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HUMAN PHYSIOLOGY AND ANATOMY: FOR ALL STUDENTS AT THE SAME TIME

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Introduction

How should a specialized science course in high school be taught? Should it be treated as a career education course or as a general survey course? Should it follow traditional methods or should it be individualized? These questions were explored in teaching a two semester course in Human Physiology and Anatomy at Dubuque Senior High School. This course attracts students who plan a post-high school career in health oriented fields, as well as students interested in additional exploratory study that goes beyond general biology. In addition, others enroll for needed science credits. As a result, the course must service a diversity of academic needs in addition to a wide range of intellectual abilities and interests.

Implementing individualization in Physiology and Anatomy is difficult since it deals with a specialized area, namely, the structure and function of the human body. The curriculum often requires memorization of bones, muscles and organs in order to understand body functions. The task was to design a course that would involve all students by traditional and individualized methods to achieve a breadth of educational goals. The following article presents an overview of the approach used. The approach involved the production of packets which provides many activities and experiences which serve the broad range of interests and talents of the students involved.

Packet Overview

The first few days in school are spent with a packet called, *What's it all about?* This is an orientation and motivation packet. The packet includes pretesting, establishment of individual and class goals, and ascertains individual needs and interests. The packet provides students with the opportunity to make preliminary decisions concerning individual goals and provides the instructor time to develop innovations and options to fulfill student needs.

Students then complete ten individual packets on each of the major body systems. The first packet deals with basic cell and tissue structure. The second deals with the skeletal system. These topics are followed by packets on muscles, nerves and other major systems. The last packet involves reproduction and heredity.

There is transfer of learning from one body system to another ending with a synergistic view of the human body as a whole. All students study the same system at the same time but in a variety of ways. Motivation is the guiding principle in this plan and is accomplished during the introduction to each packet.

A packet may be introduced by enclosing a copy of an autopsy in which many general structural terms are mentioned. An example of such an account is *The People Vs . . .* by James Mills (1). This introduction is especially helpful in the first unit as the transfer of terms is applicable to all laboratory activities and materials used in later units. The packet on the muscular and nervous system includes a short length of multi-conductor shield cable accompanied by the question, "What does this cable and a muscle or nerve have in common?" The cable is an excellent device for helping understand the structural make-up of a muscle or nerve which is a difficult concept for many students. Other introductions include copies of newspaper and magazine articles which discuss concepts within the unit. In addition, use is made of case histories, X-rays photographs or questions such as, "Which part of the body grows faster than any other part and never stops growing?"

The packet on the nervous system called *Understanding Self and Others (USO)* provides an opportunity for nurturing the psychological aspects of self-images and values. This packet contains materials for role play, mental health, learning, memory, perception and behavior, in addition to the study of the nervous system.

Individualization

Each packet contains a unit outline, objectives, required assignments and options for students in attaining personal goals. It is in the option folders that student pursue their individualized goals. These folders are designed in cooperation with the Learning Resource Center and other departments within the school. As students add their ideas and materials, the folders are continually revised in response to their interest and criticism.

A student interested in electronics or who is mechanically minded may choose to use the *Apparatus and Instrument* folder which contains instruction on the use of the kymograph, oscilloscope, biofeedback or experimental design. An art student may be interested in the *Arts* folder which contains materials on medical illustration, sculpture or drawing diagrams of body sections for labelling. A student interested in writing may decide to use the *Science Fiction* folder or work out talking models with an art student. A music student may wish to compose songs to help with learning the names of bones, muscles or other memorization materials, or they may add music to talking tapes made by the speech department. Some students may work on the preparation of audio-tutorial materials. Students interested in health professions may wish to study various folders on health related careers. Besides special interest folders, there are folders which take advantage of commercially made materials such as diagrams to label, crossword puzzles, seek and find puzzles, film loops, games, articles and videotape lectures.

Summary

The system outlined frees the instructor for work with individuals and groups with laboratory work, special interest discussions, research projects, CPR and first aid demonstrations and practice, measurement of blood pressure, body fluid analysis and many other activities. At the same time the

system provides a student with a well-defined background in Human Physiology and Anatomy in addition to fulfilling personal interests and goals. Learning is achieved through sharing, discussions, helpful relationships and the personal satisfaction of goal accomplishment. Such an approach is successful from both the teacher's and the student's point of view.

Literature Cited

1. Mills, J. 1968. The people vs . . . *Life Magazine* 65 (9): 30-38.

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Free NSTA Newsletter

The National Science Teachers Association will begin publication in October of *Energy and Education*, a free bimonthly newsletter on energy education. It is intended to serve as an information exchange for teachers and others interested in energy education.

Energy and Education will contain summaries of the various energy education projects being developed throughout the country and will feature editorials by leading authorities in energy and energy education.

Regular features will include a news column of what is happening in the field of energy education, brief reviews of books and reports of interest and use to teachers, a calendar of coming events in energy and education, and lists of free or inexpensive energy education materials.

NSTA is confident that this newsletter will link together the active, growing network of teachers who recognize the vital importance of energy education. If you would like to receive *Energy and Education* write to: *Energy and Education*, NSTA, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009.

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Chem 13 and Physics 13 News

Chem 13 News and *Phys 13 News* are distributed without charge to high school teachers. These newsletters contain materials relevant to high school and first-year university chemistry and physics, or of interest to high school teachers and their senior students. Both publications are available from the University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. Send requests for *Chem 13* to R. J. Friesen, Department of Chemistry; and requests for *Phys 13* to P. C. Eastman, Department of Physics.

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Blue Jeans

Allied Chemical Corporation, South Buffalo Works, puts blue into blue jeans by producing several thousand tons of blue indigo each year. Production is not able to meet demand. *School Science Review*, Vol. 56, No. 194, Sept. 1974.