens are dissected to create interest and develop the proper technique rather than the memorization of parts. The basic reference book for this course is entitled "The World of Living Things" by Paul F. Brandwein and his associates. This book serves as an additional

incentive to the student in its approach to the reading material included. Each year students are encouraged to enter the Middle School Science Fair, and often the seventh graders develop some of the most interesting projects in the fair. Students are taught how to use equipment and are given the opportunity to make use of this equipment throughout the year. A wide range of materials such as models, microscopes, a human skeleton, and prepared slides are available. Current science magazines are used and many recommended investigations are developed for student use. Bacteria are studied and each student is involved in the less technical aspects of bacteriology such as macroscopic examination of colonies, sterilization, media preparation, and the manufacture of culture dishes from aluminum foil. Planaria are collected locally by students and are primarily used to illustrate regeneration and simple responses. Drosophlia are used to study populations, food preferences, and insect metamorphosis. Many students make use of the flies for ecological investigations. Insect collections representing the more common orders are required of each student as school begins in the fall. Students are afforded class time to label the specimens as to order and common name.

Usually an "insect hall of fame" is established in a display case in the school and each student may contribute (nominate) what he considers to be his best specimen. Students are encouraged to bring any and all specimens which they feel would be of value or interest to the class. Live animals and plants are kept in each classroom, cared for by student volunteers, and are "farmed out" each weekend and school vacation period. Whenever possible, students are encouraged to include measurements or collect data for their investigations and then try to interpret the information they have obtained and then draw a logical conclusion from this information.

In the future, the science department plans to develop the courtyards adjacent to each science room into areas where students may study representative plants and compile data for scientific investigations. Over the past three years the Middle School seventh grade science program has proven extremely effective. During the 1964-65 school year the Watson-Glaser Critical Thinking Appraisal and the Silance Attitude Tests were given to the seventh grade science students. These results were reported to the Iowa Academy of Science in April, 1965, in a paper submitted by the authors, and the results showed that science teaching can and does develop the attitude as well as the ability of students to think critically. Interest, creativity, critical thinking, and basic understandings indicate our program has begun to fulfill the needs of our student population.