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## **ETHICAL EDUCATION IN SCIENCE AND TECHNOLOGY**

In the modern world, science and technology are two of the most significant sources of social change. Science and technology have brought about enduring and far-reaching changes in social and cultural life of people. In this connection we could ask: How have science and technology changed our lives? One of possible answer can be that science increases the stock of reliable knowledge about the external world, and technology yields machines and processes that make new human accomplishments possible. On one hand we can say that science is a method for establishing reliable and useful knowledge about natural and social phenomena; and on the other hand technology is the application of knowledge to the solution of practical problems. The relation between technology and society is interactive. It means that developments in one area force changes in another.

The implementation of technology influences the values of a society by changing expectations and realities. Technology, throughout history, has allowed people to complete more tasks in less time and with less human intellectual or manual labor. Society's traditional ethical values are challenged as technology enables new abilities and activities.

We can say that education can achieve its ultimate purpose of making one an ideal life being only if it helps fostering universal and eternal values in the minds of people. The meaningful education must not overlook any area of human development. The education, I mean also science education, should be value orientated and not only academically oriented. No doubt, technology has brought revolutions in many spheres of life by opening new horizons. I think that educational and information gap seems to be substantially overcome today through starting innovations in electronics and information technology. However communica-

tion gap has become a chasm despite the global village produced by media, migrations, trade and industrial manufactures. No education and culture can ignore the comforts of life, efficiency and economic productivity but it also needs poetic heart, moral praxis chasm that truly understand the meaning of the world. The value based rationality can only bring the balance between them.

Diana Cone claims that ethics as a multidisciplinary field has an important role to play in academic, professional, scientific and public life. Ethics is concerned with questions of what is morally good, and of right conduct. Do such questions have a place in science education? A framework for guiding the moral life of students and also an understanding of why they perceive certain conduct right or wrong is a key to a society structural integrity. The education is a crucial part of it<sup>1</sup>. I think that science education is a vital opportunity for meaningful ethical discussions. It is harder to agree on ethics in today's culture and life because diversity has increased significantly. Sometimes we are the witnesses that a decision maker does not share common, fixed values with the society within which and for whom the decision is made. There is a greater likelihood of promoting ethical disagreement and concern.

The teacher's basic philosophy of life nurtures the development of implicit theories related to teaching and teacher – student relationships. Looking at teaching from a student perspective is certainly not the same as viewing it from behind the desk of the teacher. It means that the teacher is an educator whose way of living, behaving, and acting may have a great impact on growing individuals who seek figures with whom they can identify and adults who can satisfy their need for close social relationships and caring. They should be judged like everybody else. In opinion of older female student the job of teacher is to disseminate knowledge, because they are only human. The students have to be allowed to decide for themselves what they want to believe and think. What the teacher believes to be right may not be right for everyone. Personality characteristics like empathy and social sensitivity, along with a professionally based understanding and caring, seem to be of the utmost importance. The students appreciated most the teachers whom they could “talk to” and those who cared about them as human beings<sup>2</sup>.

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<sup>1</sup> D. Cone, *The Role of Educators in Promoting Global Ethics*, “Journal of Family and Consumer Sciences” 2001, vol. 93 (5), s. 12.

<sup>2</sup> T. Bergem, *The Teacher as Moral Agent*, “Journal of Moral Education” 1990, vol. 19(2), s. 94.

The media (such as television, magazines, newspapers, etc.) is a key source of information and certainly media accounts occasion a lot of questions from students. New forms of entertainment, such as video, games and internet access could have possible social effects on areas such as academic performance. So the role of the science teacher is to teach the values in talking about some new developments. There we can see the significant opportunities for science educators or teachers in exploring the ethical dimensions. Science education which upholds the ideal of preparing students to be active participants within a civil society inevitably must equip those students to think critically about the norms and notions of what is nice, normal and natural. Science teachers should also encounter the different ways of doing moral thinking. Are they focusing on consequences, moral rules or a case – by – case consideration? They learn to value the students and other people despite the fact that their opinions may be different from the others. They learn to think in different ways and to identify the different premises that they use in arguments. They learn critically to evaluate other perspectives. Teachers must give to students some sets of values, if they are to be meaningful contributors and promoters of a democratic society. They should show an increased interest in the moral development of pupils and students and that education should be the most powerful predictor of the development of moral judgement. I think that many teachers truly desire to teach young people how to think and to act responsibly within a moral standard. But we can state that some of science teachers and educators are under – prepared for the challenges posed by the ethical dilemmas raised by contemporary science. Ralph Levinson and Michael Reiss state that recent developments in biotechnology, for example, have drawn much attention to ethical issues in science and technology and the moral responsibilities we have as citizens towards each other. However, the conduct of scientists has always concerned the public with issues across the science, for example, nuclear power, exploitation of the Earth's resources, and how we treat each other as humans. These ethical concerns are prominent in the science curriculum and in cross – curricular areas such as personal, social and health education, sex and drugs education, and citizenship<sup>3</sup>. So in our democratic country as a part of meaningful educational curricula should be honesty, acceptance of different races, caring, moral courage, etc.

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<sup>3</sup> R. Levinson, M. Reiss, *Ethics in Science Education*, “School Science Review” 2004, vol. 86 (315), s. 23.

What the teachers undertake within their classrooms, the actions they perform, the examples they set, not only has a significant impact on a student's immediate academic life, but the actions and examples also provide a profound basis for the development and improvement of students' characters and a continuity of those assets in their future world. Ethical development is dependent upon education, but moral education is a lifelong process<sup>4</sup>. The power of formal education lies in the teacher's ability to stimulate the learning environment. Then, later it provides students with a concrete reason to take an interest in their community and also in larger social issues. But education must be replete with an awareness of a right and wrong. This awareness must shape teachers, as well as learners. They can ask what are the teacher's responsibilities towards the learner and the learner's responsibilities toward the teacher. I think that the teacher (as the more experienced person) is responsible for protecting the learner (the less experienced person) from danger and bringing structure to the learner's life. The learner's responsibility is to attend to the teacher's actions and words and to be instructed by the teacher. It makes teachers and learners responsible for seeing each other as human beings. When we talk about science in education we could say that science teachers should abandon the concept of 'neutral chair' and contribute to citizenship education by presenting the scientific view on controversial issues and also they should engage 14-19 year-olds in thinking about and debating ethical issues and to give some suggestions, with examples, for engaging pupils in ethical debate about controversial issues in science lessons.

The co-existence of teachers and their students is based on complex mutual ethical understanding with respect to behaviour on both parts<sup>5</sup>. In this connection, it can be stated that, bearing in mind the growing age of pupils and students as well as their growing cognitive, intellectual, and moral abilities, teachers should make efforts in their educational activity to create an adequate partnership based on mutual understanding. On the one hand, teachers should attempt to understand the position of pupils or students and their behaviour and actions; on the other hand, they should create the right conditions and atmosphere in which their pupils or students have the opportunity to understand the role and position of teach-

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<sup>4</sup> P.J. Carruth, A.K. Carruth, *Education in Ethics! The Role of Higher Education*, "Journal of Education for Business" 1991, vol. 66 (3), s. 168-171.

<sup>5</sup> K. Aurin, M. Maurer, *Forms and Dimension of Teachers' Professional Ethics – Case Studies in Secondary Schools*, "Journal of Moral Education" 1993, vol. 22(3), s. 293.

ers within the relationship, including their moral duty and responsibility for students' moral development into morally mature individuals. In addition to the necessity of being professional in their educational activities, teachers are also expected to integrate their skills and knowledge and be aware of the moral and pedagogical responsibility and duty towards individuals who are dependent on the teacher, i.e. students. It is also necessary that attention be paid to the development of teachers' ethical and moral competence<sup>6</sup>. Teachers and also family have a responsibility to address questions of moral choice, to encourage thinking and acting responsibility within some moral framework, and to assist students in building a foundation to show respect for human dignity.

Collaboration is a process of communicating and also provides the creation and enhancement of the 21<sup>st</sup> century workplace. But what seems right today may seem wrong in the future. Modern technology and internationalism give rise to the need for new rules, thus requiring educators to step outside the classroom. It is the basis for integrating ethical content into the curriculum that will enable students to view concepts, issues, and problems from several moral perspectives while maintaining integrity and honesty. Science professionals and also family are challenged to undertake the serious work of combining moral reflection with the demands of practice to raise ethical standards.

It is of course important that we recognise the value dimension of science education at all levels of education. The day-to-day interaction of the classroom can model much of the society. The students of all ages wish to explore the rights and wrongs. Today's science teachers are producing today's citizens and tomorrow's scientists, policy makers and administrators. So we can say that science education has the important role in education as the whole.

## **Edukacja moralna w nauce i technologii**

W niniejszym artykule staram się przedstawić problem edukacji etycznej w nauce oraz technologii. Edukacja etyczna odgrywa ważną rolę w życiu publicznym, zawodowym oraz akademickim. Tworzy atmosferę, która promuje moralne ludzkie zachowania wśród różnych grup społecznych przez lepsze zrozumienie oraz eliminowanie barier. Ludzie odpowiedzialni za profesjonalną edukację demonstrują szacunek wobec każdej osoby jako indywidualności,

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<sup>6</sup> G. Colnerud, *Ethical Conflicts in Teaching*, "Teaching and Teacher Education" 1997, vol. 13(6), s. 628.

porozumiewają się uczciwie oraz szczerze, wzmacniając poczucie własnej wartości oraz, pomagając zbudować właściwy i wrażliwy społeczny i kulturalny system, który promuje powszechne dobro ludzi. Pracownicy szkół wyższych powinni starannie dbać o rozwój każdego studenta. W edukacji oraz każdym innym zawodzie powinniśmy skupiać się na naszym własnym zachowaniu, ponieważ to, co robimy jako nauczyciele, to, co mówimy i sposób, w jaki się zachowujemy, role, jakie odgrywamy, porady, jakich udzielamy odnoszą się do ludzi.

Współcześnie technologia łączy świat, czyniąc go mniejszym i bardziej dostępnym dla narodów. Złożone aspekty technologii liczą się dla wielu dodatkowych różnic w obrębie naszej kultury. Cywilizacja podlegająca wpływom nowoczesnej nauki i technologii jest narażona na wiele konfliktów, wiążących się np. z ochroną środowiska, sztucznym zapłodnieniem oraz inżynierią genetyczną. Potrzebna jest pomoc nie tylko nauce empirycznej, ale również naukom społecznym, humanistycznym oraz etyce.