
Higher Education Reform – the Societal Response to New Realities and Challenges*

Algirdas V. Valiulis

*Faculty of Mechanics, Vilnius Gediminas Technical University
Sauletekio str. 11, Vilnius LT-2040, Lithuania*

Although the higher education reform currently under preparation in Lithuania is provoking discussions in the academic community, there is nevertheless unanimous agreement concerning its aims: a higher quality of studies and better funding. It is a national imperative to transform the Lithuanian higher education system for the 21st Century and the state is responsible for designing the goals and strategies to accomplish that. Higher education is the gateway to the modern development of each country. To achieve these aims, the working group at the Lithuanian Ministry of Education and Science prepared a draft plan for the reform and development of higher education. The draft plan consists of several guidelines for the reform of funding, improvement of internal management in higher education institutions and use of resources, and conformity of study programmes to the labour market. It was proposed in the draft plan of higher education development that the internal management of higher education institutions should be revised and study programmes should aim for quality, not quantity. The fragmentation of study programmes should be stopped and faculties should be enlarged. Studies of the same field should be concentrated in one faculty and not scattered across several faculties. This would ensure the better use of intellectual and material resources. Designers of the draft plan are raising the issue of the size of state universities and colleges and their distribution in towns, since it is hardly expedient to maintain several similar higher education institutions in the same town. The active cooperation of employers and higher education institutions is encouraged. According to the reform plan, employers and students should actively participate in councils of higher education institutions and should be involved in the design of study programmes to ensure the training of skills needed in the labour market.

INTRODUCTION

On 12 November 2002, the Parliament of the Republic of Lithuania passed a resolution to approve the Long-Term Development Strategy of the State. The Strategy projects the development of Lithuania as a future European Union (EU) member state by identifying three priority areas: a knowledge society, a secure society and a competitive economy. The role of education in this development is of exceptional importance. In the Presidency Conclusions of the Lisbon Summit of 23-24 March 2000, the EU Council underlined the direct link of the continuing economic and social progress in the EU and its investment into people and their education:

*A revised and expanded version of a lead paper presented at the 11th Baltic Region Seminar on Engineering Education, held in Tallinn, Estonia, from 18 to 20 June 2007.

People are Europe's main asset and should be the focal point of the Union's policies. Investing in people and developing an active and dynamic welfare state will be crucial both to Europe's place in the knowledge economy and for ensuring that the emergence of this new economy does not compound the existing social problems of unemployment, social exclusion and poverty.

Education should contribute to the following:

- Strengthening the creative powers of a society;
- Protecting and developing national identity;
- Nurturing a mature civil society;
- Increasing employment and market competitiveness;
- Reducing poverty and social exclusion.

Higher education is vital to the success of a country's citizens, and national economic vitality and competitiveness. Higher education has always been a state responsibility and it must remain that way.

Moves to develop education should take into account new challenges and opportunities for society, such as the development of democracy and the market economy, the process of globalisation, the vast amounts of information, rapid changes and the fragmentation of society. Education should help an individual and society at large to respond to these challenges and to take advantage of new opportunities. This necessitates essential reforms in the educational system in order to increase its efficiency, improve accessibility to education, create conditions enabling continuing education and life-long learning, ensure the quality of education that conforms to European standards and meets the needs of modern society.

In light of the challenges faced by society today, as well as taking into account that a knowledge society, a secure society and a competitive economy are defined as priorities in the Long-Term Development Strategy of the State, the mission of education is as follows:

- To help an individual to understand the contemporary world, to acquire cultural and social competences and to become an independent, active and responsible person who is willing and able to learn and create a life of his/her own and the life of society;
- To help an individual to acquire a vocational qualification corresponding to the level of modern technologies, culture and personal skills, and to create conditions enabling life-long learning, which encompasses the continuous satisfaction of cognitive needs, seeking to acquire new competences and qualifications that are necessary for the professional career and meaningful life;
- To ensure the balanced and knowledge-based development of the economy, environment and culture of Lithuania, the domestic and international competitiveness of the economy, national security and the evolution of a democratic society, thus strengthening the creative powers of society.

Education should help society to achieve the following strategic goals:

- To create and develop a knowledge-based competitive economy;
- To develop the democratic culture of the country;

- To achieve a substantial reduction of social exclusion and poverty;
- To ensure the employment of people;
- To nurture solidarity in a civil society;
- To strengthen national security;
- To preserve national identity.

The Strategic Provisions shall be used as tools to mobilise the efforts of different stakeholders, state institutions and non-governmental organisations, students and their parents, educators, employers and politicians. The Provisions are targeted at the implementation of long-term goals in the area of updating the system of education.

In January 2005, the Lithuanian Government approved the Implementation Programme for the Provisions of the National Education Strategy 2003-2012. This Programme highlights strategic guidelines for educational reform and provides the implementation measures and resources in line with the Lisbon Strategy. This programme was developed in line with the Long-Term Economic Development Strategy of Lithuania until 2015 (2002) [1], the Single Programming Document for Lithuania of 2004-2006 (2004) [2], as well as the European Memorandum on Lifelong Learning [3], the European Employment Strategy [4], the Bologna Declaration [5], the main objectives for the educational development of European Union Member States until 2010, raised by the European Commission, Provisions of National Education Strategy 2003-2012 [6] plus other documents.

The Lithuanian State and society shall seek to achieve the following key aims for developing education in 2003-2012:

- To develop an efficient and consistent education system that is based on responsible management, targeted funding and the rational use of resources;
- To develop an accessible system of continuing education that guarantees life-long learning and social justice in education;
- To ensure a quality of education that is in line with the needs of an individual living in an open civil society under market economy conditions, and the universal needs of society in the modern world;
- Every citizen should have the possibility to study at a higher school in a chosen mode of study (distance, extramural or other), and more than 60% of Lithuanian youth acquire higher university or non-university education;
- The Lithuanian people should have genuine opportunities for life-long learning, the continuous updating and development of their abilities; every year, at least 15% of the working age adult

population should undergo some kind of training or educational activity;

- At least 85% of the working age population should have real opportunities and capabilities to use computer information technologies.

Lithuania's current three-tier educational system was implemented in 1991-1992. The law introducing a binary system came into force in September 2001 [7]. After successfully completing the first basic, four-year-duration studies, students are awarded a Bachelor's or Engineer's degree. The second tier after Bachelor's, covering two years, leads to a Master's degree or after one year if a Bachelor's diploma engineer's degree has already been awarded. The third tier comprises four-year doctoral studies after the Master's degree.

From 1991-1995, higher education institutions (HEIs) developed the majority of their study programmes, renewed the study content, and introduced compulsory modules of humanities and social subjects. This reform helped HEIs to survive during the period of economic and social decline, when the number of students decreased from 18 students/1,000 inhabitants in 1990-1991 to 14/1,000 in 1994-1995 [8][9]. After 15 years of transformation in Lithuanian HEIs, it is now possible to reflect back on these efforts [10][11]. Lithuanian higher education today has *consecutive* and *non-consecutive* types of studies. After completing a study programme, a person is awarded an academic or a qualification degree. Consecutive studies at technical higher education institutions can be of two types, namely:

- University, when an individual is given higher education based on a wide theoretical background and scientific investigation;
- Non-university covering one-level professional studies intended for preparing students for professional activities. An individual acquires professional qualifications on the basis of applied scientific investigation or applied research.

Upon completing consecutive studies, an individual receives an academic certificate (diploma). An individual enrolled in non-consecutive studies and having collected a sufficient number of credits within a study programme, can also be considered as having completed studies at a higher education level. The study level is a classificatory parameter of study programmes, which is defined by the level of complexity of the programme, the rank of the awarded qualification in the national system of qualifications and other indicators. The first level of studies is aimed

at expanding one's general education, providing knowledge and skills that would allow one to start professional activities and creatively apply accumulated knowledge and skills. The second level of studies is aimed at preparing individuals for careers in science and careers requiring scientific knowledge and skills.

After 15 years of operation, the accepted system showed shortcomings and the result was discontent from society and the universities. Although the higher education reform being prepared is provoking discussions in the academic community, there is, nevertheless, unanimous agreement regarding its aims, specifically: a higher quality of studies and better funding. In order to achieve these targets, the working group at the Lithuanian Ministry of Education and Science has prepared a draft plan for the reform and development of higher education [12]. The draft plan consists of several guidelines: a reform of funding, the improvement of internal management at higher education institutions and the use of resources, and aligning study programmes to the labour market.

PREFACE TO NEW EDUCATIONAL REFORMS

Higher education in Lithuania can be acquired only at higher education institutions. They offer non-university-type and university-type studies. Non-university studies are basic, one-cycle studies. University studies consist of three cycles: first cycle (undergraduate studies), second cycle (Master's studies, special professional studies) and third cycle (doctoral studies, MDs in residency and art licentiate). The quality of study programmes, as well as the quality of research and pedagogical activity carried out by higher education institutions, is periodically assessed by the Centre for Quality Assessment in Higher Education. In promoting the quality of studies, special attention is devoted to the regulation, external assessment and accreditation of the structure and content of study programmes. In 2004 alone, the external consecutive assessment of 91 study programmes was performed, out of which 29 study programmes were assessed by foreign experts, 50 study programmes were accredited, and 32 new study programmes were included into the Register of Study/Training programmes.

The Ministers responsible for higher education in the signatory states of the Bologna Declaration have entrusted the implementation of all the issues covered in the Berlin Communiqué, the overall steering of the Bologna Process and the preparation of the next ministerial meeting to the Bologna Follow-up Group (BFUG). In accordance with the latest BFUG

document prepared for ministers for the London Summit, the implementation of the Bologna principles at Lithuanian HEIs looks quite well (see Table 1).

Nevertheless, over several years, opinions

expressed in the mass media escalated: the state of higher education is unsatisfactory, the quality of education is down, many academics are over age, the university management model is out-of-date

Table 1: The Bologna process stocktaking 2007.

Indicator	Implementation in Lithuanian HEIs	
	Score (max 5)	Results
Degree System		
1. Stage of implementation of the first and second cycle	5	In 2006/2007, at least 90% of <i>all</i> students are enrolled in a two-cycle degree system that is in accordance with the Bologna principles
2. Access to the next cycle	3	There are some (less than 25%) first cycle qualifications that do not give access to the second cycle and/or some second cycle qualifications that do not give access to the third cycle
3. Implementation of a national qualifications framework	2	The development process leading to the definition of a national Qualification Framework (QF) in line with the overarching QF for the European Higher Education Area (EHEA) has started and includes all relevant national stakeholders
Quality Assurance		
4. National implementation of <i>Standards and Guidelines for QA in the EHEA</i>	4	The process of implementing a national Quality Assurance (QA) system in line with the <i>Standards and Guidelines for QA in the EHEA</i> has started
5. Stage of the development of an external quality assurance system	5	A fully functioning quality assurance system is in operation at the national level and applies to all HE. The evaluation of programmes or institutions includes three elements: internal assessment, external review and the publication of results. In addition, procedures have been established for the peer review of national QA agency(ies) according to the <i>Standards and Guidelines for QA in the EHEA</i>
6. Level of Student and International Participation		
6a Students	5	Students participate at four levels: <ul style="list-style-type: none"> - In the governance of national bodies for quality assurance; - In external reviews of HEIs and/or programmes in expert teams or observers in expert teams or at the decision making stage; - In consultation during external reviews; - In internal evaluations
6b International	3	International participation takes place at two of the four above levels
Recognition of Degrees and Study Periods		
7. Stage of implementation of the diploma supplement	5	Every student graduating in 2007 received a diploma supplement in the EU/CoE/UNESCO diploma supplement format and in a widely spoken European language (English) automatically and free of charge
9. Stage of implementation of ECTS	4	In 2007, credits are allocated in at least 75% of the first and second cycle higher education programmes, using ECTS or a fully compatible credit system enabling credit transfer and accumulation. A <i>translation</i> between the national system and ECTS is obligatory
Life-Long Learning		
10. Recognition of prior learning	4	There are procedures/national guidelines or policy for the assessment of prior learning but they are used for only one of the abovementioned purposes
Joint Degrees		
11. Establishment and recognition of joint degrees	4	There are no legal or other obstacles to establishing joint programmes and the awarding and recognition of joint degrees or at least double or multiple degrees (a double or multiple degree is defined as two or more diplomas issued by two or more higher education institutions involved in an integrated study programme), but legislation does not specifically refer to joint degrees or legislation for establishing joint programmes; the awarding and recognition of joint degrees has been prepared and agreed, but not yet implemented

(pro-Soviet), corruption at universities is flourishing and obscure financial operations are pursued. While continuously receiving such information, it seems that universities in Lithuania are the main setback to the new, modern existence.

DEVELOPMENTS AT HIGHER EDUCATION INSTITUTIONS OVER THE LAST DECADE

The student population at Lithuanian universities doubled from 1997-1998 until 2005-2006, whereas financial support for one student (in GDP%) halved. The university student population gradually reached 54 students/1,000 inhabitants.

Before Lithuania was admitted into the EU, the unemployment ratio was quite high, and government and society observed the extensive growth of the student population positively without negative emotions. In this period, the societal opinion formed that higher education was *obligatory* for youths' successful careers. This pressure was responded by universities with options for study that was free of charge, partly paid or fully paid. However, the growing student population encountered worsening study facilities and quality of studies. Technicums – institutions for middle range professional education – were swept out from the professional education panorama. These institutions become higher non-university level education institutions offering Bachelor and Master's degree education.

Entrance into the EU coincided with the growth of labour force emigration and the economy facing a shortage of labour resources. Business, industrialists and politicians started discussions about the necessity of study reforms, publications appeared asserting that higher education reform had never started and the situation emerged revealing guilty rectors of universities. In this avalanche of accusations, political parties totally forgot about signed memoranda with obligations to support the quality assurance of study through adequately rising higher education financing.

Many European countries are significantly improving their higher education performance. They are prioritising higher education in their national public agenda and are approaching higher education reform as part of a national economic development strategy [13]. The Lithuanian higher education system is not sufficiently ready to prepare students for the challenges of 21st Century society. Universities are not taking globalisation seriously. Globalisation demands different priorities, different skills and different knowledge. Today's students differ significantly from those of yesterday. Only part of those students in the higher

education system fit the model of the *traditional* student. Many attend part-time studies and have matched studies and jobs. Today's students include older and returning students. Yet policy decisions still focus primarily on the traditional student.

THE CURRENT MODEL OF UNIVERSITY MANAGEMENT

The management model at all Lithuanian university-type HEIs is similar. The *University Board* supervises all the university's activities and is responsible for ensuring that university tasks are properly fulfilled. The rector is a Board member. By the order of the Minister, the membership of the Board is confirmed and *its Chairman is appointed taking into account the proposals of the rector*. The Chairman of the Board cannot be a university staff member. The Board acts according to the confirmed regulations and should make decisions on, and recommendations about, the university's development plan and university-Ministry agreements. The Board should also announce the elections of the rector or senate and should submit an annual report to the Minister about the university's activities.

The university senate is the highest decision-making body of a university. The university senate is authorised to elect a rector (and to impeach him/her if necessary), to adopt by-laws regulating the process of education, research and financing, and provide a yearly report on the university's activities. At least 10% of senate members must make up students appointed by the Students' Representation.

PIVOTAL POINTS OF THE REFORM AND BACKGROUND TO FUTURE REFORMS

The draft plan of guidelines prepared by the working group define more clear state goals, identify the state's strengths and weaknesses, rethink funding and the student aid system, estimate demographic trends, etc. Lithuania needs long-term priorities for higher education that links higher education to overall state economic goals. It is difficult to articulate meaningful goals for state higher education systems without good information about upcoming population changes for the next 10 to 20 years.

Over the years, states have reduced their share of overall higher education costs; as a result, the share of costs for students, families and institutions has gone up. States should examine their financial aid programmes to ensure that they are well balanced and reward efficient students.

However, ensuring that students get into higher

education institutions is only half the problem. States should also ensure that students graduate. Study system reform should encourage innovation within the entire state higher education community. Adults going back to universities or colleges now represent a growing number of the student population and they have different needs than traditional students.

The new order should ensure that state money is spent productively with the demand that institutions become more efficient. Higher education institutions are expected to deal with a number of tasks of high importance for the country's economy, culture, welfare, environment and democracy. At the same time, they are required to contribute to education and research of immediate benefit to working life in both the public and private sectors. New legislation should help communication with business to better articulate expectations and outcomes. A 21st Century education system should support opportunities for all citizens to participate in some form of post-secondary education or training.

The internal management of higher education institutions should be revised and study programmes should target quality, not quantity. The fragmentation of study programmes should be halted and faculties should be enlarged. Studies of the same field should be concentrated in one faculty and not scattered across several faculties so as to ensure a better use of intellectual and material resources.

International experts will be invited to evaluate the activities of universities in different fields of studies. Centres of excellence will be identified and Master's and doctoral studies will be concentrated there. Designers of the reform have raised the issue of the size of state universities and colleges and their distribution in towns, since it is hardly expedient to maintain several similar higher education institutions in the same town.

The design and use of the financing model for universities and colleges must support major educational and research policy goals and strategies. Quality considerations in education and research are best safeguarded by means of a financing system that emphasises the results attained. Control arrangements must result in better assurance that educational institutions develop and follow up quality development strategies in education and research, and that they make efficient use of their resources.

In order to safeguard considerations regarding long-term research activities, the breadth of academic provisions and the maintenance of costly disciplines, the reform draft emphasises that a performance-oriented component of the financing of research and teaching must be supplemented by the introduction of

the basic financing of educational institutions as an additional budget component.

The draft plan foresees tax advantages on study loans for young specialists employed in Lithuanian enterprises. They would get a tax refund to cover the costs of the loan. Another aspect of the funding reform is a reduction of the duration of studies. The suggestion is that, in general, both cycles (Bachelor and Masters) should not exceed five years. This duration of studies is recommended in the Bologna Declaration. A new common degree structure is proposed that involves a lower degree upon completion of three years of study (Bachelor) and a higher degree building on this to be awarded upon completion of a further 1.5-2 years of study (Masters). This higher degree builds on the lower degree, providing professional qualifications and/or the opportunity for admission to doctoral studies. Formal research training will continue to have the current duration of four years. There will be a need for two types of course: one resembling the traditional theoretically oriented Lithuanian university degree at the Master's level, the other more practically oriented (college degree). The first type of degree will qualify one for admission to formal research training while the second type will not necessarily do so.

All students should pay for their studies. The state settles the amount of the support per student (grant and loan) and the total number of students supported. Higher education institutions are free to set their enrolment rates, ie decide upon the total number of students and the cost of studies. The support scheme does not ensure that low-income students have access to higher education. Nevertheless, the Government's primary responsibility in higher education is to guarantee post-secondary education not for the wealthiest individuals, but for all citizens.

Under discussion are more aspects of university management, specifically:

- The election or nomination of rectors;
- The status of the university: state or public;
- The principles of Board nominations.

Those ministers responsible for higher education in the countries participating in the Bologna Process met recently in London in 2007 to review the progress made since meeting in Bergen in 2005. The London Communiqué declares that higher education should play a strong role in fostering social cohesion, reducing inequalities and raising the level of knowledge, skills and competences in society. Therefore, the governmental policy should aim to maximise the potential of individuals in terms of their personal development, and

their contribution to a sustainable and democratic knowledge-based society. The student body entering, participating in and completing higher education at all levels should reflect the diversity of the population. The ministers reaffirmed the importance of students being able to complete their studies without obstacles related to their social and economic background [14]. Europe looks for educated young people and is against restrictions in higher education.

Reformers consider that Lithuanian higher education institutions should be at the forefront of academic cooperation and student exchanges between countries. It is seen as a goal that all higher education institutions should offer students a period of study abroad as a component of their Lithuanian degree course. It is likewise important that universities and colleges continue to develop their provision of courses held in English.

The reform stimulus in Lithuania takes the following path:

- Agreement among the government, President and political parties concerning the necessity of study and research reform;
- The government, society and business strive to create the nucleus of a knowledge economy;
- Revision of the Lisbon strategy, focusing on research and knowledge creation;
- Use of the financial tools of the 2007-2013 EU structural fund as sponsorship.

The components of the planned reform include the following:

- The strengthening of science and business interaction;
- The renewal of the research infrastructure;
- Human resources quality development;
- Research management system development;
- The reformation of the legal basis.

The system of state Lithuanian research institutes was reorganised several years ago. This reorganisation was aimed at promoting the integration of science and studies. A system of university research institutes was created allowing a more effective use of the national research potential for study purposes.

This new development of the research infrastructure will include the creation of a knowledge nucleus comprising studies, research and business valleys. These tasks will involve improved cooperation among research, business, government and municipalities; updated laboratory equipment in key sectors of research; revised research and study institutional

networks (small units joined into larger ones, etc), implementation of the coordinated development of business incubators and technological parks. Research activities should be supported according to the research programmes and scientific projects based on competitive principles.

The part of national funding for research and studies is being increased within the state budget and is going to reach the *EU average* in the period of five years.

The following schedule of the reform has been announced:

- Announcement of the basic principles of reforms: 1 September 2007;
- Presentation of the scientific research sponsorship model: April-May 2007;
- Decision making: autumn 2007;
- Implementation: from the beginning of 2008;
- Implementation of the EU Structural fund sponsorship programme: from 2007-2008.

CURRENT SITUATION IN ENGINEERING STUDIES

Students at technical universities do not see the challenge in engineering and perceive it as dull. It is necessary to help students focus on real challenges that engineers face by providing creative problem-setting within the engineering courses. Real problems could be supplied by industry. In the engineering profession, it is necessary to reflect continuously current reality and train students' abilities to become the next generation of engineers and to face an ever-changing future.

It is the responsibility of university staff to help students to develop the skills required for graduates of tomorrow and to ensure that technical universities do not lose the best students to other professions. There are students who fail during their studies due to a lack of motivation or application to their studies, or decide to change to another career path due a lack of interest or disillusionment in engineering (the dropout rate in engineering is close to 40-50%). Many engineering students have very low entrance grades and hence might be considered at high risk.

Relations between students and institutions must also be strengthened. Educational institutions must make provisions to enable the closer monitoring of students throughout their studies. This presents new challenges for educational institutions and a call for a critical approach to the content and structure of courses, as well as a competence policy.

CURRENT SITUATION IN HIGHER EDUCATION REFORM

There is no special national budget allocated for the new higher education reform for Lithuania in 2007. But some steps of the reform would not be expensive. Among these steps are the following:

- Restructuring of research management and financing;
- Establishment of a research council and applied research agency;
- Development of the mechanisms for research policy coordination;
- Preparation of the legal documents for reform.

However, those academics, who have been discussing the coming reform, have not been so enthusiastic. In 2007, salaries will be raised in the higher education system by around 10%, while salary increases in other areas of the economy will be about 15% as foreseen. So the de facto salaries of academics will increase less than the national Lithuanian average. As such, are academics really motivated to support this reform? Unlikely.

CONCLUSIONS

Lithuanian universities technically made a reform of the study system long ago, but from the viewpoint of teaching and learning strategies, as well as meeting new challenges, universities have lots of unfinished transformations and unsolved problems. Study reform is necessary because the Lithuanian higher education system is not preparing students for the 21st Century global society but is instead applying 20th Century policy solutions to a 21st Century world.

The main tasks of the reform are to strengthen science and business interaction, renew the research infrastructure, develop quality human resources, develop a research management system and reform the legal foundation.

The Lithuanian society is not prepared for the dramatically changing demographic shifts in the country's populations. Considerations of the impact of a decreasing birth rate and population (including emigration) are absolutely essential to the future higher education.

The Bologna Declaration, which declares the creation of the European area for higher education, was a good reason for the revision of the existing education model in Lithuania and has clearly stimulated the building of *bridges* between the sub-systems of higher education.

REFERENCES

1. Bansevicius, R., Vilemas, J., Telksnys, L., Zavadskas, E.K. and Vasiliauskienė, V., Lietuvosukio (ekonomikos) plėtros iki 2015 m. ilgalaikė strategija (Long-Term Economic Development Strategy of Lithuania until 2015). Vilnius: LR Ukio Ministerija/MA (2003).
2. LR Finansų Ministerija, Single Programming Document for Lithuania of 2004-2006 (2004), [http://www.finmin.lt/web/stotis_inf.nsf/BA52679E81AFE651C2256EC10033AEA7/\\$File/BPD.doc](http://www.finmin.lt/web/stotis_inf.nsf/BA52679E81AFE651C2256EC10033AEA7/$File/BPD.doc)
3. Commission of the European Communities, A Memorandum on Life Long Learning (2000), http://www.education.gov.mt/edu/edu_division/life_long_learning/lifelong_learning_-_time_to_take_action.htm
4. Scottish Parliament Information Centre, SPICe Briefing: European Employment Strategy (2002), http://www.scottish.parliament.uk/business/research/pdf_res_brief/sb02-98.pdf
5. Université de Genève, Bologna Declaration, the European Higher Education Area, Joint Declaration of the European Ministers of Education convened in Bologna, 19 June 1999, <http://www.unige.ch/cre/BolognaForum>
6. Lietuvos Respublikos Seimas, Nutarimas, Dėl Valstybinės Švietimo Strategijos 2003-2012 Metų Nuostatų (2003), <http://www3.lrs.lt/cgi-bin/preps2?Condition1=215471&Condition2>
7. Lietuvos Respublikos Švietimo, Istatymas (2003), <http://www3.lrs.lt/cgi-bin/preps2?Condition1=238731&Condition2>
8. Zavadskas, E.K. and Valiulis, A.V. The Reform and Development of Vilnius Gediminas Technical University. Vilnius: Technika, 284 (1998).
9. Zavadskas, E.K. and Valiulis, A.V., A Time of Challenge and University's Growth. Vilnius: Technika, 288 (2002).
10. Law on Higher Education of the Republic of Lithuania. *State News*, No.27-715 (2000).
11. Documents on Higher Education and Research in the Republic of Lithuania. Vilnius: Leidybos Centras (1997).
12. Ministry of Education and Science of the Republic of Lithuania, Modernisation of the Education and Training Systems towards the 2010 Common Goals of the European Union. Vilnius: ŠAC (2006).
13. Bell, J., Transforming Higher Education: National Imperative—State Responsibility. Washington, DC: National Conference of State Legislatures (2006).

14. Fírgoa, London Communiqué: Towards the European Higher Education Area: Responding to Challenges in a Globalised World (2007), <http://firgoa.usc.es/drupal/node/35825>

BIOGRAPHY



Prof. Dr Habil Algirdas Vaclovas Valiulis was born in Vilnius, Lithuania, in 1943. In 1967, he was awarded a Mechanical Engineer Diploma and in 1974, he defended his PhD thesis. He was awarded his Doctor Habilitus degree in 1997. He has been a professor and an Expert member of Lithua-

nian Academy of Science since 1998.

Prof. Valiulis teaches fusion welding technology and equipment for ferrous and non-ferrous metals and polymers, materials science, soldering and brazing. His research interests are in arc, resistance, lasers, diffusion welding and the heat treatment of ferrous metals, as well as the curriculum development of study programmes.

From 1990-2006, he was a Vice-Rector of Vilnius Gediminas Technical University in Vilnius, Lithuania. Since 2001, he has been the Head of the Department of Materials Science and Welding, and the Dean of the Faculty of Mechanics at Vilnius Gediminas Technical University since 2006.

He has authored over 300 research, methodological, scientific and study organisation publications, including several books and textbooks, plus many study guides and manuals. He has also presented over 100 papers at international conferences. Prof. Valiulis is a member of the European Society for Engineering Education, European Association for International Education, national representative for Lithuania in the European Society for Engineering Education, European Commission Committee for Coal and Steel, a mirror group member of the European Steel Technology Platform, a member of the EC Bologna experts team, and chairman of the Lithuanian Welding Society.

In 2000, he was awarded the UICEE Silver Badge of Honour (2000) for *...distinguished contributions to engineering education, outstanding achievements in the globalisation of engineering education through the activities of the Centre, and, in particular, for remarkable service to the UICEE.*

5th Global Congress on Engineering Education

Congress Proceedings

edited by Zenon J. Pudlowski

This volume of Congress Proceedings comprises papers submitted to the *5th Global Congress on Engineering Education*, which was held at Polytechnic University, Brooklyn, New York, USA, between 17 and 21 July 2006. The chief objective of this international Congress was to bring together educators, professional organisations and industry leaders from around the world in order to continue discussions tackling important global and contemporary issues, problems and challenges in engineering and technology education.

The papers in these Proceedings present international research and development activities with three opening addresses, 12 keynote addresses, eight lead papers and over 40 regular papers, which have been contributed by authors from 27 countries across the globe. The papers present readers with a significant source of information on a wide spectrum of issues and topics in engineering and technology education. They showcase findings describing innovation and best practice in engineering education, new trends and approaches to engineering education, multimedia and the Internet in engineering education, effective methods in engineering education, the development of new curricula in engineering education, quality issues, accreditation and the international mobility of staff and students, as well as current research and development activities in engineering education at the Polytechnic University and the UICEE.

The 5th Global Congress can be characterised as a strong academic event; most papers in these Proceedings were found to be of a very high academic standard. Further, all papers have undergone through a strict refereeing process to ensure their future relevance for engineering educators, academics and students.

To purchase a copy of the hardbound Congress Proceedings, a cheque for \$A120 (+ \$A10 for postage within Australia, and \$A20 for overseas postage) should be made payable to Monash University - UICEE, and sent to: Administrative Officer, UICEE, Faculty of Engineering, Monash University, Clayton, Victoria 3800, Australia.

Tel: +61 3 990-54977 Fax: +61 3 990-51547

Please note that Australian purchasers must also pay GST.