

# The Romanian Contribution to the Development of Engineering Education

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The current article presents the author's scientific achievements, including those performed as Rector of *Lucian Blaga* University of Sibiu (LBUS), Sibiu, Romania. The LBUS is one of the Romanian universities that has gained wide international recognition. Also covered in this article is the author's significant contribution to the development of engineering education and his close and active association with the UNESCO International Centre for Engineering Education (UICEE), in general, and his leadership of the *Balkan Region Centre for Engineering Education* (BRCEE), a satellite centre of the UICEE, in particular.

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## INTRODUCTION

Engineering education is a major component of the educational process that takes place in universities, and which involves *knowledge*, defined as a sum of information, habits and attitudes whose value determines the *professional competences* of the future specialist.

In a knowledge-based society, the labour market demands an ever-increasing level of qualification (brain workers), which requires a balance in the academic curriculum between theoretical and applied disciplines, by creating a new learning environment with new methods and technologies for teaching and learning. This includes Problem-Based Learning (PBL), Work-Based Learning (WBL), Project-Based Learning (PjBL), Computer-Based Learning (CBL), Continuing Professional Development (CPD), etc.

The development of a suitable *teaching culture* is a prerequisite of the academic world, once the principle *to have learned to learn* has been promoted. On the other hand, the development of the concept of *sustainable employability* determines that the university trains people to become future professionals with basic competences: cognitive, social and affective, allowing them to achieve creative and effective professional performances in quick-change work environment.

The increase of educational offers requires a significant increase in the level of competition among

universities, whereas the application of quality assurance systems for higher education is a *sine qua non* condition with regard to performance achievements for academic strategic management and international recognition.

In this context, the author of this article, as an engineering professor and manager, has well understood the real mission in this double position of initiating and promoting these new concepts in order to actively contribute to achieving representative results, especially in engineering education [1].

## RESEARCH, DEVELOPMENT AND SCHOLARLY ACTIVITIES IN ENGINEERING EDUCATION (LOCAL AND INTERNATIONAL)

### Grants

The author has participated as a coordinator and member in international and national research projects in various fields of engineering, including: information technology, industrial management, education in engineering, etc. Presented below are some of the representative research projects:

- A group decision support system in the academic and public administration environment as a premise for the decentralisation and democratisation of the decisional system;

- The measuring and monitoring of welded parts in an SPC integrated system;
- An information system regarding the acquisition, processing and visualisation of old books' fund designed to facilitate community access to the national cultural patrimony;
- A distributed information system for monitoring the quality of urban public transportation services;
- Design of statistical methods and instruments to keep technological manufacturing processes under control, in compliance with the QS 9000 system;
- An e-business solution for the academic environment;
- A system of measuring and monitoring the aspects, parameters and characteristics that impact upon the environment, applicable to the machine-building industry;
- Modelling the design and management of ISO 9001:2000 quality systems using reference architectures;
- Modelling quality system processes at Romanian universities;
- Research into the adaptability of integrated-production reference architectures to the demands of the machine-building industry and to that of Romanian engineering education;
- Tools and accessories designed to expand the generating possibilities of electrical discharged processed surfaces;
- Designing and implementing a quality assurance service in higher education, particularised for *Lucian Blaga* University of Sibiu [2][3];
- Quality Evaluation of Services and Training (QUEST) PHARE – TEMPUS UM – JEP 13377-98.

## ACHIEVEMENTS

The author's academic career began in 1978, first as a teaching assistant, then as an assistant professor and an associate professor. Since 1992, he has been a professor and doctoral advisor in the field of industrial engineering. Under his doctoral supervision, 12 engineers have obtained a doctoral degree in the field of industrial engineering, and 23 engineers are currently involved in this doctoral programme [4].

As an academic manager from 1988, the author has held several managerial positions, including: Vice-Dean, College Director, Vice-Rector and, at present, Rector of *Lucian Blaga* University of Sibiu (LBUS), Sibiu, Romania [5]. The author's managerial experience in the field of industry has enriched his managerial abilities, since he also occupied the

position of a chief production engineer. He has also significantly contributed to the efforts regarding quality in Romanian higher education [6].

## THE RELEVANCE AND IMPACT ON BOTH THE LOCAL AND INTERNATIONAL COMMUNITIES

The recognition of the author's scientific and professional activities is reflected in his nomination as a member of various national and international organisations, as follows:

- Corresponding member of the Romanian-American Academy of Arts and Sciences;
- Member of European University Association (EUA);
- Member of the Romanian-Chinese Friendship Association;
- Member of the Association of Romanian Bursaries in France;
- President of the Romanian-Italian Association;
- President of the General Association of Teachers and Professors in Romania;
- Member of the General Association of Engineers in Romania;
- Member of the Academy for Non-Conventional Technologies;
- Vice-President of the National Council for Quality Management in Romanian Higher Education;
- Member of the Permanent Bureau of the National Council of Romanian Rectors;
- Member of the National Council for Scientific Research in Higher Education.

The author has also been awarded a number of distinctions and medals, including:

- Order *Education Merit*, high-rank officer;
- Doctor Honoris Causa;
- *Honorary Citizen* of Sibiu.

## SELECTED PUBLICATIONS ACCOMPLISHED

In his academic career, the author has written and co-written many publications. These include books, manuals, refereed conference papers and journal articles.

Books:

- *Quality and Environment Management*. Sibiu: *Lucian Blaga* University Publishing House (2003).

- *Strategic Management*. Sibiu: *Lucian Blaga University Publishing House* (2002).
  - *Quality Management*. Sibiu: *Lucian Blaga University Publishing House* (2002).
  - *Quality Engineering*. Sibiu: *Lucian Blaga University Publishing House* (2002).
  - *Public Administration, the Councilor and the Citizen*. *Lucian Blaga University Publishing House* (2001).
  - *Quality Management in Higher Education*. Arad: *Vasile Goldis University Press* (2000).
  - *Quality Assurance Policy in Higher Education*. Bucharest: *Paidea Publishing* (2000).
  - *Management of Nursing Education*. Sibiu: *Lucian Blaga University Publishing House* (2000).
  - *Quality Management in Public Administration*. Sibiu: *Lucian Blaga University Publishing House* (2000).
  - *The Dictionary of Non-Conventional Technologies*. Bucharest: *Technical Publishing* (2000).
  - *Quality Assurance Policy in Higher Education*. Bucharest: *Ars Docendi Publishing* (1999).
  - *University Management*. Brasov: *Lux Libris Publishing* (1998).
  - *Equipment and Device Design, Security and Quality Standards*. Sibiu: *Lucian Blaga University Publishing House* (1998).
  - *Strategic Management Case Studies*. Sibiu: *Lucian Blaga University Publishing House* (2004).
  - *Control Systems*, Sibiu: *Lucian Blaga University Publishing House* (1997).
  - *L'usinabilite des Materiaux*. Toulon: *University Toulon et du Var Publishing* (1995).
  - *Material Processing by Cutting*. Sibiu: *Lucian Blaga University Publishing House* (1994).
  - *Quality Assurance*. Sibiu: *Lucian Blaga University Publishing House* (1995).
  - *Elements of Operations Management*. Sibiu: *Lucian Blaga University Publishing House* (1994).
  - *Theory and Application of Cutting Tools*, Vol.I, II, and III. Sibiu: *Lucian Blaga University Publishing House* (1994).
  - *Geometric Measurements in Mechanical Engineering*. Bucharest: *Scientific and Encyclopaedic Publishing* (1998).
  - Various course notes and laboratory guides.
- Papers:
- Oprean, C., Kifor, C.V. and Georgescu, N., Applying the six sigma approach in problem-based learning projects. *Proc. 8<sup>th</sup> UICEE Annual Conference on Engineering Education*, Kingston, Jamaica, 31-36 (2005).
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  - Oprean, C. and Kifor, C.V., Electrical discharge machining of smart materials parts. *Proc. Conference on Computational Methods for Smart Structures and Materials (SMART '98)*, Rome, Italy, 272-280 (1998).
  - Oprean, C., Kifor, C.V. and Georgescu, N., Managing processes within the Master Programme in Quality Management from *Lucian Blaga University of Sibiu*. *Proc. 6<sup>th</sup> Baltic Region Seminar on Engineering Education*, Wismar/Warnemünde, Germany, 137-141 (2002).
  - Kifor, C.V. and Oprean, C., A generic process model for higher education institutions based on ISO 9001:2000 and IDEF0 language. *Proc. 5<sup>th</sup> UICEE Annual Conference on Engineering Education*, Chennai, India, 93-99 (2002).
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## **SPECIFIC ROLE WITHIN THE UICEE GLOBAL NETWORK**

The author has been a member of the UNESCO International Centre for Engineering Education (UICEE) since 2001 and, in September 2002, he became the Director of the *Balkan Region Centre for Engineering Education* (BRCEE), a satellite centre of the UICEE established at *Lucian Blaga University of Sibiu* (LBUS).

He was awarded the UICEE Silver Badge of Honour for Distinguished Contributions to Engineering Education in 2002, and the UICEE Gold Badge of Honour was conferred upon him in 2004. Prof Constantin Oprean is a member of the editorial advisory boards of many international journals, including the *International Journal of Engineering Education* and the *World Transactions on Engineering and Technology Education*. He has participated at numerous UICEE organised conferences and chaired sessions. He has also coordinated the organising of the 2<sup>nd</sup> and 3<sup>rd</sup> *Balkan Region Conference on Engineering Education* (2005 and 2007) as General Chairman of these Conferences.

## **SPECIFIC LINKAGES WITHIN AND OUTSIDE THE UICEE GLOBAL NETWORK**

During the 3<sup>rd</sup> *Balkan Region Conference on Engineering Education*, an Agreement of Cooperation was signed between Hochschule Wismar - University of Technology, Business and Design, Wismar, Germany, and *Lucian Blaga University of Sibiu*. The agreement was signed with the main purpose to promote friendship and to cooperate in a mutually beneficial association. *Lucian Blaga University of Sibiu* is already a partner in various international research and education projects.

In 2002, a consortium, coordinated by Aalborg University, Aalborg, Denmark, was established that included the following partners:

- Glasgow Caledonian University, Glasgow, Scotland, UK;
- Hochschule Wismar - University of Technology, Business and Design, Wismar, Germany;
- *Lucian Blaga University of Sibiu*, Sibiu, Romania;
- The Pedagogical Network for Engineering in Denmark, Copenhagen, Denmark.

This consortium submitted an application in the SOCRATES PROGRAMME for ERASMUS NEW Curriculum Development (CD) projects, with the title: *Master in PBL in Engineering*. The proposal was successful and work effectively began in 2003. It should also be noted that the first three institutions listed above are Partner members of the UICEE.

## **SPECIFIC AND OUTSTANDING INVOLVEMENT IN CONFERENCES ON ENGINEERING EDUCATION**

Staff and close associates of the author, representing the BRCEE, have participated at the following UICEE-organised conferences:

- 4<sup>th</sup> *UICEE Annual Conference on Engineering Education*, Bangkok, Thailand, 7-10 February 2001.
- 5<sup>th</sup> *UICEE Annual Conference on Engineering Education*, Chennai, India, 6-9 February 2002;
- 6<sup>th</sup> *Baltic Region Seminar on Engineering Education*, Wismar/Warnemünde, Germany, 23-25 September 2002;
- 6<sup>th</sup> *UICEE Annual Conference on Engineering Education*, Cairns, Australia, 10-14 February 2003;
- 3<sup>rd</sup> *Global Congress on Engineering Education*, Glasgow, Scotland, UK, 30 June - 5 July 2003;
- 4<sup>th</sup> *Global Congress on Engineering Education*, Bangkok, Thailand, 5-9 July 2004;
- 8<sup>th</sup> *UICEE Annual Conference on Engineering Education*, Kingston Jamaica, 7-11 February 2005;
- 9<sup>th</sup> *UICEE Annual Conference on Engineering Education*, Muscat, Oman, 11-15 February 2006.

Participation at this conference included the presentation of papers in the field of engineering education and the chairing of some of the conference sessions.

## **FUTURE PLANS AND MILESTONES**

The most important objective is to establish strong partnerships in view of promoting engineering

education, as well as disseminating experience and new ideas in a wide area, thus leading to the world's progress.

Creating and developing new sciences requires a thorough specialised knowledge, as well as interdisciplinary approaches.

## SUMMARY AND CONCLUSIONS

The development of a sustainable society in a knowledge-based world requires joint efforts in view of accomplishing the objective of improving the quality of life, with its well-known components:

- The quality of occupational health;
- Spiritual quality;
- Environmental quality.

A prerequisite for the accomplishment of this objective is to insure the introduction of technical progress and to develop societal culture. All these rely on the manner that the LBUS has invested in education – essential elements for generating knowledge, a source of richness for any future-oriented society.

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5. Universitatea *Lucian Blaga* Sibiu (2005), [http://www.ulbsibiu.ro/en/universitate/lucian\\_bлага/blaga.htm](http://www.ulbsibiu.ro/en/universitate/lucian_bлага/blaga.htm)
6. Oprean, C. and Hang, C., *Quality Manual for the Faculty of Engineering*. Sibiu: Lucian Blaga University Printing House (1995).

## BIOGRAPHY



Constantin Oprean was born in Spring, Alba County, Romania, in 1948. He graduated as an engineer in mechanical engineering in 1971 and gained his doctorate in industrial engineering in 1985. He went on to become a professor in 1978 and a PhD adviser in 1985 at *Lucian Blaga* University

of Sibiu (LBUS), Sibiu, Romania, after accomplishing experience as an engineer in the industrial production field between 1971 and 1978.

In 1992, Prof. Oprean was promoted to Vice-Rector for Quality Management and Scientific Research at the LBUS. In this role, Prof. Oprean coordinates policies in the field of quality at the LBUS. He also supervises the evaluation procedures for the University and the implementation of the quality system.

He coordinated the work for the first Quality Manual in Romanian education: the Quality Manual for the Faculty of Engineering. In recognition of his noteworthy contributions to the field of quality and university management, Prof. Oprean was elected Vice-President of the National Council for Quality Management in Higher Education. In 2004, he was elected Rector of *Lucian Blaga* University of Sibiu.

Prof. Oprean is a recognised specialist in the fields of quality management, university management, strategic management and technological transfer. He has participated in numerous international conferences and congresses in the USA, France, the UK, Italy, Germany, Sweden, Denmark, Belgium, the Netherlands, Finland and Australia.

He has written over 24 books/handbooks and published 276 scientific papers, 82 of them being presented at international conferences. He is the author of 24 inventions and has coordinated over 50 scientific research projects at the national and international levels.