



RESEARCH IN LIFELONG LEARNING PROJECT IRMA ORIENTED TO MANUFACTURING AREA

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Abstract: *The Project Inter-countries Research for Manufacturing Advancement (IRMA project) consists of the realization of a Research/Comparative Analysis in the 27 European Union's Member States, aimed at promotion of excellence, efficiency and fairness of the instruction in Higher Education Institutes. The IRMA project focuses on the Manufacturing Engineering field, taken into consideration its high level of innovation and fast changes in requirements that students must possess, in order to be adapt and competitive on the labour market. The objectives of the IRMA project is to innovate and to improve educational systems of technical universities at European level, in order to offer to students a competitive environment based on innovative teaching methods, instruments and contents, that allows their intellectual increase and be able to satisfy new necessities and requests, emerged from the market labour.*

Key words: *manufacturing engineering, lifelong learning programme, research in manufacturing.*

1. INTRODUCTION

The project Inter-countries Research for Manufacturing Advancement (IRMA), co-financed within the Lifelong Learning Programme, consists in realisation of a two years Research-Comparative Analysis in the 27 European Union's Member States, aimed at the promoting excellence, efficiency and fairness of the instruction in Higher Education Institutes within the Manufacturing Engineering sector. The above sector was selected since it is supposed to contain a high level of innovation and quickly-changing requirements that students should possess in order to adapt them and be competitive in the labour market.

The Research Analysis involves three Interfaces: Enterprises, Universities, and "Intermediary" Institutions (Enterprises Incubators, Technological Poles, Academic Spin-off, and Institutional Agencies). The analysis focuses on the following activities:

- to understand what competences and knowledge are demanded by Enterprises;
- to understand what competences and knowledge are supplied by Universities;
- to understand what competences and knowledge are spread by Intermediaries.

Duration of the IRMA Project is planned for 24 months (1/1/2008 – 31/12/2009) and it will be carried out in the following phases:

- 1) Preparation and Design of Project ICT instruments.
- 2) Research Analysis Realisation.
- 3) Realization of Quality, Evaluation, Validation Plan.
- 4) Dissemination.
- 5) Exploitation.

The data will be collected through a web questionnaire, specific for everyone of the three Interfaces, and put in a Data Base created on a Portal.

The following criteria will be compared at the European level, as declared within the Project IRMA:

Qualitative level of teaching in the higher education, Innovation level of teaching in the high education, Quantitative level of students, Causes/rate of scholastic defection, Preventive actions for scholastic defection, European mobility, Occupational way out, Skills and competences management, Obstacles to access/change/transfer to another faculty, E-learning services [5].

The analysis allows a detailed comparison among various Universities that will have the opportunity to exchange best practice and innovative elements existing in their own educational systems. The above-mentioned database – including all gathered data through web questionnaires – will be available on the Lifelong Learning Manufacturing Portal – LLMP. The Portal will be used during the project realisation, and most of all, after its end as a place where to communicate and to exchange information and knowledge about manufacturing in an "open logic".

2. PARTNERS IN THE IRMA PROJECT

2.1. Partner 1 – Project Applicant/Beneficiary: Faculty of Manufacturing Technologies TUKE

The Faculty of Manufacturing Technologies of the Technical University of Košice with a seat in Prešov (Slovakia) was established on 1 May 1996 by the transformation of the Faculty of Professional Studies which was originated in 1992. Study branch "Manufacturing Technology", which has been accredited, is the result of gradual transformation from technologies of mechanical engineering towards technologies covering the needs in the district of Prešov. More than 1,600 students study at the faculty in various forms of studies and each year more than a hundred students are graduated from the faculty. Role of the Faculty of Manufacturing Technologies in the project: Project Strategy Guidelines preparation (detailed planning) in EN language, preparation proposal for detailed economic planning among partners,

specification of equipment (purchased from the project budget), preparation of draft Analysis Format proposal, establishment of communication and administrative system, definition of requirements specification for the LLP, project management.

2.2. Partner 2 – Project Coordinator: Gruppo CS Torino (Italy)

Gruppo CS (Italy) is a small enterprise that belongs to Gruppo CS, a company that deals with consulting, education and training at national and international level. Gruppo CS is active in the area of industry, manufacturing, services and third sector, construction business as well as public sector. Gruppo CS training activities (traditional and distance learning) are the realization of: longlife learning courses for employed persons, higher education courses, projects and training activities in the field of high technical superior education and training courses realized in cooperation with intermediate schools, educational agencies and universities. Role of the Gruppo CS in the project: management & coordination, TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation.

2.3. Partner 3 – University of Oulu, Department of Industrial Engineering (Finland)

The University of Oulu (Finland) is one of the largest universities in Finland with an exceptionally wide academic base. Internationally pioneering research is conducted as a collaboration of different disciplines. The fields of information technology, biotechnology, northern and environmental issues have been defined as special research focus areas. The University cooperates closely with industry and commerce, and has broad connections with hundreds of international research and educational institutions. Six faculties and their departments form a multi-disciplinary academic community that enables diversified studies based on multifaceted research. Role of the University of Oulu in the project: participation on TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation.

2.4. Partner 4 – PU of Technology, Poznan (Poland)

The Poznan University of Technology (Poland) is one of the top rated research and educational institutions in Poland. The Faculty of Mechanical Engineering and Management (FMEM) was established in 1974. The FMEM mission is to provide graduate and undergraduate education and to conduct research in information and communication technologies. Innovation and breadth of opportunity are the hallmarks of the FMEM educational experience. All available courses are designed to meet a variety of challenges by providing professional training as we continue to respond to the diverse needs of the information age. Our curriculum provides students with a superb background for careers in an increasingly technological society. Role of the Poznan University of Technology in the project: participation on TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation.

2.5. Partner 5 – NU of Baia Mare (Romania)

The Faculty of Engineering of the North University of Baia Mare (Romania) has been functioning since 1990 and starting with the academic year 2005–2006 it has the following main domains (majors) undergraduate studies: Industrial Engineering, Mechanical Engineering, Electrical Engineering, Economic Engineering, Computers and Information Technology, Electronics and Telecommunications. The Faculty coordinates the fundamental research activity, ensures the students' fundamental training in every major, takes part in the higher education entrance examination. Ensures the improvement of the curriculum for the engineering fields, coordinates the scientific research activity, suggests and supervises diploma projects, coordinates practical training and placement. Role of the North University of Baia Mare in the project: participation on TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation.

2.6. Partner 6 – Balear de Desarrollo y Formación, Palma (Spain)

Balear de Desarrollo y Formación – BDF Palma (Spain) is an ICT research and development, training and consultancy company. BDF collaborates with organisations and institutions involved in R & D, adult education and training, employment etc., contributing to the building of the Knowledge Society by developing innovative adult education, lifelong learning, training and IT systems, programmes, products, services and methodologies. Research in the fields of eLearning systems, methodologies and materials; equal opportunities and mainstreaming. Development of total ICT solutions for business and local government, e-commerce systems, eLearning systems and our own eLearning centre. Role of the Balear de Desarrollo y Formación in the project: participation on TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation.

2.7. Partner 7 – Studio TEOS, Milan (Italy)

Studio TEOS Milan (Italy) was founded in 1982: the three founders carried on activities of research for the University of Milan. Studio TEOS deals with projects and consulting in ICT field with particular reference to Internet communication, E-Learning and workgroup, and has specific expertise and experience in: design and development of applications and portals that organize services and digital objects coming from distributed and heterogeneous repositories, use of the new technologies in the organizational processes and training systems, management of enhanced learning projects, based on the new technologies. Role of the Studio TEOS in the project: participation on TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation.

2.8. Partner 8 – CAD-Up International s.r.o. Prešov (Slovakia)

CAD-Up International s.r.o. Prešov (Slovakia) has been founded in 1994. The main activities are oriented for support CAD/CAM/PLM products and engineering

projects for machinery companies in Slovakia – especially for mould producers, special tools producers, CNC programs consumers and now furniture producers too. From 1996 it is non-exclusive distributor for CAD/CAM/PLM products from previous EDS, USA – now UGS–The PLM company, USA (Solid Edge, Uni-graphics–NX, Teamcenter etc.) in Slovakia. The firm is well known among CAD/CAM users from machinery and furniture industry, among educational institutions for providing en education knowledge and skills of e-learning and web based courses both in Slovakia and Czech Republic. Role of the CAD-Up International s.r.o. Prešov in the project: participation on TSCC meetings, preparation & design project ICT, research & analysis, quality, evaluation, validation, dissemination, exploitation [4].

3. DESCRIPTION OF THE IRMA PROJECT

The Project consists in the realization of a Research/Comparative Analysis in the 27 European Union's Member States. The objective of the Project is the promotion of excellence, efficiency and fairness of the instruction in Higher Education Institutes, or in other words of access and students' retention in Higher Education. In our opinion excellence refers to the quality and to the level (or capacity) of innovation of the Higher Education's teaching system (contents, methods, technologies used, services provided to students, etc.), efficiency is due to the correspondence among skills and competences

provided by Universities and those required by Enterprises and equity can be evaluated thanks to the Equal Opportunities given to students independently from social, cultural, religious and economical factors.

The Research is circumscribed to a specific field, the Manufacturing Engineering and is realized involving three Interfaces: Universities, Enterprises and "Intermediary" Institutions (Enterprises Incubators, Technological Poles, Academic Spin-off, Institutional Agencies), with the purpose to understand which are competences and knowledge demanded from Enterprises, which are competences and knowledge supplied from Universities and the competences and knowledge spread from Intermediaries.

The project wants to support the introduction of reforms in the educational and training system and to improve the investments in the human capital of Universities, that is to say Students, giving them new instruments and knowledge coherent with the competences demanded from the economy of knowledge, focusing on the state of the art of the way of teaching Manufacturing Engineering in the European Universities.

The goal of Inter-countries Research for Manufacturing Advancement (IRMA) project is, through the research of manufacturing advancement education analysis, to analyze, accelerate and enhance the ability of the education sector to capitalise on the emergence of a powerful information infrastructure on manufacturing advancement [2].

The screenshot shows the IRMA Project website. The header has a background image of a tunnel with light at the end, and the text "IRMA Inter-countries Research for Manufacturing Advancement". Below the header is a navigation menu with links: Abstract, Partners, News, Meetings, Results, Contact Us, Login. The main content area is divided into three columns. The left column contains sections for "Project Abstract", "Project Partners", and "Project News". The middle column contains "Project Meeting" and "Project Results". The right column features logos for "EAC/EA Education, Audiovisual & Culture Executive Agency" and the European Union flag.

Fig. 1. IRMA Project website – www.irmaproject.eu [1].

The key components of projects approach are:

1. Through selected indicators to conduct the research on current status in education, research and training on manufacturing technologies.
2. Research the manufacturing engineering advancement education based on multilateral approach.
3. Use of web-based multi language platform to highlight the progress and results increasing the visibility of the research.
4. Manufacturing operation scheduling derived from the operation specifications.

Realised research goals and methods can certainly be used to encourage education facilities and personnel to further explore topics on their own and take ownership of their learning and improve the overall procedures, goals and system of education. Also, they are used to encourage the sharing of information, knowledge, to secure the distribution of the top of the line data on manufacturing advancement education through the network.

For instance, the excellence of Universities and their capacity to advance the manufacturing technologies education could be analyzed/evaluated through the following topics of education conducted at the education facilities of interest:

- Creative use of progressive tools for design phases using the modern tools with elements of artificial intelligence as strategic approaches for implementation of modern technologies. It will include the SW technologies (CAD/CAM/CAE/PDM/PLM), optimization of product design focused on price and manufacturing costs, cooperation and out-sourcing on product design, modern CAPP systems and their implementation.
- Use of sophisticated approaches during the production phases focused on new methods in organization and management of manufacturing processes, ERP, MRP systems, logistics, innovation of manufacturing tools, visualization of manufacturing management.
- Implementation of out-sourcing methods of manufacturing processes management. Out-sourcing decision making processes. Implementation phases of out-sourcing management.
- Environmental impacts of cutting edge manufacturing technologies. Environmental approaches of waste management.
- Nanotechnology in manufacturing processes. Development, testing and implementation of nanotechnology use in modern manufacturing processes focused on improvement of manufacturing process effectiveness. Environmental impact and risks of nanotechnology use in manufacturing.

All the data are collected through a web questionnaire, specific for every of the three interfaces, and put in a data base created on the Lifelong Learning Manufacturing Portal (LLMP), that are used as technological instrument to support the research.

The web-based platform is also enable best solutions for communications such as notices, updates, asynchronous and synchronous discussion, and for content that is frequently updated or only becomes available during the actual project duration. Web based platform allows the

direct connection between partners conducting the research on modern information on manufacturing advancement education directly, covering the whole network of partner and non-partner countries.

The manufacturing advancement education research is concentrated on analysis, processing, comparative analysis and distribution of the results up to the education personnel, decision makers and stakeholders. Project lifetime is underlined by the necessity of conducting research, analysis of current status of manufacturing technologies education, interviews, distribution and analysis of the questionnaires and automatic data collection. The creation of database is executed continuously and should be finished until February 2009. Duration of the project is also dictated by the requirements of impact evaluation and analysis due to the certain period of time to judge the outcome of the research results implementation into the practice [2].

4. CONCLUSIONS

LLP Project Inter-countries Research for Manufacturing Advancement (IRMA) supported by EACEA Brussels Agency will bring long-term advantages to manufacturing technologies education personnel and decision makers especially in high-quality learning content and applications which allow quick and profitable transfer of research results to the practice. It will improve quality of manufacturing technologies education system and its adaptability to the quickly changing requirements of the manufacturing industry in broad area of knowledge and skills.

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