Quality in Engineering Education

Sebastião Feyo de Azevedo[*]

Keywords: Trust, Recognition, Sectoral Qualifications Frameworks, Field-specific Quality Assurance

Abstract

The general title chosen for this talk is for sure a very wide one.

Quality cannot be dissociated from quality assurance. The first divide of analysis can be between what is termed as 'institutional quality (assurance)' and 'field-specific quality (assurance)'. The former is mainly concerned with structure, procedures and macro-conformity. The latter is mainly related to structure and academic 'substance'. They have as common ground the major concepts of qualifications frameworks (QF).

The focus of this presentation is on 'field-specific quality (assurance)'. The relevance of these concepts stems from the fact that it is today clear that only "field-specific" QF and quality assurance (QA) approaches can give concrete application and put on solid and practical grounds the "Bologna" objectives.

Under this umbrella we can speak about and look at many important topics: (i) course structure and contents; (ii) learning outcomes, competences to be achieved; (iii) pedagogical methods adjusted to today's life, to the students' social expectations and to the means and tools available; (iv) the required fundamental knowledge that students should capture; (v) the development of skills, namely concerning entrepreneurship and the sense for innovation; (v) the understanding of the relevance of learning in a multicultural environment; (vi) the understanding of multidisciplinary environments; and more, much more.

When we speak of quality we may be led to thinking of values that somehow we can see and understand as thresholds, but indeed we should think much higher than that. To a large extent quality is what we perceive and evaluate, thinking of some given standards and looking to the outputs and results. We have experience, we compare, we see what are the outcomes, technical, social and human, of the students, we see their ability to perform and to be active citizens in the society. Quality is in fact linked to the perception that partners and stakeholders have or build about one's capacity and ability to cooperate or represent an added-value to society.

---

[*]   Professor of Chemical Engineering; Dean of the Faculty of Engineering, University of Porto

Understanding today's global world requires mobility of students and professionals. Cooperation, a must for development, requires mobility. Cooperation and mobility require academic and professional recognition. Recognition requires TRUST. Trust requires transparency and readability of academic curricula and professional qualifications. Such is achieved through transparent qualifications frameworks and quality assurance procedures, recognised and accepted by all partners and stakeholders.

The conference will cover a number of topics of this so general, but vital, subject of quality.

First, I shall revisit the main concepts of qualifications frameworks and quality assurance, central issues of the Bologna Process.

I shall stress the concept of a three-layer qualifications framework and link it to the relevance of field-specific quality assurance systems. Here, I shall use two relevant models: (i) the sectoral framework for engineering, the EUR-ACE framework standards; (ii) the seminal contribution of the European Federation of Chemical Engineering, that approved recommendations for field-specific descriptors compatible with EUR-ACE and with the the (Meta) Qualifications Framework of the European Higher Education Area, directly related to the Bologna Process, upon which quality assurance procedures can be built.

I shall outline that sectoral and branch specific descriptors of outcomes, applied in combination with the European Standards and Guidelines, should lead to "pre-professional accreditation" and Mutual Recognition Agreements for academic and/or professional purposes.

In a second part, I shall address some issues of the substance – contents and methods.

Some of the concerns have already been raised in the opening of this abstracts. Here are some questions that will be discussed: (i) which profiles for engineering education best serve the demand and the society? (ii) how to choose contents, to balance between fundamentals, specialization and engineering practice? (iii) how to provide development in key skills of today – innovation, entrepreneurship, sustainability and culture of continuous education? (iv) which methods and how to use adequately the existing information technology in the educational process, namely the existing solutions for cooperative work; (v) how to deal with students' expectations and motivations, in which we should include how to make use of the enormous amount of information available in the net.

In all, we should not forget that quality is closely related to 'trust' and this is equally closely related to success and development. Without quality, understood and recognized beyond doubt by partners and stakeholders, there is no future in this global, open market society.

Some relevant references related with this conference

Augusti, G. and S. Feyo de Azevedo (2011), *Qualifications Frameworks and Field-Specific Approaches to Quality Assurance: Initiatives in Engineering and Technical Education*, Int. J. of Quality assurance in Engineering and Technology Education, 1 (1), 44-57, January 2011, available in http://www.fe.up.pt/~sfeyo (publications/opinion and dissemination papers)

Bergan, S. (2007), *Qualifications – Introduction to a concept*, Council of Europe Higher Education series No. 6, Council of Europe Publishing, Strasbourg

EQF-LLL (2008), *The European Qualifications Framework for Lifelong Learning (EQF)*, Recommendation of the European Parliament and of the Council, 23 April 2008, available in the site of the European Commission at http://ec.europa.eu/education/lifelong-learning-policy/doc44_en.htm

ENAEE (2008), *EUR-ACE® Framework Standards for the Accreditation of Engineering Programmes,* available in www.enaee.eu

Feyo de Azevedo, S. (2002), Notas para Reflexão sobre o Tema Bolonha - Oportunidade Imperdível para a reforma do sistema do ensino superior, XIV Congresso da Ordem dos Engenheiros, Coimbra, 27-29 de Junho, available in http://www.fe.up.pt/~sfeyo (publications/opinion and dissemination papers)

Feyo de Azevedo, S. (2003), *A Respeito da Reforma do Ensino Superior*, in Avaliação, Revisão e Consolidação da Legislação do Ensino Superior (Inquérito Público: Análise e Resposta, Ed. A. Amaral, p. 315-329, CIPES, Pub. Fundação das Universidades Portuguesas, 2003; available in http://www.fe.up.pt/~sfeyo (publications/opinion and dissemination papers)

Feyo de Azevedo, S. (2004), *Os novos paradigmas de formação no espaço do ensino superior e as actividades profissionais, In* Seminário – Reflexos da Declaração de Bolonha, Ed. Fórum Regional do Centro das Profissões Liberais, Coimbra, 13-14 Nov. 2004, p. 27-40, Junho, available in http://www.fe.up.pt/~sfeyo (publications/opinion and dissemination papers)

Feyo de Azevedo, S. *(2007), A Respeito da Reforma Legislativa em curso no Sistema do Ensino Superior – Gestão, Qualificações Profissionais e Garantias de Qualidade*, Ingenium, II Série nº 101, 24-26, Setembro/Outubro, available in http://www.fe.up.pt/~sfeyo (publications/opinion and dissemination papers)

Feyo de Azevedo, S. (2007), *Technical Education – from London to Leuven/Louvain-La-Neuve and beyond,* Keynote speech at the Workshop on "Scientific & Technical Education and the Bologna Process" held on 14 November at the Facoltà di Ingegneria, Università La Sapienza, Roma, Italy, available in http://www.enaee.eu (documents)

Feyo de Azevedo, S. (2009), 2009, *High Level Qualifications Frameworks and the EUR-ACE Frameworks Standards – do they fit together?* Invited Conference in the Workshop on Overarching and Sectoral Frameworks, ENAEE, Brussels, Fondation Universitaire, January 22, available in http://www.enaee.eu (documents)

QF-EHEA (2005), A Framework for Qualifications of the European Higher Education Area, Bologna Working Group on Qualifications Frameworks, Ministry of Science, Technology and Innovation, Denmark, available in the site of the Bologna Follow-up Group at http://archive.ehea.info/about

SGQA (2005), Standards and Guidelines for Quality Assurance in the European Higher Education Area, European Association for Quality Assurance in Higher Education, Helsinki, 2005. Available in http://www.enqa.eu/files/BergenReport210205.pdf and http://archive.ehea.info/about

WPE-EFCE (2010), EFCE Recommendations for Chemical Engineering Education in a Bologna three cycle degree system, available in http://www.efce.info/Bologna_Recommendation.html