

Curriculum Units by Fellows of the Yale-New Haven Teachers Institute 1996 Volume V: Genetics in the 21st Century: Destiny, Chance or Choice

Introduction

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The teachers in this seminar developed curriculum units that will prepare students for the new genetics, in which they will need to be able to understand new questions. What is the genome project learning about our genes? Is there one human genome ? How are people genetically different, and how are they the same? How will genetic information be used? Who will be allowed to know what we each learn about our own genes? The sooner students learn about genetics in school, the better equipped they will be to use genetics in the 21st century. They may have to educate their parents! The teachers developed a broad variety of curriculum units that span the spectrum of teaching from special needs to advanced high school biology. Each one addresses aspects of genetic appropriate to the age and need level being taught.

Four units are structured for Kindergarten through fourth grade. These units emphasize learning the vocabulary associated with inheritance, concepts of how traits are passed on from parent to child, and similarities and differences between people. They are built around hands on activities that reinforce the learning. They are interactive and do not require a long attention span. The units use familiar objects, plants, and animals to make the ideas come to life. They build on the students own observations. Activities are suggested, instructions are given for carrying out the plans. There is room for individual variation. Field trips, animal and plant observations in the classroom, and construction of simple models of DNA are among the activities.

Three units are designed for high school biology classes. One unit combines genetics with problem solving in a Deweyan paradigm. It works at the intersection between science and ethics, and emphasizes the need to solve scientific problems in a social context. Its structure can be adapted to a variety of student achievement levels. The unit is built around scenarios that pose a scientific problem with social implications, such as the use of genetic testing to diagnose disease in the unborn baby. Assessment tools to measure student progress are included. The second unit is a scientifically sophisticated unit suitable for advanced biology students. This unit provides instructions for experimental studies using the fruitfly, Drosophila melanogaster. Concepts of chromosome mapping and DNA sequencing are covered. The unit shows how to use a computer simulated laboratory as well. Clear instructions for teachers are included. The third unit addresses ethical issues in genetics. It provides the student with the opportunity for role-playing a variety of questions, such as decisions around gene therapy and the use of genetic information in public policy. A very interactive unit, it lends itself to a broad spectrum of student levels of knowledge, and affords opportunities to use the library and other resources.

Three units are aimed toward students with special needs. One is designed for students at the Polly T. McCabe

School, a program for pregnant students. It focuses on the impact of genetics on the unborn baby and gives the pregnant teenager an opportunity to learn more about what influences the development of her baby, what testing is usually done during pregnancy, pregnancy risk factors, and post-partum testing such as newborn screening. While the biology is emphasized, social issues can easily be part of the discussion. Many interactive activities are part of the unit, such as constructing models of cells, group reading, and small group discussion. The second unit is designed for students with visual impairment. It can be used in grades 9-12, and could be adapted for sighted students as well. Genetic concepts are addressed in the context of inherited eye disorders. Many strategies are included for students with visual impairments, which take advantage of other senses. The third unit is designed for students with serious learning disability. It emphasizes sameness and differences, utilizing sorting skills. It focuses on differences between and within families. The strategies for helping the learning disabled are clearly described. These include the use of pictures, finger painting, and cake batter mixing.

Any of the units could be easily transported to any school. Few special facilities are needed. Most of the resources are available. In addition, teachers could modify many of these units up or down the scale of student ability. The reading lists provided for the elementary grades do not require advanced scientific knowledge on the part of the teacher. The readings for high school teachers are at a more advanced level.

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