

**Sustainable Education in Russia:
The Experience of the
Mendeleyev University of
Chemical Technology**

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Introduction

The urgent need for re-orientating this generation's lifestyles underlies the importance of the humanistic and ethical components of the whole framework of education for sustainable development (ESD).

The National Sustainable Development Strategy of the Russian Federation stresses that "...the greening of human conscience and ethical principles and radical reorientation of the whole system of education and training toward sustainable development principles must prioritize intellectual and moral values over material values."⁷³

The Russian Ecological Doctrine also stresses the need to develop new educational standards that promote basic principles of national sustainable development.⁷⁴

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⁷³ "National Sustainable Development Strategy for the Russian Federation." Moscow, 1997.

⁷⁴ The Russian Ecological Doctrine represents the official view on the principles, main priorities, and means to promote sustainable development in the Russian Federation. The Doctrine provides the basis for the Russian State's ecological policy.

In the sphere of *public education*, ESD focuses on introducing knowledge and skills that encourage harmonious relations between humankind and nature. *Life-long ESD* provides necessary conditions for the creation, functioning and further development of the whole system of general public education at all levels: pre-school and kindergarten, primary and secondary school, higher education, life-long professional training, nonformal education for local communities and, finally, informal education for the mass media.

The methodology adopted by the Russian educators who are engaged in promoting ESD in the country is based on the following **principles**:

- Variety of forms and methods of education and upbringing
- Interrelation with other education programmes
- Programme continuity at different levels
- Adaptability
- Consideration of local conditions
- Inseparability of general, professional and environmental education
- Practical activities

The higher education system for engineering in Russia is undergoing a transition to a new educational paradigm - the professional training of future specialists in a holistic manner. Addressing the need for sustainable use of natural resources, energy conservation, environmental protection, prevention of technological accidents, and risk management requires



Mendeleyev University of Chemical Technology of Russia organize the first international conference on Chemical Education and Sustainable Development.

the active participation of engineers, with their particular knowledge and skills. Hence, the goal of education must be training specialists within a holistic life paradigm, so that they can be responsible citizens. The special role of engineer-chemists should be mentioned, because environmentally friendly technologies and green chemistry could greatly help in the transition to sustainability.

During the former Soviet Union's period of industrialization and construction of a centrally planned economy, higher education in engineering was subject to quite strict state control over the content of curricula, the style of teaching and the structure of education in general. The indepth specialization of graduates and their placement in jobs was the responsibility of the state ministries and the higher institutions themselves. Such an approach resulted from the fast growth of industry and the beginning of the Cold War. The goal was 'victory at any price.'

In today's modern world, it is quite obvious that such an approach cannot be put into action and would lead nowhere. The strategy of sustainable development is the only viable alternative. New techniques and technologies in all branches of material goods production make it evident that the role of engineers is becoming even more important.

Engineers trained in a systemic and holistic manner can become change agents in the practical implementation of the concept of sustainable development. The leading technical universities in Russia are steadily moving in this direction.

At the secondary school level, in order to achieve success in sustainable education, there is an urgent need for education programmes based on sustainable development curriculum for use in teacher training. Such training will allow teachers to use interdisciplinary approaches to integrate sustainable development principles into the different subjects of the formal school curriculum.

Sustainable education at all levels – life long, informal and nonformal - should also be available to all citizens

of the Russian Federation in order to achieve a more ambitious goal: the transformation of the mainstream lifestyle of unsustainable consumption and production to a sustainable way of living. This can be done through public lectures, the creation of new learning centres, seminars and workshops, mass media such as TV and radio programmes, and audio-visual means, as well as local and national roundtables and conferences.

The research, development and industrial implementation of new 'nature-friendly' technologies is one of the most significant components of the whole system of sustainable education.

Education for Sustainable Development at Dmitry Mendeleev University

I. ESD in Russia

The advance of education for sustainable development in Russia builds on the efforts of environmental education, which constitutes the major part of ESD in its best methodologies and forms. The 'greening' of the higher technical education in the Soviet Union began in 1983 at the then Moscow Mendeleev Institute of Chemical Technology, with the initiative of its rector, the future Minister of Education and academician G.A. Yagodin, who founded the Department of the Industrial Ecology.

In order to bring the knowledge of sustainability into the world of professional engineers, the University became the first school in Russia to organize a Department for the Problems of Sustainable Development in 1995 and, in 2000, the Institute of Chemistry and the Problems of Sustainable Development at the Dmitry Mendeleev University of Chemical Technology was established. This unique educational institution includes:

- The College for Rational Use of Natural Resources
- The Department of Sociology
- The Department of Risk Assessment and Risk Management

- The Department for the Protection of the Producers' Rights (dealing with legislation of chemicals, the chemical industry, and environmental regulation).

All technical majors in environmental protection at the Institute for Problems of Sustainable Development are grouped under the umbrella of the Department of Environmental Protection. In compliance with the recommendations of the international conference "Environmental Chemistry," "Environmental Engineering" is now a compulsory course for all future engineers.

The Educational Department of the Institute has developed programmes and specialized courses, such as "Development and Natural Resources," for its students, who are studying to become chemistry teachers in the near future.

II. The experience of integrating ESD into higher education

Since 1995, two compulsory courses on sustainable development, "The Problems of Sustainable Development" and "Industrial Security and Risks" have been included into the curricula of all departments and institutions of Dmitry Mendeleev University.

Since the year 2000, several summer schools have been organized at Dmitry Mendeleev University to update young university faculty on innovative pedagogical methodologies. The attendees were presented with programmes in such subjects as sustainability, democracy and justice, the goals of sustainability, the reorientation of existing education towards sustainable development, and the best pedagogical practices and experiences at the international and national level.

The Department of Environmental Engineering at the University organizes scientific-practical student expeditions that seek to provide students with practical knowledge of education for sustainable development. These expeditions have been very successful, and the results of several were

presented to the Russian State Committee on Nature Protection, and included in the National Report "Lead Pollution of the Environment and its Influence in Public Health" (1997). In recent years, some of them have also been sent out to the regional committees of the Russian State Committee on Nature Protection.

In April 2007, the Academic Council of the Institute of Chemistry and the Problems of Sustainable Development at Dmitry Mendeleev University approved the professional oath that each graduate of the Institute is expected to take during the graduation ceremony, starting with the 2007–2008 academic year. The text of the oath is built on the main principles and values of sustainability.

III. Helping integrate ESD in secondary education

In addition to its ESD activities at the higher education level, Mendeleev University set up a long-term patronage programme to promote education for sustainable development in secondary education by creating centres of environmental monitoring in secondary schools and colleges in various parts of the country.

From 1991-1993, in Moscow and Tomsk (Siberia), the professors of the Department of Sustainable Development of the University developed and held a series of workshops and seminars on global issues related to sustainable development. As a rule, these

seminars were held during the summer and winter school holidays, and autumn and spring breaks. The duration of each workshop varied depending on the individual requirements of each group and the level of their preparedness. Among other topics, such issues as environmental protection and its relation to poverty, and examples of unsustainable economies and poor environmental management were addressed. As the result of this sustained effort, ESD practices and methodologies became an indispensable part of the educational process for every teacher, faculty member, and student from Tomsk Municipal College who took part in these workshops.

The creation of the Centres for School Environmental Monitoring turned out to be one of the most effective tools for the integration of sustainable development issues into the formal and nonformal educational process in secondary education. These Centres provide college students (15-18 years old) with the opportunity to carry out systematic, scientific research by working on various projects. The programme is developed with consideration of the educational and psychological levels of students' development. The experience of the first Centres for School Environmental Monitoring and the information gathered by the University was very useful for further expanding this programme. For the last several years such Centres were organized in several Moscow schools.

IV. Professional training for sustainable development

The University's experience in convening ongoing training seminars and workshops on environmental management was incorporated by the Government of Moscow. In late 1999, the Moscow Government issued Decree N990, in which both environmental and sustainable development professional training were pronounced compulsory for professional and business managers at all levels.

In accordance with the Decree, the University, as a member of the Moscow Association of Environmental and Sustainable Development



On the century-old grand University staircase. The famous students choir.

Education, provides professional training by giving the course "Environmental Protection at Industrial Enterprises." Since 2000, about 1,000 representatives from various plants and factories in the Russian capital have received this training.

V. Regional activities: Promoting ESD principles among Russian educators

The Director and faculty of the Institute for Chemistry and Problems of Sustainable Development at the Mendeleyev University have developed a programme for the promotion of sustainable development at the regional level. They created a partnership with the Inter-Regional Association for Economic Cooperation of the Subjects of the Russian Federation, called "The Siberian Agreement." This Association constitutes an NGO that brings together nineteen regional subjects of the Russian Federation. The Association focuses its activities on life long environmental and sustainable development education, raising the awareness of the broader Russian public through formal and nonformal ESD.

Week-long training courses were held in various Siberian cities – Tomsk, Krasnoyarsk, Novosibirsk, and others. The courses were held by professors of the Institute headed by its Director; they were mainly focused on secondary school teachers and university professors, although, on one occasion, Professor Tarasova's audience were kindergarten teachers.

The Institute for Problems of Sustainable Development at the Mendeleyev University works in close cooperation with the UNESCO Centre of Chemistry and Education, and serves as an experimental testing ground for new educational methods and curricula. In order to train the diverse and numerous educational communities in Russia, educators at the Institute developed courses on natural protection and sustainable development to be taught by educators in hundreds of schools across nineteen regions of the Russian Federation.

Since early 2000, the Institute has been convening a series of training workshops and seminars in

Moscow and other regions; this is an ongoing process. The courses are designed primarily for secondary and high school science teachers and are built around the new educational curricula developed at the Institute. Interactive approaches and experience sharing are widely applied in these courses, as well as simulation role-playing, discussions of global problem issues, and social and economic aspects of sustainable development.

Methodology

Education for sustainable development is a very complex and innovative process.

The IPSD at the Mendeleyev University uses the following features in the educational process:

- Interdisciplinary approach, which implies the combination of traditional forms of education with innovative ideas and methodologies. Young chemists learn chemistry along with special courses on sustainable development and environmental risk assessment and management, as well as sustainable patterns of production and consumption.
- Overarching approach for dealing with global problems at the local level.
- Active personal involvement and interaction between educators and students.
- Use of role-playing and other active methods of engaging students in creative participation within the teacher-student exchange.
- Simulation games with small groups of students, which create real-life problematic situations in need of sustainable solutions.

It is important to note that the Earth Charter is integrated into the text of lectures given to the students during a special course, "Problems of Sustainable Development." The course is included in the curricula of each School and Department of Dmitry Mendeleyev University. It is being taught to all students during their second year for 108 hours, of which 36 hours are dedicated to the lectures, and 72 hours to practical and individual work (one semester).

All students have to master the computer game "Strategema" (an after class exercise, which allows the students to get 30 credits out of 100). The game is based on the theory and practical methods of applied systems approach and management introduced by Dennis Meadows. The game requires close interaction of several participants united in a working group that helps participants master the fundamentals of system thinking and apply them concretely to the solution of each given problem. The outcome of the game depends on coordinated decision-making that integrates the needs and perspectives of every participant.

Students also watch four documentaries on the most complex problems of sustainable development (also completed after class). During their group exercises, and also as an individual assignment, students work on finding solutions to the problems raised in these films and present them to their professor. Students can earn 20 credits for the best solutions.

All students have to prepare and turn in three papers and one thesis on sustainable development issues. Out of the three mandatory papers, one must be written on the Earth Charter principles and their importance for sustainable development processes.

By applying these methods, the Dmitry Mendeleev University plays an important role in the education of new generations of professionals ready to face interdisciplinary challenges and find innovative and sustainable solutions.

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