

Workshops to teach bioethics to biologists in developing countries

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SUMMARY

A description of a survey conducted among participants in a bioethics education course is presented, and the need for bioethics education discussed. The present findings among university teachers in Madras and Pondicherry suggest that Indian teachers are also standing in dire need of intense education in all areas of bioethics. One of the ways by which objective knowledge in diverse areas of bioethics can be imparted to biology (college) teachers is to integrate bioethics with biology. It is suggested that the approach of “towards an integrative biology” be extended and adopted in the present program of educating the educators. Secondly, It is proposed to organize workshops both summer and winter schools in most developing countries to fine-tune the knowledge level of college teachers. Thirdly, It is proposed that the All India Bioethics Association (AIBA) can serve as a nodal agency to organize such summer/winter schools in Asian developing countries with financial aid from IUBS. Fourthly, a collaboration among three organizations (All India Bioethics Association, Chennai, India, Center for International Bioethics in Israel, and Eubios Ethics Institute, Japan) has been proposed to prepare textbooks integrating biology with bioethics for enhancing the survival changes of human beings and the biosphere.

KEY WORDS

Bioethics, Bioethics education, developing countries

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TEXT

With the birth of 20th century the world eagerly expected to reap the benefits of industrial revolution. Although advancements in science and technology have changed remarkably the way of life of human beings, they brought about the deep divide between the North (the developed countries) and the South (developing countries). During late 20th century the biosphere experienced highest degree of damage to environmental quality. With the birth of 21st century the biosphere fondly expects that environmental quality may improve to ensure the survival of human species and other species as well. Human survival amidst dwindling natural resources is the principal human concern. If humans are to survive, then the management tool is education. Education disciplines human mind besides imparting training to live a meaningful life in terms of the perceived risk and the problem. It is customary to think that education is for the students and trainees. But if a teacher stops to be student then the teachers* output in teaching become very limited. Some of the ways to upgrade the teachers* ability are 1. to upgrade the text books, 2. To qualify the teacher for a higher degree 3. To provide in-house training in the subjects concerned.

During 1960, the Biological Sciences Curriculum Study (BSCS) of the United States of America, revolutionized teacher education by developing a three level biology textbooks, namely, the Yellow, Green and Blue versions. Each version introduced the subject of biology at three different levels. Such a contribution was the result of an earlier survey to assess the objective level of knowledge in the learning and teaching community. Using these three level text books, the University of Madras, conducted indepth summer and winter schools for college teachers for a period of 45 days. Similar attempts were also made using the Nuffield Council textbooks (UK). Interest in teaching biology was much enhanced among college teachers. Such summer and winter schools were conducted during 1964 to 1997 at the University of Madras and later such practices were discontinued.

The 21st century has been coined as the Age of biology. However, the science of biology was fragmented due to marked advances in Science and Technology. Emerging sister subjects like Molecular Biology and Biotechnology began to dominate the educational curricula. There were many issues that need to addressed due to these emerging new subjects. As a result, during 1970, Dr. Van Rensselaer Potter II of the University of Wisconsin Medical School proposed a new discipline called Bioethics. According to Potter, bioethics serves to bridge the gap between disciplines (science and humanities; science and ethics) as well as to serve as a bridge to the future i.e. to develop an ethic towards nature.¹ Ethical, legal, social issues have been faced by the community in general and the teachers in particular not knowing the current moral problems.^{2 3 4 5 6 7}

¹ Van Rensselaer Potter, II (1998) Script for a videotape for Tokyo, November 1998. Fourth Global Congress on Bioethics. Nihon University, Tokyo. pp. 1-9.

²D.R.J. Macer *Bioethics for the People and by the People*. Christchurch: Eubios Ethics Institute 1994.

³ Darryl R.J. Macer, Yukiko Asada, Miho Tsuzuki, Shiro Akiyama, & Nobuko Y. Macer, *Bioethics in high schools in Australia, New Zealand and Japan* (Christchurch: Eubios Ethics Institute, 1996).

Methodology

A detailed survey was conducted in Chennai (Madras), India to assess the knowledge level of teachers in various aspects of biotechnology and bioethics. In India, Universities have a division of Academic Staff College that conducts various Refreshing Courses/workshop for college teachers. Teachers who were drawn from the University of Madras area and Pondicherry University area were administered with a questionnaire containing about 20 questions to assess the objective knowledge level of teachers. The questionnaire were in the patterns described by Macer, et al (ref. 2, 3). Four additional statements were added in the area of genetic engineering, with special reference to transgenic and genetically modified organisms (GMOs). Three statements were taken from Nuffield Council (1999)⁸ and the author added an additional statement.

Ordinary tomatoes do not contain genes whereas genetically engineered tomatoes do.

If people eat genetically modified fruit, their genes could also become modified.

It is impossible to transfer animal genes to plants

Sugar produced from GM beet or plants can not be distinguished from that produced by a non GM plant

The knowledge level concerning these statements was tested before and after a detailed lecture of three hours on transgenic and genetically modified organisms (GMOs). Teachers who were drawn from the University of Madras and Pondicherry area amount to 33 and 40 respectively.

The responses received to the questionnaire distributed before the lecture evaluated their actual state of awareness to the issues raised in the statements. A fresh set of the same questionnaire was distributed after the lecture and the responses gave an indication of the changes in their attitudes and concerns.

Results

Data reported by the Nuffield Council of Bioethics is taken as the reference for comparing the results obtained with Indian respondents. It can be seen from the results summarized below found 50 to 75 % of the EU respondents (Eurobarometer Survey 46.1) were ignorant of the truth of these statements.

⁴ Jayapaul Azariah "Reflections on Ecology." *Biology Education*. 5 (1) (1988), 15-18.

⁵ Jayapaul Azariah "Global Bioethics and Common Hope : Ecology and Religion: spirituality Mode: A keystone in Ecobalance" pp. 98-104 in *Bioethics for the People and by the People*. Ed DRJ Macer. Christchurch: Eubios Ethics Institute 1994.

⁶ Jayapaul Azariah "Biosphere, Biopiracy and Bioethics." Pp. 232-245 in *Environment, Health and Food*. Eds. S.J. William and S. Vincent. Loyola College Chennai 2000.

⁷ Jayapaul Azariah "Biopiracy of Genetic information and Materials: A need for Global Control Strategy" pp. 16-21 in *Proceedings of the 2nd Asian Bioethics Seminar*. Nov. 1999. Comprehensive Study on East Asian Culture Project. Ed. Dr. N. Takase. University Research Centre. Nihon University. Japan 2000.

⁸ Nuffield Council *Genetically Modified Crops: The Ethical and Social Issues*. Nuffield Council on Bioethics, May 1999. p. 89.

For each Statement the responses were (Right answers = B; Wrong Answer = A Ignorant = C):

Ordinary tomatoes do not contain genes whereas genetically engineered tomatoes do.

A + C = 66%

If people eat genetically modified fruit, their genes could also become modified.

A + C = 50%

It is impossible to transfer animal genes to plants.

A + C = 75%

These statements in the questionnaire reflected only commonly known, plain and simple scientific facts. Hence it was thought that it might not be necessary to test the level of knowledge to these elementary scientific statements with science teachers who must be aware of these facts. However, the reality is not as assumed by the present author. The responses from these teachers before the training are summarized below [Statement [A True; B False; C I do not know; * = Right answer].

Ordinary tomatoes do not contain genes whereas genetically engineered tomatoes do.

A + C = 26 (28)%

13 (23)

74 (72) *

13 (5)

If people eat genetically modified fruit, their genes could also become modified.

A + C = 48 (37) %

13 (32)

52 (63) *

35 (5)

It is impossible to transfer animal genes to plants.

A + C = 65 (46) %

22 (41)

35 (54) *

43 (5)

Sugar produced from GM beet or plants can not be distinguished from that produced by a non GM plants.

B + C = 78 (37) %

22 (63) *

35 (32)

43 (5)

Responses after the training:

1. Ordinary tomatoes do not contain genes whereas genetically engineered tomatoes do.

A + C = 26 (28)%

16 (35)

68 (62)

16 (3)

2. If people eat genetically modified fruit, their genes could also become modified.

A + C = 50%

6 (24)

68 (56)

26 (20)

3. It is impossible to transfer animal genes to plants.

A + C = 75%

16 (32)

39 (53)

45 (15)

4. Sugar produced from GM beet or plants can not be distinguished from that produced by a non GM plants.

19 (62)

19 (20)

62 (18)

The ignorance level ranged from 26% to 78% before the brief lecture, which was tilted to range from 38 to 46 %. The reduction in the percentage of change in the response of teachers may appear to be significant as the range of significantly reduced. However, a careful examination may reveal that those respondents who have answered positively were firm in their response after the lecture. The migration has happened mostly from the I do not know category to the negative category which is an indication of their uncertainty of the scientific facts in the area of GM technology. For instance, to statement No. 2, there is a significant reduction in the “ do not know “ category after the lecture, the reduction being from 35 to 5. However, most of these respondents have indicated the wrong answer i.e. from 13 to 32. Similar instances can be observed in other cases also.

The pattern of response of college teachers from Pondicherry University area does not differ markedly from that of the teachers drawn from the University of Madras area. The survey suggests that teachers are not fully equipped with the necessary bioethical knowledge base to meet the challenges of the 21st century. The results indicate that besides imparting mere biological knowledge it is also important to equip the teachers with recent discipline of bioethics. It is emphasized that bioethics is the key player in the social Tuning technology.

Remarks

Pioneering work of Macer (1994, 1996) has provided valuable information on the perceived need of teachers of New Zealand, Australia, India and Japan. His survey indicated that science teachers also be encouraged to include the teaching of these issues in science courses, especially in some subjects, such as human gene therapy biotechnology and genetic engineering,

where there is significant difference in familiarity”. Further, there is a full range of diversity of opinions in each country, * on animal experimentation, with some very positive and others very negative. Hence, there is a need in Asia and in developing countries, in particular, for teacher education of issues and challenges in bioethics.

The present findings among university teachers in Madras and Pondicherry suggest that Indian teachers are also standing in dire need of intense education in all areas of bioethics. One of the ways by which objective knowledge in diverse areas of bioethics can be imparted to biology (college) teachers is to integrate bioethics with biology. It is suggested that the approach of “towards an integrative biology” be extended and adopted in the present program of educating the educators. Secondly, It is proposed to organize workshops both summer and winter schools in most developing countries to fine-tune the knowledge level of college teachers. Thirdly, It is proposed that the All India Bioethics Association (AIBA) can serve as a nodal agency to organize such summer/winter schools in Asian developing countries with financial aid from IUBS. Fourthly, a collaboration among three organizations (All India Bioethics Association, Chennai, India, Center for International Bioethics in Israel, and Eubios Ethics Institute, Japan) has been proposed to prepare textbooks integrating biology with bioethics for enhancing the survival changes of human beings and the biosphere.