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## 1994 EDEN: Developing Human Potential for Successful Socio-Economic Reform in East Romania - Iasi Region

Adrian Adascalitei, Dan Galea, Vitalie Belousov, Ioan Desire Suceveanu

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## **Developing Human Potential for Successful Socio-Economic Reform in East Romania – Iasi Region**

by **Adrian Adascalitei**, Iasi Technical University, **Dan Galea**, Institute for Theoretical Informatics, **Vitalie Belousov**, National Romanian Institute for Creativity in Engineering and Technology and **Ioan-Desire Suceveanu**, General Association of Engineers, Romania.

### **Introduction**

In recent years, there have been many reports and reviews conducted in Romania which have examined the manufacturing industry. The following conclusions have been agreed:

- Romania needs to maintain a manufacturing industry;
- Romania's manufacturing industry is unhealthy and in crisis.

To survive, Romanian manufacturing must:

- become more innovative and more effectively adapt its production to local and international markets;
- control quality in its manufacturing goods;
- apply effective and appropriate technology;
- adopt a management style which is responsive to technological change, economic realities and human relations;
- educate the community to accept manufacturing as an area vital to the well-being of the whole population;
- accelerate the successful introduction of computer related systems into firms and plants.

### **Iasi Technical 'Gh. Asachi' University**

#### History and traditions

At the basis of the development of education (including engineering education) in the former Romanian countries (Wallachia, Moldavia, and Transylvania) up to the foundation of the national unitary state, Romania, stood not only the permanent socio-cultural and economic relationships between these countries, but also the durable contacts with famous European cultural centres.

At the beginning of the 19th century, in 1813, a class of cadastral engineers was created (lessons were taught in Romanian language) inside the 'Prince Michael' Academy of Iasi.

This is considered the start of engineering education in Romania. An important contribution was the appointment of Gh. Asachi as professor of engineering sciences.

Within the University of Iasi (founded in 1860 as the first Romanian University), between 1910 and 1913 was set up the School of Technical Applications (having sections in: electricity and industrial chemistry). 'Gh. Asachi' Polytechnic School of Iasi was established in 1937.

After the Second World War in 1948 following the Reform of the Educational System, the Polytechnic Institute 'Gh. Asachi' of Iasi was created, having four faculties: Industrial Chemistry, Electrotechnics, Mechanics, and Constructions.

After December 1989, in 1993 the Iasi Technical 'Gh Asachi' University was created having ten faculties:

- 1) Automatic control & computer sciences;
- 2) Industrial chemistry;
- 3) Constructions & architecture;
- 4) Electronics and telecommunications;
- 5) Electrical engineering;
- 6) Hydrotechnics;
- 7) Mechanical engineering;
- 8) Science and engineering of materials;
- 9) Machine building technology;
- 10) Textile & leather technology.

#### Mission and aspirations

The necessity to develop a creative and productive technical workforce equipped with the knowledge and skill to generate technological breakthroughs is the basis of the Iasi Technical 'Gh. Asachi' University's commitment to Open and Distance Learning (ODL). The objective of the ITU (Iasi Technical University) is to deliver:

- short courses and research seminars;
- advanced, degree, and certificate programs;
- technology transfer programs and customised offerings into the work sites of engineers, scientists, and technical managers through the Iasi (Regional) Center for Open and Distance Continuing Engineering Education (ICODCEE).

Through ICODCEE, technology based corporations and SMEs (Small and Medium

Enterprises) address the issues of sustaining competitive advantage and job productivity, while providing technical professionals with opportunities to extend their education without interrupting their careers.

### **Technology transfer through human resource development**

#### Central and East European (C&E-E) context

The objectives for a regional initiative in Distance Education are as follows:

- to assist countries in the transformations to market economies and democracy by accelerating human resource development;
- to contribute to the closer integration of C&E-E countries with Western Europe;
- to increase opportunities and access to education and training throughout the C&E-E region, especially in remote areas;
- to co-ordinate and make effective use of scarce expertise and other resource on a wide scale;
- to speed up the development of high quality, cost effective distance education systems;
- to promote interaction and mutual support for the development of distance education between institutions and countries in the C&E-E region and Western Europe.

#### The new role of the university in the process of transition to a market economy

The reasons for which ITU is involved in continuing education network have to do with:

- the challenge of lifelong learning;
- the research network which is created;
- the pedagogical approach used.

In the process of transition to a market economy, it has become clear that the university has not only a task of basic and advanced education and research, but that it must take up responsibility for upgrading the scientific knowledge of its graduates. The new Romanian law of universities mentions explicitly the task of continuing education. The task lies with the universities to take on their own responsibility to define their strategy of research, basic education, continuing education and scientific services towards the society.

#### Technology transfer

Technology is the set of engineering and managerial knowledge necessary to design and develop products for manufacture. It incorporates the skills to operate the machinery and equipment in manufacturing plants and to market the finished

products in a commercial arena that is continuously changing in consumer and industrial sophistication.

Technological change is the progressive and innovative advancement of this society's knowledge regarding the industrial arts; the improvement of current products and production processes, the introduction of new products and manufacturing methods and synergistic development of new techniques in: marketing, distribution, management, and organisation.

Technology is transferred through people and the effective communication of information is the essence of the transfer process (ability to understand, learn and apply information). Within the near and medium term it is essential that knowledge of the new technology be imparted to the labour market through the university curriculum. Local firms are then in a position to adopt and to adapt the current available technology.

Universities provide the fundamental knowledge to understand and utilise new technologies. They train and develop the necessary manpower to facilitate the absorption of technology. Over time, the fostering of an environment for innovation and Research & Development will bring forth new products and techniques that can form the core of locally generated proprietary technology.

Market forces dictate the nature and educational level of workers demanded by industry type with economic sequences on the patterns of earnings and income distribution. The educated workers are a high component of this aggregate. The university, as agent of public policy, must ensure education and training programs are continually update to meet the requirements of industry through mutual consultation.

Today, even more importantly engineering education must relate the role of engineering to that of entrepreneurship and show what part engineers can play in technical innovation. By the invention process is meant the process whereby the technical feasibility idea is worked out and embodied in physical form; in contrast entrepreneurship is the process whereby an invention becomes developed into a desirable form and a viable market is established for it.

## **Opportunities for Continuing Engineering Education**

### Continuing Engineering Education (CEE)

The international competitiveness of a nation is not only dictated by the competitiveness of the individual firms, but by the infrastructure and social programs that exists. To survive in the world of business, especially where international forces rule, a business must be highly productive, efficient, well managed, and use the best technology. The competitive price pressures require the lowest cost, and wasteful practices will only force a company out of business.

CEE is simply an efficient way of combining experiences of others into a packaged programme that allows an individual to learn in a week what may have taken others many years to learn.

CEE is a part of human development, another element in the same scheme comprising primary, secondary, and higher education; and technology transfer. The mission of CEE is to assure that all employees are at the forefront of their speciality and continue to broad their speciality and skills. CEE objectives are:

- to bring all scientists/engineers to state of the art knowledge in the areas relative to their speciality;
- to introduce technical employees to the relevant foundation technologies of the corporation;
- to require that all technical employees have a continuing educational plan to maintain competency and growth;
- to assist managers in recognising that maintaining their on-board investment in technical personnel is essential to the accomplishment of the corporate objective and in working with technical employees to establish objectives and plan to meet them;
- to provide additional in house educational opportunities

### New opportunities for CEE

Most new opportunities for engineering education arise from the different types of student now seeking entrance to an education in engineering. Developments in communications technology and the techniques for using these devices in the delivery of education models for the provision of initial training, graduate education and continuing professional education; and some of their course materials could be readily adopted and adapted for use in Romania.

The new cohort of engineering students is an interesting mixture: professional groups in the private sector; civil servants (central & local government, agencies); teachers; social workers; people who need training for a new profession; people connected with the agricultural sector; unemployed people; engineers wanting to upgrade their qualifications in management of technological enterprises but are unable or unwilling to put university time table constraints ahead of their workplace commitments; qualified engineers wanting credit short courses refreshers or updates as a part of a programme of continuing professional education.

These new and growing audiences for Engineering Education (EE) have common elements to meet their needs:

- the programs need to be tailored to individual needs (time, place, pace and style of learning) and take account of specific deficiencies in prior learning (much more attention to instructional design)
- a more open and co-operative approach to the management and administration of CEE programs, with greater recognition of previous education and relevant experience (more flexible policies on credit transfer; course brokering between institutions; the sharing of instructional resources and joint ventures in course offerings);
- the use of new instructional and communications technologies for the delivery of instructional and learning activities and in the management of instruction.

In working to meet these important needs Romanian engineering universities open a whole range of new opportunities for themselves. In the same time they are instrumental in raising the level and quality of engineering and technological education within the community.

### A university-industry CEE programme

In an university-industry based CEE programme, one of the conspicuous merits is the immediate access to expert groups teaching many different disciplines. Thus, curriculum formulation and adjustment of course contents, for example, may be continually incorporated and improved even in the process of execution to provide the clients with better understanding and comprehensive instructions. Vividness in research-minded attitudes and creative and liberal thinking may help students to re-orient themselves to a phase of transferring new knowledge.

The degree programme and CEE programme must complement each other in the sense that complimentary interactions and viability can be effected to enhance and promote the programme quality. CEE doesn't have to be a programme dealing only with the state of the art knowledge as a whole. Much of the foundation theories and technologies relevant to the particular corporation may constitute the main flow of the education plan.

The CEE programme will need to help engineers to maintain competency and growth through motivation, and to assist corporate managers in recognising the absolute necessity of investment in CEE to train their technical personnel in order to accomplish corporate objectives. It does need, in general, to differentiate the level of the programme content according to that of industry but quickly readjust to the advancement of the corporate level. Technology evolves so fast that technical education has to be incessantly updated and reformulated, by eliminating the inertial effect of the university, which sometimes is apt to be contrary.

#### Characteristics of open and distance learning (ODL)

Open Learning means any form of learning that has elements of flexibility which make it significantly more accessible to potential students than the courses traditionally provided within higher educational institutions.

This greater accessibility may result from many different factors including: flexibility in the content of the course; in the place of its provision; in the mode, medium or timing of its delivery; in the pace at which students may proceed through it; in the special support which is available; or in the forms of assessment that are offered (e.g., the accreditation of prior experiential learning). The openness is achieved, in part at least, by the use of new information and communication media (Interactive and Multi-Media Educational Technologies).

Distance Learning (DL) is defined as any form of study not under the continuous or immediate supervision of tutors, but which nevertheless benefits from planning, guidance, and tuition of tutorial organisation. DL has a large component of independent and autonomous learning; it is therefore heavily dependent on the didactic design of materials which must substitute for the interactivity between student and teacher in face to face instruction. The autonomous component is

supported by tutoring and counselling systems which are provided at regional or local study centres and to an increasing extent by modern communication media.

The ODL material is structured in units or modules geared to specific learning outcomes. Open and Distance Education is making students more responsible for attaining their own learning objectives.

#### Developing teaching and learning materials.

A project management activities matrix for ODL projects outlines four management arrays through five project phases (analysis, design, production, implementation, evaluation and maintenance):

- a) Planning array: to arrange the conditions and prepare plans for project activities;
- b) Controlling array: to stimulate, monitor, intervene, criticise, and modify project activities, materials or products;
- c) Communicating array: to deliver communications among team members and outside people;
- d) Documentation array: to document materials or products.

The steps for developing teaching/learning materials use print as the paradigm; but the same steps may be applied to the development of enriching audio and video materials, and with some adaptation could be applied to the development of computer-based approach.

The most prevalent models of instructional systems development are those based on an engineering approach to curriculum. These models typically divide the process of developing instruction into five stages/phases (having typical goals):

- analysis: define training requirements; analyse target populations; establish performance levels;
- design: specify instructional objectives; group and sequence objectives; design instructional treatments;
- production: develop learning activities; develop test items; evaluate prototypes;
- implementation: implement learning activities; administer test items; assess student results;
- maintenance: revise course materials; revise test items; assess course effectiveness.

## The future for CEE in Romania

The restructuring of industry and of trade patterns throughout the country and the world has industry, particularly due to the lack of useful industrial technologies and know-how for the economic relaunchment. As a result, industry in Romania has begun to recognise that universities must be productive forces in the process of technological innovation, and thus they help to increase the value of production factors of: labour, technology and capital. The industry-university linkage accrues not only from the classical role of the university but also from non-traditional interactions which must be strengthened so that they can live together, share their unique resources, and co-operate with one another, to the benefit of both sectors.

As technology advances with its ever-decreasing life cycles, the need has increased for closer interactions and expeditious exchanges of information and knowledge among industries, universities, and professional and research institutions. This is necessary to facilitate the flow of technology from one institution or sector to another and to keep abreast of the changing technologies and market needs. CEE can serve as a bridge or agent linking those various institutions. And for it to be viable, it too has to adjust itself productively with changes of technological needs of industry.

## Iasi Center for Open and Distance Continuing Engineering Education (ICODCEE)

### Objectives

The ICODCEE should provide the necessary resources for a wide range of activities including Research and Development of, and training for, Continuing Engineering Education, by using Open and Distance Learning (including interactive multimedia educational technologies), as a professional activity.

The ICODCEE performs its functions by working in the following directions:

- promotes new educational technologies for engineering universities in Romania;
- implements training schemes;
- creates and maintains a documentary fund in engineering education (pedagogy).

### Organisation structure

The center is governed by an academic council created tensions and difficulties for Romanian under the leadership of a chairman.

The director of this center assumes overall responsibility for the operation of the center and is advised by, and responsible to, the academic council. The industry advisory committee advise the director on matters relating to the conduct of teaching, research, and other activities. The academic staff (a mixture of engineering and educational experts), the administration, and the technical staff (computer-aided design technique experts) are responsible to the director.

The ICODCEE is located in the Iasi Technical University and has following participant members: Iasi Technical University; Institute for Theoretical Informatics, Romanian Academy, Iasi Branch; Romanian National Institute for Creativity in Engineering and Technology; Iasi County Service for Labour and Social Assistance.

### Budget

ICODCEE is funded by a grant from the PHARE Programme and national contributions (Ministry of Education, Government of Romania).

### Conclusion

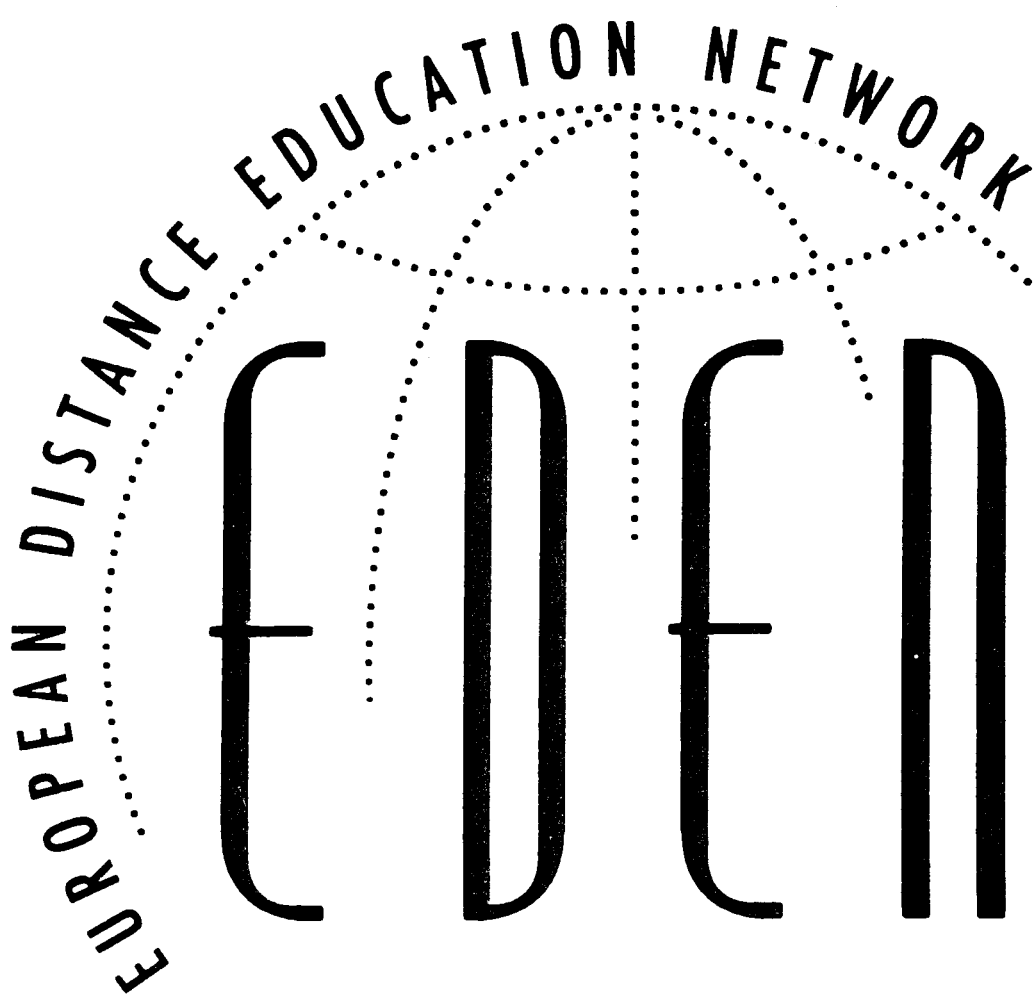
The aim of this study and project document is to give some general information regarding the operation of the ICODCEE, its objective and structure. It is also hope that the proposal will convince the Romanian Ministry of Education as well as the National Romanian Accreditation Board for Higher Education.

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**European Distance Education Network**

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## Table of Contents

---

1994 EDEN Conference Report <i>by Kerry Mann, Executive Secretary, EDEN.</i>	1
Opening Address <i>by Lennart Meri, President of Estonia</i>	2
Human Resources, Human Potential, Human Development: The Role of Distance Education <i>by Erling Ljosd, NKS, Norway and President, EDEN.</i>	3
<b>Keynote Addresses</b>	
The Baltic University Programme - Distance Education through University Networking in the Baltic Sea Region <i>by Lars Rydén, The Baltic University Programme, Sweden.</i>	6
Twenty-five Years of Distance Education - the Case of the UK Open University <i>by John Daniel, Vice-Chancellor, The Open University, UK.</i>	14
<b>Curriculum Development and Course Design</b>	
Continuing Upgrading of Overperforming Students <i>by Ioan Popa and Ionel Chera, Ministry of Education, Romania.</i>	20
The EUROHOT Project - the Development of a Pan-European Training Programme <i>by Barry Taylor, CoBOLD, the City of Bath College, UK.</i>	21
The Open Secondary - Norway's Biggest Classroom <i>by Dagny Blom, NKS, Norway.</i>	24
Developing Human Potential for Successful Socio-Economic Reform in East Romania - Iasi Region <i>by Adrian Adascalitei, Iasi Technical University, Dan Galea, Institute for Theoretical Informatics, Vitalie Belousov, National Romanian Institute for Creativity in Engineering and Technology and Ioan-Desire Suceveanu, General Association of Engineers, Romania.</i>	29
Introducing Distance Learning in Swiss Higher Education: Initial Assessment of Know-How Transfer Processes. <i>by Marino Ostini, Federal Office for Education and Science, Switzerland.</i>	35
Reshaping Doctoral Programmes in Management <i>by David Birchall, Henley Management College and Arthur Money, Brunel University, UK.</i>	41
Course Design for the Distance Education of Disabled Students in Romania <i>by Ionel Chera and Iulia Ciubuc, University of Bucharest, Romania.</i>	44

<b>The Role and Cost of Technology</b>	
Open Hypermedia System for Automatic Control Teaching <i>by Joaquin Aranda, Sebastián Dormido, Maria A. Canto, Jose' Luis Ferndndez, Fernando Morilla, UNED, and Jose Antonio Ramos, Carlos de Castro, Universidad de Córdoba, Spain.</i>	121
The Multimedia Teleschool for Personnel Development in Eastern Europe <i>by Stefanie Fischer, Berlitz Europe Projects, Germany.</i>	125
Curriculum, Pedagogy and Educational Technologies: Some Considerations on the Choice of Technology for Open and Distance Learning <i>by Jørgen Bang, Jutland Open University and Aarhus University, Denmark</i>	127
EuroPACE 2000: Professional and Academic Channel for Europe 2000 <i>by Johan Van Heddegem (with Georges Van der Perre, Jef Van den Branden and Erik Luyten), EuroPACE 2000, Belgium.</i>	135
Synchronous Versus Asynchronous Communication: A Pedagogic and Economic Debate <i>by Bernard Loing, President d'Atena and Ministry of Telecommunications, France.</i>	138
<b>Transfer Activities</b>	
The TACIS Pilot Projects on Distance Education in Management Training <i>by Gottfried Leibbrandt, TACIS Programme, European Commission, Belgium.</i>	141
Pilot Project for Regional Co-operation in Distance Education <i>by Peter Soltész, Director, PHARE Regional Project, Hungary.</i>	142
<b>Feasibility Studies</b>	
Distance Education in Estonia, Latvia and Lithuania <i>by Bjørn Baaberg, NKS, Norway.</i>	147
<b>Report of Nordic Experience</b>	
From External Control to Internal Quality Assurance: the Background for the Development of NADE's Quality Standards for Distance Education <i>by Erling Ljoså, NKS, Norway and President of EDEN and Torstein Rekkedal, NKI, Norway.</i>	153
Some Recent Swedish Initiatives in Distance Education <i>by Janerik Lundquist, Linköping University, Sweden.</i>	167

## Poster Sessions

Adult Students' Needs and the Effectiveness of Distance Education <i>by Sorina Ardelcanu, Alina Barsan and Ionel Chera, University of Bucharest, Romania.</i>	171
The Learning Organisation: Development through Open Learning <i>by Roy Baber and Andrena Telford, University of Northumbria, UK.</i>	172
Distance Education in Russia - The Power of the Media <i>By Kari Blackburn, Editor, BBC Marshall Plan of the Mind UK.</i>	176
Distance Teaching of Programming in Lithuania <i>by Jurate Bulotaite, Institute of Mathematics and Informatics, Lithuania.</i>	179
The Work Principles of Lithuanian Young Programmers School by Correspondence <i>by Viktoras Dagys, Institute of Mathematics and Informatics, Lithuania</i>	182
Feedback: the Bridge between Teaching Aims and Reality <i>by Anna Kóczán, University Medical School of Pécs, Hungary.</i>	185
Consequences of the Regional Structure of the Open University's Students in Slovenia <i>by Janja Lap, University of Ljubljana, Slovenia.</i>	197
The Build-Up of the East Hungarian Regional Distance Education Centre and its Activity from an Agricultural Aspect <i>by László Lévai Debrecen Agricultural University, Hungary.</i>	199
Developing Distance Education in the University of Helsinki <i>by Seija Malmi, University of Helsinki, Finland.</i>	201
Tartu University Library as a Mediator of the ICDL Database in Estonia: First Experiences <i>by Ülle Must, Tartu University Library, Estonia.</i>	203
Co-operation as a Strategic Model for Distance Education <i>by Juha Nieminen, University of Jyväskylä, Finland.</i>	205
Further Teacher Training through Distance Learning at the- Technical University in Liberec, Czech Republic <i>by Jiri Vacek, Technical University in Liberec, Czech Republic.</i>	208
Teleteaching at the Nicholas Copernicus University, Toruń <i>by Kazimierz Wiczorkowski, Nicholas Copernicus University, Toruń, Poland.</i>	213

## Appendix

Details of Contributors	220
-------------------------	-----

- Title** Human resources, human potential, human development: the role of distance education
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- Abstract** Contents: 1994 EDEN conference report, Kerry Mann, p.1 Opening address, Lennart Meri, p.2 Human resources, human potential, human development: the role of distance education, Erling Ljosa, pp.3-5 Keynote addresses: The Baltic University programme: distance education through university networking in the Baltic Sea Region, Lars Ryden, pp.6-13 Twenty-five years of distance education: the case of the UK Open University, John Daniel, pp.14-19 Curriculum development and course design: Continuing upgrading of overperforming students, Ioan Popa and Ionel Chera, p.20 The EUROHOT project - the development of a Pan-European training programme, Barry Taylor, pp.21-23 The Open Secondary - Norway's biggest classroom, Dagny Blom, pp.24-28 Developing human potential for successful socio-economic reform in East Romania - Iasi region, Adrian Adascalitei, Dan Galea, Vitalie Belousov and Ioan-Desire Suceveanu, pp.29-34 Introducing distance learning in Swiss higher education: initial assessment of know-how transfer processes, Marino Ostini, pp.35-40 Reshaping doctoral programmes in management, David Birchall and Arthur Money, pp.41-43 Course design for the distance education of disabled students in Romania, Ionel Chera and Iulia Ciubuc, p.44 Continuing professional development and training: Distance education for developing teacher competence in the use of information technology, Jan Wibe, pp.45-48 The Technical Open University at the University of Mining and Metallurgy in Cracow (Krakow) and its role in continuing professional development, Aleksandra Wagner and Jan Dobrowoski, pp.49-51 Meeting the needs of regional tutors and mentors in specialist distance education courses: approaches to professional development, Christina Tilstone and Chris Arter, pp.52-57 Distance education and professional development for teachers, Carol Miller, pp.58-60 Part-time initial teacher training at a distance: an initiative in England, Wales and Northern Ireland, Jenny Leach, Roger Mills and Frances Smith, pp.61-68 Facing new social and professional demands by AKAD co-operating in higher-level continuing distance education in the Baltic region, Kurt W. Schoenherr and Horst Moehle, pp.69-73 Distance education networking in the Czech Republic, Jan Lojda, pp.74-76 Programme evaluation, quality assessment and learning processes: The training of distance tutors and counsellors in distance education, Heinrich Dieckmann, pp.77-84 Improving access to higher education for non-traditional learners, Pip Hardy and Eileen Sutherland, pp.85-87 Towards 'hybrid teaching and learning facilities', Jacques Perriault, pp.88-93 Didactic function in graphic presentation of learning materials, Andreja Istenic, pp.94-101 Distance education in Latvia, Ilmars Slaidins, pp.102-104 How distance learning

assists in the transition towards a market economy: human resource development in Hungary, Nick Farnes, Alan Woodley and Imre Kornyei, pp.105-16 What is Europe? Quality and evaluation in collaborative course presentation, Kevin Wilson, pp.117-20 The role and cost of technology: Open hypermedia system for automatic control teaching, Joaquin Aranda, Sebastian Dormido, Maria A. Canto, Jose Luis Fernandez, Fernando Morilla, Jose Antonio Ramos and Carlos de Castro, pp.121-24 The multimedia teleschool for personnel development in Eastern Europe, Stephanie Fischer, pp.125-26 Curriculum, pedagogy and educational technologies: some considerations on the choice of technology for open and distance learning, Jorgen Bang, pp.127-34 EuroPACE 2000: professional and academic channel for Europe 2000, Johan Van Heddegem, Georges Van de Perre, Jef Van den Branden and Erik Luyten), pp.135-37 Synchronous versus asynchronous communication: a pedagogic and economic debate, Bernard Loing, pp.138-40 Transfe

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## Continuing Upgrading of Overperforming Students

by Ioan Popa and Ionel Chera, Ministry of Education, Romania.

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### Summary

In all European countries, the population of students with special intellectual abilities and a capability for learning that is much higher than the average, is distributed in small groups in many universities. This could be one of the most suitable targets for high quality programs of Open Distance Learning (ODL). These very talented young people could easily lose their potential if they do not have access to professors able to communicate effectively with them.

Due to their specific psychology, the overperforming students usually need access to flexible/optional/alternative study programs. The conventional education system does not usually offer the opportunities of interdisciplinary studies.

ODL methods for upgrading could offer to the young overskilled student the opportunity to come into intellectual contact with top level scientists, acting as his tutors. On the other hand, the systems of ODL stand for producing: specialised study packages, broadcast or computer-based programs, suitable tutorial activities designed for stimulating the abilities of overskilled students.

The paper described the Project for a European Centre for Overperforming Students, to be organised in the town of Sibiu, located in the mountains of Transylvania. This centre could implement modern interactive educational technologies and telematics networking for preparing the future overskilled and hyper-specialised experts for the benefit of all European countries.



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## **Course Design for the Distance Education of Disabled Students in Romania**

*by Ionel Chera and Iulia Ciubuc, University of Bucharest, Romania.*

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### **Summary**

Taking into account that some chronic maladies install without link with the intellectual development or the social environment of the student, society must allow equal learning opportunities for disabled students.

The paper presented an experiment undertaken in special schools, aiming to introduce distance education for teaching sciences to disabled students.

The proposed courses address those students who, due to their bad state of health (locomotive deficiencies, pulmonary diseases, etc.), are obliged to be absent from school for long periods of time and are unable to recover the losses by

themselves. Due to their physical handicap (even if their psycho-intellectual state is not affected) they accumulate deficiencies in their training and they also lose the trust in themselves, letting the feeling of useless in their mind.

The methods of Open and Distance Learning (ODL) will allow the student to find a new self confidence and trust in his learning potential.

From the viewpoints of the pedagogy and methodology, the course will answer the motivational needs for forming and informing the students – to approach also their interest to permanent implication in their evolution.

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## Adult Students' Needs and the Effectiveness of Distance Education

by Sorina Ardeleanu, Alina Barsan and Ionel Chera, University of Bucharest, Romania.

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### Summary

The paper presented the results of an investigation concerning the needs of higher education in Romania, with a view of implementation of Open Distance Learning methods. The following aspects were studied:

The economical aspect, with the analysis criteria:

- a) the ratios between numbers of candidates to universities and of the students admitted to conventional universities (at different specialisation, in different towns, along the years);
- b) the re-orientation of candidates to new fields (business, languages, computers, banking) which cannot be satisfied in a short time and in an effective way by the traditional universities.

For getting the data about the mentioned subjects, two viewpoints were followed:

- the real needs of society;
- the new consciousness of the Romanian population towards higher education.

The observed structures were correlated with the information on the needs of the work market and the government policy towards reform of the economy. The authors found also the effects of the sharp change of the workforce structure, as well as the appearance of unemployment, which found the people not prepared.

### The social aspect

The change in career development mentalities of people determined by:

- the new structure of labour force;
- the appearance of new fields of activities;
- new professional standards required by the new Romanian market economy