

Biology and Ethics

Their Role in Education for the 80s and Beyond

Peter F. Dedecker

In past decades, the study of biology was involved primarily with taxonomy, anatomy and physiology, microbiology, the nature of heredity and evolution, etc., accompanied by the various laboratory techniques necessary to pursue the study properly. Although traditional studies have much current value, recent advances in technology have changed the complexion of the biological sciences. Perhaps the root of this change began in 1953 with Watson and Crick's discovery of the molecular structure of DNA.

In recent years, an explosion of knowledge responsible for previously unimaginable advances in biology and medicine has taken place. Consider, for example: the discovery, manufacture and effective-

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ness of many drugs and pharmaceuticals; the structure, function and influence of chromosomes and genes, including gene transfers, in nonhuman species and applications of those understandings in plant and animal breeding; in-vitro fertilization and the techniques required for successful embryo transfer; treatment and prevention of the "major killers" such as heart disease and cancer and our increasing understanding of their genetic connection (e.g., oncogenes); increasing the likelihood that fewer infants will be born with deformities, disabilities and genetically determined disorders; and many other startling advances. With each new day this list continues to grow at a faster rate than at any time in history.

All this "new biology" forces us, as biology teachers, to reconsider the traditional views of what science is and how it must be approached in today's classroom. This knowledge explosion demands that we examine not only what moral and ethical problems we face now and may face in the future, but also that we provide a moral and ethical decision-making process students can use to cope with

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the increasing number of value choices they will confront, be they personal decisions or societal decisions (i.e., in the voting booth). This means that biology teachers have a responsibility, in today's classroom, to deal in a professional manner with the bioethical decision-making process. Educators must realize that today's students will significantly influence the future direction of society and that democratic society and personal integrity may suffer without a proper framework to guide their decision making.

Kieffer (1979) explains the need for a new classroom approach as follows:

Until now, our main objective has been to avoid a biological calamity. We are now entering a new phase aimed at finding effective and long-term resolutions for the issues arising from scientific discoveries and their technological applications are not so easily solved that a few general guidelines will make them go away.

Second-generation problems require analysis and deliberation. To respond adequately to them will require fundamental changes in our attitudes. Education at all levels is in a position to contribute much to this process. We must introduce a humanistic direction to our science teaching, changing the emphasis from the purely cognitive to the affective. As a beginning, we can insert into the curriculum . . . the following proposition: We are free to make choices but we are bound by the consequences of our choices. We are not free to ignore how our choices affect others, both now and in the future. The exercise of freedom generates this responsibility.

Ethics and Ethical Decision Making

Ethics may be defined as the study of moral beliefs, the actual standards of conduct which influence the decision making of each person. Ethics raises questions about our conduct toward, and responsibility for, each other. In making ethical decisions, a branch of ethics called "normative" ethics is used which deals with developing a set of principles that guide us in judging which acts are good or bad, right or wrong, forbidden, permissible or obligatory. Individuals have a fundamental core of values that serve as the foundation for important value decisions. These values, then, function as guides for directing

correct or "ought-to" behavior. A person with a normative ethic is prepared to defend a system of fundamental ethical rules and principles around which a process has been developed to determine which actions are "right or wrong". Normative ethics provide norms by which individuals can judge actions and therefore may be very important when responding to the issues and choices arising as a result of the "new biology".

Ethical decision-making methodology is a procedure in which different values are compared; and in weighing these values, an ethical judgment is made. According to Kieffer (1979), values: "1. indicate what is judged to be the 'good'. 2. imply preference. 3. are supported by rational justification. 4. countenance strong feelings or intense attitudes. 5. specify a course of action. To qualify as a value a statement must satisfy *all* of these criteria. This requirement differentiates a value statement from a purely technical statement."

Kieffer (1979) suggests the following procedure for ethical decision making: "1. Perceive that an ethical problem exists by stating it in plain language. 2. List all recognized alternative courses of action both immediate and long term. 3. State all the values that bear on the identified courses of action. 4. Analyze the individual values and their consequences in ethical terms. 5. Rank order the studied values on a preferential scale from most to least desirable. 6. Make a selection on the basis of this scaling and analysis. This approach is useful for two reasons: first it insists that a choice be made; second, the choice is validated in ethical terms."

Classroom Use

One procedure to deal with bioethics in the classroom is to develop case studies which approximate realistic decision-making situations. Another method would be to investigate actual case histories, have the students express their decisions and rationale in each case, and then compare their decisions and rationale with those in the real case. The results of such activities can show students the need for a solid procedure in the process of decision making.

The following is an example of a fictional case study written for use with my high school biology students. I include it here only as an example.

BIOETHICAL DECISION CASE STUDY (FICTIONAL)

Janet and Jim have been trying to have a baby for the past 10 years since they were married. Prior to their marriage, they had decided to raise a large (at least 5 children) family. Because of their desire to have children they sought medical help and found that not only did Jim have a very low sperm count but Janet's fallopian tubes were blocked.

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New techniques, their doctor told them, would allow them to have their own child if they so desired. The techniques involved in vitro fertilization of Janet's ova by Jim's sperm and the transplantation of the zygote into Janet's uterus. She should have a normal pregnancy.

To proceed with the technique, Janet would be given female hormones to cause a number of ova to ripen in her ovaries. Then at the proper time these ova could be removed by simple surgery. Jim's sperm count could be concentrated to ensure proper fertilization.

Janet and Jim decided to proceed with this new technique and have, at last, the child they both wanted more than anything else.

In the removal of the ova and subsequent fertilization, it was determined that eight of the twelve ova had been fertilized and could be implanted. Janet's pelvic structure, her doctor told them, could only safely allow Janet to have one child at a time.

Decisions to be made:

What should be done with the other seven zygotes?

Is the destruction of an in vitro-produced zygote the same as an abortion?

Should Jim and Janet hire surrogate mothers to have the other seven children at a cost of \$25,000 each?

With another new technique, the zygotes may be frozen for a period of time and then implanted at a later date, but not enough evidence is available to determine the long range effect of this freezing. If Jim and Janet decide to go with this option, what should happen to the zygotes if something happens to Jim and Janet?

The use of such a scenario with high school students promotes much thought and discussion. Such questions as "When does life begin?," can generate lengthy discussion in which individual values can be identified and confronted. Classroom "straw votes" can be taken on issues in the scenario to illustrate that not everyone has the same values or "feels" the same about an issue.

The discussion and the kinds of questions presented to the students may make them "squirm" or feel uncomfortable because they are now faced with a difficult decision. It should be pointed out to the students that decisions must be made and that avoiding a conscious decision is, in fact, making a decision. For example, in the case of Jim and Janet, ignoring the question about the remaining seven zygotes will not eliminate what should happen to the zygotes. It also must be acknowledged that although personal values differ, many ethical issues should not be solved by allowing just any choice as acceptable. Though we have an equal right to our opinion, all opinions are not of equal value. Therefore, one choice is not always as "good" as another choice. As

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Kieffer (1979) puts it, "All ethical views are highly individual, but to allow a moral "free-for-all" is incompatible with having a well-ordered society. Unlimited freedom, be it social or ethical carries with it the seeds of its own destruction. If History has any lesson to teach, it is that a total concern for oneself leads to socially disruptive behavior."

Decision-making models are useful for helping students develop a personal decision-making procedure. In a high school classroom I believe that it is first necessary to have students develop, perhaps through "brainstorming" techniques, a list of their values. Once the values are determined, they can be applied to a specific decision-making scenario. (Students need to be guided through this procedure of applying their values to the scenario.)

A procedure as designed by Barman and Hendrix (1983), or as listed earlier by Kieffer (1979), can be followed but perhaps modified to meet the intellectual level of the students involved. Any modification by the teacher should retain, however, a step-by-step procedure by which the students values can be ranked and consequences assessed.

Stress to the students that the results of such a procedure will not, and perhaps should not, end in a single "good" or "right" answer. It also must be understood by educators that the purpose of such classroom exercises is not to force an ethical position on a student but to develop a procedure the student can use in decision making, and to understand in ethical terms how valid alternative choices are made.

The Ethics of Teaching Bioethics

It is ethical to teach ethics in high school biology? Should educators be allowed to teach students *how* to make decisions based on values? Recent literature reflects a definite concern about not only educational needs but ultimately their effect on society. The following are but a few examples.

Science educators face the dual task of both preparing the professionals who will propose possible solutions to the problems and of educating the mass of citizens who will help decide how those solutions are translated into social and public policy. To argue which is the more important task is to miss the point that good science and effective science policy require informed

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participation by both groups. (McInerney 1982)

What students need, I believe, is a general framework in which they can place (these) advanced and sometimes technical writings. (McConnell 1982)

Although the teacher may be no better qualified to actually make a decision than any other citizen, the teacher *should* be qualified to assist students in the analysis of the issues and of the nature and extent of the available options. Thus, teachers and students should work together for better understanding, rational discourse, and reflective decision-making. (Hickman 1982)

Though scientific purists would disagree, biology and human society have never been separate enterprises, and they never will be. An exploration of biological/societal problems, ethical dilemmas, and interactive consequences are not educational frills—they could influence our society's survival. (McCormack 1983)

I believe that professional educators must not only be allowed to direct students in how to make decisions, but also that decision-making methodology must be a primary goal of education. After all, decision making based on knowledge and an identifiable value system reflects the wisdom of an individual. To educate members of our society without the proper procedures to make decisions on difficult and perhaps controversial issues is not consistent with

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the educational philosophy of a free people. If professional educators do not provide guidelines for decision making, from where, in today's society, will such a guide come? What other part of our society, other than the schools, can see to it that the general public has information on how to make decisions? The wisdom of *how* society uses new technologies depends on an informed public that can make decisions based on a value system. I believe we have a responsibility to prepare for the future now by preparing students with a methodology of decision making.

The concern may be that high school students are not ready to face these kinds of decisions. I must ask, "When, then, are they going to be ready?" Maybe no one is totally "ready" to make difficult decisions, but they must be made. In many states the student at age 18 is a legal adult, able to influence, through the voting booth, the direction of society. I believe that "being ready" means that the student is prepared by knowing *how* to use his knowledge and values to make a decision and that process should be in place by the time a student graduates from high school. A poster in my classroom reads: "Give me a fish and I eat for a day; Teach me to fish and I eat for a lifetime." I believe "teaching to fish" means teaching how to make decisions based on knowledge and

values. If we do not do this I feel we are missing the whole point of education. When students leave our schools they should be able to say, "This is what I believe is right and therefore my decision is . . .".

Kass (1971) stated, "In the long run, our hope can only lie in education: in a public educated about the meanings and limits of science and enlightened in its use of technology; in scientists better educated to understand the relationships between science and technology on the one hand, and ethics and politics on the other; in human beings who are as wise in the latter as they are clever in the former."

Is it ethical to teach bioethics in high school? I say, "It is unethical not to". Should our schools be allowed to direct students in how to make decisions based on values? I say, "It must be allowed or the very nature of a free society is at stake." Knowledge in and of itself is neither good nor bad. It is how the knowledge is used that is important. To teach only knowledge (facts) without how to use the knowledge is, in my opinion, educationally unsound. As new technology becomes available, how it is used will depend on the decisions made by society. To not prepare students how to make decisions could spell disaster. To paraphrase Edmund Burke: ALL THAT IS NECESSARY FOR EVIL TO TRIUMPH—IS THAT GOOD PEOPLE DO NOTHING.

Author's Note:

I believe bioethics and decision-making methodology are a necessary part of every biology course, however its use must be to supplement and reinforce student understanding of the basic biological principles. Caution should be exercised to avoid lengthy discussions which may ultimately cause the deletion of "basics" from a course.

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