Bioethics for an educated debate

Peter Finegold

The Human Genome Project has not only captured the imagination of the public, but also generated in its wake considerable controversy. Intense media coverage of the moral and societal challenges arising from the use of genomic information—for example, the confidentiality of human DNA samples, gene patenting, and reproductive cloning—has moved the bioethics debate out of the university lecture hall to dinner tables and coffee bars. But is society equipped to engage usefully in such a dialogue, given the rudimentary treatment of bioethics in current models of science education?

Pioneers of biotechnology education in schools have helped to develop protocols and kits to give young people a feel for the techniques involved in modern genomics, such as polymerase chain reaction (PCR) and gel electrophoresis. But an appreciation of the mechanics of the science, although desirable, does not guarantee that tomorrow's electorate is sufficiently well informed about the impact of genomics.

In the developed world, the attitudes of young people toward science are constrained by education systems rooted in the industrial age, emphasizing the technical to the exclusion of the social, political, economic, and moral. For example, school students are taught how a genetic test might identify gene alleles linked to an increased risk of coronary heart disease, but are left unaware of of how a "positive" test result might impact on affect insurance, employment, or other civil rights.

More worrying, the staid monotony of today's science curricula has eroded interest in the topic among students. In the United Kingdom, research has shown that young people choose to study science out of job aspiration rather than intrinsic interest[1]. The consequences of neglecting science education in the future should raise concerns within the scientific community, including how research will be perceived amongst future voters. Indeed, the governments in England and Wales have now designated the 2001–2002 as the "Science Year". During the coming academic year, young people aged 10–19 years will be able to participate in a range of initiatives that might improve the image of science and facilitate increased recruitment and retention in scientific careers. The government is committing £6–7 million to this scheme, and hopes to raise an additional £13 million from industry.

Recent research has shown that young people tend to apply a "rights-based" approach when resolving bioethical issues. Dawson and Taylor[2] found that when 14- and 15-year-old science students were presented with three bioethical scenarios, a significant number considered only the rights of the main character, ignoring the negative impact of the events on others involved.

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Young people are by nature drawn to the impassioned views of the more extreme single-issue groups. Unless they are exposed to the full range of arguments, and are encouraged to analyze the situation in depth, they will choose the simple, but often radical, solution to a complex problem. The recent outcry over genetically modified crops reveals how an alliance between commerce and interest groups can result in the rejection of a technology, based on fear rather than fact.

According to Osborne and Collins[1], young people are interested in science that is contemporary and relevant, and would like the education system to address—at least occasionally—those same issues as science in the media. In particular, young people value practical classes and discussion work. However, although science teachers are skilled in the former, they often leave a discussion about the human and social dimensions of science to their arts and humanities colleagues.

Some science educators have now started to consider ethical issues when teaching genetics. Others continue to express concern that the articulation of opinion can undermine the integrity of the subject in the eyes of a student. If you can overturn questions about ethics through argument, they reason, then you can do the same for scientific fact. Nevertheless, bioethics educator Michael Reiss side steps the argument as to whether science and moral philosophy are incompatible, favoring a more pragmatic response. Reiss says that adopting the "ethics" approach is justified because "on a significant number of occasions the social contexts, in which science is placed, raise ethical issues that are both of interest to students and of valid concern for them"[3].

Research commissioned by The Wellcome Trust (London, UK) and carried out by the Institute of Education (London, UK), suggests that science teachers are best placed to address issues related to bioscience, but they must borrow techniques from their humanities counterparts[4]. Different styles of assessment may be needed to credit students for their essays and debating skills—this is currently neglected because of constraints on teaching time and a trend toward use of (questionably) more objective prescribed marking schemes.

The remaining challenge for science educators will be to increase interest in science across the board, while maintaining the quality of education needed for prospective researchers. Genetics will certainly continue to raise more issues than most other medical disciplines have done to date, and society must be better equipped to join the debate. As a result, both the medical research community and the biotechnology industry must work with education systems to influence policy makers and practice.

If the biotech industry wishes to attract the brightest and most creative young scientists, and to generate a climate in which progress is not impeded by hype and hysteria, then science education must reach out beyond the technophile. Young people want science to be exciting, relevant, and socially responsible. Science has always attempted to win minds—it may be in its long-term interest to win hearts first.

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1. Osborne, J. & Collins, *S. Pupils' and parents' views of school science curriculum.* (King's College, London, 2000).
2. Dawson, V. & Taylor, P. J. *Biol. Edu.* **34**, 184–188 (2000).
3. Reiss, M.J. *Studies Sci. Edu.* **34**, 115–140 (1999) .
4. Levinson, R. et al. *The teaching of social and ethical issues in the school curriculum, arising from developments in biomedical research.* (Institute of Education, University of London, 2001, in press).