

Enhancement of social participation : Developing bio-ethical analysis skills among youth

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The bioethical movement and its underlying metaphors

One of the most pervasive social movements in post-modern societies has been the one associated with pluralism and diversity. In many instances, the recognition of the fact of human differences in race, gender, access to goods and services, and welfare has been cause for war and intolerance. In others, it has helped create mechanisms and institutions based on the notions of dialogue and equity.

The bioethical movement started as a means of overcoming the unbalanced and unprecedented influence of techno-science on human affairs. Particularly in those areas in which everybody takes contact with science and technology, the need to reappraise goals and to relieve frustration became more apparent. This has become specially important in fields of study and intervention such as medicine and biology, which seem to be closer to everyday life and whose potential for changing the human condition became relevant from the middle of the 20th century. In industrialized countries, despite all the influence of science in policies and development, people were not satisfied with the evolution shown by medicine and biology. It was a feeling of dissociation between goals and means, between what was envisioned and expected from techno-science and what ultimately came about as its outcome. As powerful social metaphors of the state of mankind, science and technology revealed themselves limited and in need of revision and improvement. In this sense, the bioethical movement of the sixties and seventies can be seen as a revival of those human values associated with any long-lasting and transcendent endeavor.

It should be noted that, along with moral pluralism, modern societies exhibit what may be termed epistemic pluralism. Knowledge as power and not as illumination meant for some restricted access, specialization and cryptic language revealing the limits of possible participation in democratic societies. This was particularly apparent in the libertarian tradition of capitalistic Western societies at a point in their development in which a revision of ends and means was needed. It was apparent that land, work, capital, and knowledge were not the only bases for development and satisfaction. Moral sustainability of decisions and culture-fair goals were also needed for that sense of accomplishment which civilization should bring about to its bearers.

Epistemic pluralism brings to the foreground the issue of literacy. Scientific literacy in particular has been a debatable issue in industrialized societies of the democratic type. One of the assumptions is that participation in social decisions demands information and knowledge, but the exact type and extent of the information and the knowledge required remain imprecise. Even experts do not agree on the importance of formal education to achieve the desired goals and everybody recognizes that people, especially young people, get much more from everyday informal exchanges than from those acknowledged by educators and other experts.

The bioethic movement soon turned into an academic discipline concerned with the moral justification of the uses and goals of techno-science. It became institutionalized through learned societies, scholarly journals and deliberating bodies known as "ethic committees" for medical practice, scientific research, and decision-making. Its aims grew beyond the original modest one of reorienting the goals of biomedicine and became concerned with global issues: ecology, human welfare, and policy-making. In fact, bioethics came at a time when traditional moral philosophy and the classic deontology of the professions had shown their limits and to some extent their lack of relevance for solving the new problems posed by the development of technology and science. There are several definitions of the term bioethics. The dictionary of the Spanish Royal Academy of Language defines bioethics as the scientific discipline that studies the ethical aspects of medicine and biology in general, as well as the relationship between humans and the rest of the alive beings (Real Academia Espanola, 1992). The term bioethics is commonly understood as an amalgam of practices, methods, and contents related with the impact of techno-science in human life and health (Lolas, 1998).

Bioethics and science in non-industrialized countries

In non-industrialized or newly industrialized countries some of the issues already discussed may be considered not as prominent as they may be in industrialized countries. For instance, pressing needs related to basic survival under difficult conditions may preempt interest in what appears as a distant side-effect of technological development. On the other hand, scientific establishment in undeveloped countries tends to be relatively powerless and are usually more concerned with developments in industrialized centers than with the realities in its homeland. Despite continuous lip service to the need for science and technology, political leadership does not really understand the exact uses of scientific literacy in the population at large or the way in which sensibility to science might be increased for the better. Even the relationship between scientific development and human welfare may be questioned in those contexts since, as it has been repeatedly asserted, there is no straightforward connection between them or even between basic research and applications.

It is in these contexts where different ways of increasing awareness related to science and technology should be devised and tested. Formal education will not reach all strata of society since the compromise between market needs and social obligation will predictably lead to selective exclusions. Yet, for democratic governability, for social participation, and for informed decision-making, access to information, knowledge, and moral justification of techno-science are essential.

Accepting this proviso, the development of a cost-effective and efficient method for conveying messages and increasing sensibility regarding science and technology, specially among youth, appears necessary.

A case study

At the University of Chile, the largest and oldest in the country, whose origins can be traced back at least to the eighteenth century, interest in bioethics first appeared at the end of the 1980's. Formerly, traditional philosophical ethics and applied ethics of the professions were cultivated and taught but the reorientation came as a result of strong interaction with American and European thinkers who had just initiated the "bioethical turn" in their careers (Lolas, N8). Local activity was instrumental in the early alliances with the international community, particularly with the Pan American Health Organization (PAHO), whose pioneering effort led to the creation in 1994, of a unique Regional Program on Bioethics for the Latin American and Caribbean Region (Lolas, 1999; Lolas, 1999a).

In 1996 the University of Chile created a Center for Interdisciplinary Studies in Bioethics, funded initially through grants from the Ford Foundation, the National Commission for Scientific and Technological Research (CONICYT), and PAHO. At this Center, several lines of research were defined. One of these lines aimed at creating a model for socializing the concept of Bioethics among youth, established that the first model to be tested would be focused on the education system.

An important reform of the educational system is taking place in Chile, one of its goals is to contribute to social equity by means of improving the quality of public education. In the past ten years most public schools in the country have been supplied with computers and connected to Internet. The Ministry of Education has also increased hours of schooling, so as to avoid many of the social problems involving children and adolescents left to their own discernment on how to use their free time.

This last policy has been approved only in 1998 and its slow implementation has been due mainly to the scarce amount of innovative didactic materials produced in the country, available for teachers to develop attractive and beneficial activities. Since some implicit goals of the reform in Chile deal with increasing awareness on issues such as gender equity, democratic governability, civic responsibility, and broad social issues, the need has arisen to produce relevant educational materials on this subjects.

Considering the goals and needs of the educational system, the Center for Bioethic Studies decided to develop a project aimed at producing and evaluating an educational model aimed at promoting Bioethic discussion in the schools.

The project had the following objectives:

- To contribute to the dissemination and socialization, among youth, of bioethics as a discipline related to science and technology.
- To help understand the scientific and technological procedures originating bioethic problems.
- To stimulate the use of critical axiological thinking both in the formulation and in the discussion of ethical issues in science and technology.

Definition of the target group and educational media

Students from grade seven to twelve were defined as representatives of the universe of adolescents attending school. A series of comics was chosen as the main source to promote reflection on scientific and technological progress, among youth. These comics would narrate cases from the history of science, showing ethical dilemmas during their development. Each comic would include a teachers guide, which would allow the use of the comics as instructional resources in classes related to Language and Communication, History, Biology and Philosophy. Teachers guides would include a summary of the most important events of the episode, the activities suggested for students, examples of questions to be posed and references on books, Internet sites and movies. The series would be printed and distributed and included in a newspaper of national diffusion.

Analysis in the Selection of the Educational Media

It is well known that learning is a continuous process that takes place in the formal context of teaching institutions as well as at home, in the streets, and among friends. It is also acknowledged that formal contexts in the transmission of attitudes and values fail if they are not accompanied with role models examples or are dissociated from daily experiences.

As a methodological challenge, it must be observed that the same categories employed in a moral discourse, that includes the affective domain, are valid for constructing knowledge. This identity, that comes from some forms of the Greek philosophy, was broken down in the course of the history of knowledge. As a result, ludic methods began to be considered as epistemically not valuable.

Nevertheless the use of games and amusement as foundation of knowledge and its moral implications, have recovered its age old tradition. What comics can obtain is to transmit knowledge and values in a ludic context, not only pleasant but also satisfactory and certainly attractive.

Although this media does not completely constitute the whole message it contributes to a register of immediate and undeniable impact. The images provide unforgettable sensorial anchorages. The constitution of the narrative in a temporary context allows inflections and decision points that generate dramatic constellations susceptible of association and impact.

During the selection of comics as educational media, the possibility emerged of joining two personal experiences that usually are dissociated in most of the people: scientific knowledge and direct or indirect experience of the adventure. Comics thought to be produced, would also join a type of a very popular reading material among adolescents with a thematic area that is never considered in them.

At the same time, the use of comics as educational resource would make possible that a type of reading material usually excluded and even forbidden by the schools could enter them. This initiative adds up to others that search the necessary link between the school and the surrounding environment.

Another factor considered in the selection of comics as the main educational media was the evident increase in children, adolescents, and also adult interest in reading them. This fact is demonstrated by the progressive increase in stores devoted to sell exclusively this type of reading material, the importance given to them on

different mass communication media and also the increasing amount of comics available in public libraries, as a result of request from users.

The selection was also influenced by the positive results obtained in using comics to teach health education to children and adolescents (Misrachi and Allende, 1994) in the Project Methods and Materials for Health Education funded by the Kellogg International Fellowship Program in Health (Misrachi, 1990). In order to make the proposed teaching method a privileged model for examining ethic dilemmas it was established that the cases to be selected had to meet several conditions:

- It should constitute a well demarcated case: a scientific breakthrough, a novel discovery, an outstanding contribution or an event of great impact feasible to be articulated as story.
- The anecdotal base should be known, accessible and unequivocal.
- The bioethical dilemma should be apparent and possible to formulate as a clear-cut option between alternatives.
- A context, or meta-history should be possible to create linking the historical event with the reader's daily life.
- Reflections and conclusions should be in accordance with the interests and motivations of the audience and never be imposed by the authors.
- The iconic cultural imperative should be as ludic as possible in order not to lose the motivating power of comics.

It is recognized that moral as a set of behaviors based in commonweal and ethics as a rational foundation of moral decisions, include emotions and beliefs. These are best transmitted through a narrative media especially if this last one, like the comic gender, appeals to several sensorial channels and is intertwined with the daily life of the addressees

Comics as instructional media

Since comics use stories as the base for their development, they provide stimulus that go beyond the cognitive information scope. In fact a comic represents (Cencillio, 1973):

A strong stimulation of the reader's imagery. Each reader builds the image with which he/she lives the story, with elements from the text and also with contributions of his/her own repertoire of internal images;

An emotional conscious and unconscious mobilization that involves the diverse components of affective life: attraction, repulsion, identification;

- An affective conscious and unconscious appeal towards attitudes, values and ideals;

- A stimulation towards global practical responses mainly of imitative type;

- An attribution of significance to the diversity of elements involved, being in this case primarily of a moral character; and

- Inclusion of the perceptions in a categorical paradigm. In fact comics are useful to, in example, typify behaviors: Believing to be Superman, be as fast as.....

The article " Comics in Chile" (Jofre, 1986) shows that comics produced with complete self-consciousness can be effective and positive education means. The negative effects of traditional comics, criticized by Wertham (1953), can be overcome by comics responding to high principles and not only to commercial ends. From Jofre's study it is possible to conclude that comics can be put to high purposes service whenever they:

- Present characters that produce positive self-identification in the reader;
- Maintain appropriate balance between reality and fantasy;
- Succeed in entertaining through action and humor; and
- Use high quality drawings and an adequate management of colors.

Bioethic Problems selected as subjects of the comic series

A list of the target group characteristics and a recommendation to consider ethic problems in the history of science that could produce significant alterations in alive beings, was provided to six members of the Center for Bioethic Studies. Each member had to produce a list of five episodes of the history of science hierarchically arranged from 5 to 1 in order of importance. A single list of episodes resulting from the five different lists was elaborated and hierarchically ordered from 5 to 1 by the same judges. The five first majorities of ranked episodes were selected as arguments for the comic series. The following cases in the history of science, related with bioethic problems faced by scientists, were selected -

- The Manhattan project: Creation of the atomic bomb.
- Pasteur's decision: Production of anti-rabies vaccine.
- The first hearth transplant.
- The use of pesticides and the Bhopal case.
- Dolly: the first cloned sheep.

A sixth comic was planned with an argument that would allow a summary of the ethic problems stated in the preceding five. It was also planned to include teachers guides in each one of the issues. Teachers guides would provide the basic contents of the related episode and also methodological suggestions to allow the comics to be used as teacher aids for bioethic introduction in classes of Biology, Philosophy, Natural Sciences, etc.

Comic series production and distribution

The production of the series involved the following steps:

- Determination of the central characters to be used in the whole series.
- Definition of the psychological profile of the central characters.
- Selection of drawings representing the central characters.
- Gathering of information about the selected cases of the history of science.
- Comic scripts production and revision of scripts by an expert committee.
- Production of the final version of comic scripts.
- Illustration of scripts by the graphic art group.
- Review of the images by the expert committee and the editor, including corrections.
- Review of the final images by the editor
- Teachers guides production by the specialists in education group.
- Editor's review of teachers guides and final graphic design.

The series of comics was printed and distributed by "La Nacion" a newspaper of national circulation, on a fixed day for six consecutive weeks. Eighty thousand issues were distributed each week.

Evaluation of the comics used as instructional material

The assessment was done in a sample of 360 students, grades seven to twelve, from three schools of low socioeconomic level and 360 students of three schools of medium-high socioeconomic level.

A pre and a post test were applied to measure learning. The test included questions about bioethics and about the events related to the episode of the history of science used as argument. The capacity to identify the ethical dimension of scientific research described in the first comic, was also measured. In addition, an opinion questionnaire was applied to validate the material in relation to its legibility in linguistic, physical, psychological, and conceptual aspects (Wertham, 1953). This questionnaire was applied after the students' reading of the first comic. Likert scales were used for the questionnaire responses.

Results

Before testing the comics a level of acceptance of 60% was expected for the variables linguistic, physical, psychological and conceptual aspects of legibility. Results from the evaluation showed the acceptance to be much

higher. Students' answers showed an average acceptance higher than 80%. General appraisal obtained 85% approval and the comic was considered to be good or very good. Images were qualified as good or very good by 90% of adolescents. Comics were considered to be easy-to-read by 82% and the vocabulary used was approved by 94%. The episode of the history of science described in the comic seemed important to 90% and 83% of the sample declared themselves to be interested in reading other comics similar to the one tested.

Measurement of students' learning was based primarily on the reading of comics. Teacher's support and guidance was very poor because of a prolonged detention of school activities. Also, time devoted to the recommended references' review and to perform the activities suggested in the teacher's guide, estimated to be 15 days for each comic, was not available.

Nevertheless, results only of personal comic reading show an increase in learning. The comparison among pre and post tests indicate that in the pre-test only 30% of the students had information about the most important issues in the episodes of the history of science selected. This percentage increased to 60% after reading them. Before reading the comics only 20% was able to describe the ethic problems exposed, after the reading 90% was able to identify those problems.

Information on youth acceptance of the comics published was also obtained from adolescents of different countries participating in the Nineteenth World Jamboree of scouts' meeting held in Chile between December 26, 1998 and January 4, 1999. For this Jamboree, the project team prepared an extensive technical sheet giving a detailed description of the activities proposed. The following activities were accomplished:

- Twelve workshops were carried out, twice a day, during six days.
- Forty students participated in each workshop and were divided into four groups of ten each.
- Every group was in charge of carrying out a creative dramatization based on one of the comic arguments.
- The following episodes of the history of science were represented: Pasteur's decision, the first heart transplant, Dolly: the first cloned sheep and the Bhopal case.
- In total 1,500 comics were distributed - there being 500 issues of each of the three comics.
- Although the representation was performed only by some members of each group of ten, all members had to participate in preparing the dramatizations, giving ideas, helping to create new disguises, handling sound effects, etc.
- Once the rehearsals were finished each group presented the created dramatization to the rest of the 40 participants.
- After every representation spectators posed questions and made comments on the cases presented.

Each workshop had two monitors who acted as moderators and stimulators of participation. Great interest and active participation of scouts was observed. Results from opinion questionnaires about the comics showed 90% or more positive responses on all questions.

In addition to these activities, information on teachers' opinion about the comic series was obtained, showing issues of all the series to teachers participating in - the P900 Program of the Ministry of Education (Program devoted to give significative support to the poorer schools of the country), the Program for Fundamental Improvement in Teaching of the Ministry of Education, and the Schools' First Scientific Symposium held in 1999. Around 95% of the teachers considered the comic series as very innovative and useful educational material. All teachers showed great interest in obtaining the materials to use them to enhance analysis of bio-ethic problems that nowadays is still very poor in primary and secondary education.

Conclusions and challenges

The educational media produced in the context of this project (comics and teachers' guides) as means for providing knowledge and developing skills for analyzing relevant problems in the history of science in bio-ethical terms was shown to be adequate for adolescents and attractive for teachers. This media contributed to the socialization of the concept of bioethics and thus increased awareness on problems related to progress in science and technology.

This has been the first step within a wider project aimed at developing highly cost-effective and efficient methods to develop skills for social participation, and for informed decision-making, thus for increasing social governability, for which access to information, knowledge and moral justification of techno-science are essential. Following a request from the Chilean Ministry of Education, a self-instructional book on bio-ethical problems in the history of science is being produced. Here comics are used for content development and transmission. While questions about contents are aimed at stimulating discussion with peers and with family members or at school. School Bio-ethics Committees are using innovative ways of informing and interesting young people in scientific dilemmas. The book also aims at motivating the organization of school bio-ethics committees by providing a description of their objectives and procedures. The final chapter suggests relevant aspects to consider in answers to questions and a list of references, Internet sites, and movies.

A new project aimed at evaluating increase in social participation skills through behaviors of participants in school bio-ethics committees, is being developed. In addition an interactive Web page is being produced, based on our experience in the application of comics in class rooms and also in the book's instructional design. Advances in science and technology and their relevance to bio-ethical problems makes it necessary to develop the capacity of youth to have opinions on bio-ethical problems, such as to enable them to have political influence. In this way the management of these important problems of life would not only be done by specialist elites groups but by each and every one of the human beings involved.

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