

EDUCATION WEEK

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Science Teachers Learning to Tackle Thorny Issues Inherent in Subject

Interest in bioethics rises in schools, as it does in public arena.

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A teenager is dying. What he first thought was simply a case of the flu gets steadily worse. The whites of his eyes turn yellow. His urine becomes dark brown. Doctors realize the 17-year-old is in the grip of a sudden and overwhelming liver failure and has only a few days to live.

When it appears a liver transplant won't be available in time, a surgeon suggests an astonishing alternative: Use a pig's liver to keep the teenager alive until a suitable human organ can be found. The procedure is highly experimental, and after the patient lapses into a coma, it's up to his grandmother to decide whether to go through with it.

That decision, and other aspects of the real-life case, served as a launching point for a group of teachers who gathered in a forest encampment here last week. They were attending a weeklong workshop on how to discuss the role of ethics in science with their classes—an issue of growing importance to educators.

"I'd like you to think of how this will play out in the classroom," Lola Szobota, a high school science supervisor leading the presentation, tells the teachers. Here, she says, was a formerly "healthy young teenager. Close to the same age of the students you teach."

The group of about 25 teachers begins weighing the ethical issues at stake. The young man can't give consent, which raises legal questions, one participant notes. Is it humane to use an animal for the procedure, another asks? Has the government approved the procedure, a teacher wonders? Does it have to?

Bioethics Online

Resources on ethics in science for teachers and students include:

- **The Genetic Science Learning Center at the University of Utah**
- **Georgetown University's Kennedy Institute of Ethics, online database and other resources**
- **The National Institutes of Health's Office of Science Education**

The science teachers attending the workshop, hosted by the Northwest Association for Biomedical Research at the encampment's conference center, are not alone in taking on such vexing topics. Teachers nationwide are engaging students in discussions of some of the most controversial ethical questions in science and society today, from embryonic-stem-cell research to clinical experiments on humans to the use of genetically modified food.

While lessons on bioethics—generally defined as the ethics of medicine, health care, and other aspects of science—have long been a part of many science classes, interest in the subject has grown in recent years, with new advances in science, and as public debates about science's role in society play out in the

• **The Northwest Association for Biomedical Research**

news media, the courts, and Congress.

A number of universities, medical centers, and scientific organizations offer resources on bioethics for teachers and students. The Northwest Association for Biomedical Research, based in Seattle, is one of them. It promotes public understanding of scientific research and devises curricula on issues such as stem cells and HIV, along with arranging professional-development programs like this one.

“Done poorly, teaching bioethics can really be divisive,” said Mary Glodowski, a high school teacher from Kirkland, Wash., who helped lead the camp’s workshops. “It’s not about teaching kids what’s right and wrong. It’s about teaching kids a process for thinking.”

Drawing From Real Life

Throughout the week, workshop organizers try to prepare teachers for that mission. The camp’s setting is far removed from the distractions of the school day. Teachers stay in cabins at a conference center in the Pack Forest, a 4,000-acre blanket of Douglas fir, sun, and intermittent fog nestled in the foothills beneath Mount Rainier, about two hours south of Seattle.

Their days are long, but discussions are broken up by other activities that fit the setting: a group hike, a campfire barbecue, and nightly movies, such as the genetics-themed sci-fi drama “Gattaca.”

Several common strategies for addressing bioethics topics emerge. No matter what the question, students need a solid grounding in the scientific facts behind it before they can understand the ethical implications, workshop leaders say.

Issues such as stem-cell research, assisted suicide, and allocation of vaccines during a pandemic all generate strong participant reactions. Leaders of the workshop recommend the use of case studies from real-life situations—such as the teenager with the failing liver—and other exercises drawn from imaginary medical cases. Teachers can then ask students to identify the affected individuals, groups, or institutions. After that, a teacher can ask students to make scientifically based arguments from any stakeholder’s perspective.

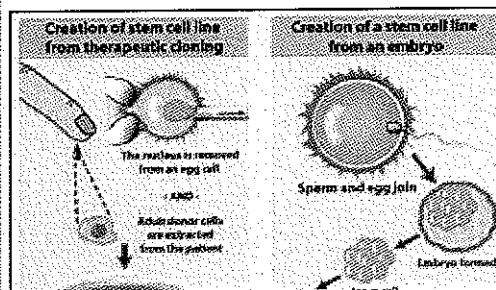
That process, workshop leaders tell the camp participants, encourages students to appreciate the reasoning behind opinions that differ from theirs.

Even that role-playing can prove challenging for teachers. Ms. Szobota, a science supervisor from the 2,500-student Northern Valley Regional High School District in New Jersey, remembers a student in an anatomy and physiology class she taught refusing to play the role of a scientist who favored conducting experiments on animals. The student’s beliefs were firm: She refused to wear leather products and was a

Under the Microscope

The Genetic Science Learning Center at the University of Utah provides resources on bioethics topics. One offering shows two processes through which stem cells might be created to repair or replace damaged human tissue for potential medical use.

*Click image to see the full chart.



SOURCE: Genetic Science Learning Center, <http://learn.genetics.utah.edu>.

strict vegetarian. Ms. Szobota arranged a different assignment for her.

When her class discussed stem cells, Ms. Szobota heard arguments from students—and their parents—who opposed embryonic-stem-cell research for religious reasons, arguing that it relied on the destruction of human life. Other students, however, were equally committed to the other side of the argument. Some of them had relatives who suffered from Parkinson's disease, a condition that some scientists believe might be cured through replacement of damaged cells with ones derived from embryonic stem cells.

An effective teacher, workshop leaders explained, encourages students to use scientific knowledge to better understand their own ethical beliefs about what is right and wrong, issue by issue—and uses that same reasoning to evaluate the beliefs of others.

“In any class, you’re going to have some kids who are being really vocal,” said Matt Krehbiel, a high school biology teacher from Junction City, Kan., who attended the workshop. “Your job as teacher is to get them to think more about why they’re being vocal, and why they’re saying what they’re saying.”

In the Standards

Bruce A. Fuchs, the director of the office of science education at the National Institutes of Health, said bioethics has become a “standing room only” topic at school workshops he’s attended recently. Educators see an opportunity to rouse students’ passion for science through “intriguing, socially relevant” topics that stir an “an immediate gut reaction” in students, he says.

Ten or 15 years ago, Mr. Fuchs remembers hearing teachers talk about bioethics in their classes by simply passing out newspaper or magazine clippings on a controversial topic, dividing their classes in two, and calling for a debate. He sees a more sophisticated approach today. “I see a lot of sharing going on between teachers,” he said.

The Northwest Association for Biomedical Research receives \$220,000 a year through a federal grant from the NIH’s Science Education Partnership Award program. Other resources include Georgetown University’s Kennedy Institute of Ethics, which offers an online database of articles and links to bioethics information. The University of Utah’s Genetic Science Learning Center, which also receives NIH funds, offers Web-based factual content, interactive lessons, and other resources. The site drew 600,000 online visitors a month during the spring semester—a 60 percent increase over last year.

The importance of ethics topics is reflected in states’ standards, many of which call for students to understand such issues, said Jeanne Chowning, the education director of the biomedical-research association. In addition, two prime reference tools, the *National Science Education Standards* and *Benchmarks for Science Literacy*, published in the 1990s by the congressionally chartered National Research Council and the American Association for the Advancement of Science, respectively, say students should understand ethical issues in science.

Reining in Religion?

Some bioethics advocates believe teachers should be wary of allowing discussions to evolve into discussions focused primarily on religious or other beliefs.

But David Prentice, a senior fellow for life science at the Family Research Council, an advocacy

group in Washington that champions a broad range of socially conservative causes, said that while teachers need to provide students with grounding in scientific facts, they should also incorporate arguments based on religious faith and other beliefs into ethical lessons. Class discussions of such issues as stem cells make little sense without that larger context, said Mr. Prentice, who has a Ph.D. in biochemistry.

“The reason [those issues] are controversial is not because of the science itself; it’s due to all of the other factors,” Mr. Prentice said. “Teachers shouldn’t be afraid. They should just say, ‘These are what the different viewpoints are.’ ” Too often, he said, “that’s not getting out.”

Last week, his organization was active in opposing a congressional bill to authorize an expansion of the use of federal money for embryonic-stem-cell research. President Bush vetoed the bill July 19.

The hope of many teachers and scientists is that the strong emotional pull of such issues can lead students deeper into science. That potential is obvious, Ms. Szobota told teachers at the workshop. The case study about the teenager with the failing liver, she said, is a perfect example.

That patient, Robert Pennington, went through the procedure using the pig’s liver, known as a “bridge to transplant,” in 1997 and survived without any apparent medical complications. The experimental treatment was later hotly debated by scientists and others. Ms. Szobota recommended that the teachers look up photos and other research on the now-adult liver transplant recipient, and have their students do the same.

“If you search the Internet, you’ll find pictures of Robert Pennington,” Ms. Szobota told the camp’s teachers. “They are unbelievably powerful. Your students will say, ‘This is real?’ It is very real.”

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