

Chemistry Doctorate Eurolabel[®]

European Chemistry Thematic Network Association

Quality Assurance and Accreditation for Third Cycle Quality Labels in Chemistry

With the support of the



Education and Culture DG

Lifelong Learning Programme



Education
and
Training





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Chemistry

October 2011



Editorial Board: Evangelia A. Varella
Ioannis A. Kozaris

Layout: Ioannis I. Kozaris

Editor: ECTNA

Publisher: Magenta Ltd

ISBN

with the support of the



Education and Culture DG

Lifelong Learning Programme



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Training

Disclaimer notice:

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Aarhus University, Denmark, 11-12 April 2011	46
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OVERVIEW OF THE BOLOGNA PROCESS

Source:

European Commission

Directorate General on Education and Culture

Executive Agency Education, Audiovisual and Culture

Eurydice – Information on Education Systems and Policies in Europe

Thematic Studies:

- Focus on the structure of higher education in Europe. National trends in the Bologna Process – 2006/07 Edition (11/05/2007)

- Focus on higher education in Europe 2010: The impact of the Bologna Process (08/03/2010)

1. Introduction

The Bologna process is the product of a series of meetings of Ministers responsible for higher education, at which policy decisions have been taken with the goal to establish a European Higher Education Area by 2010.

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At the Berlin conference in 2003 it was decided to include doctoral study as the “third cycle” of the Bologna process.

Two years later, in Bergen, important statements on the nature of this third cycle were made.

The process also includes the European Commission as a full member. The Council of Europe and the UNESCO European Centre for Higher Education (UNESCO/CEPES) joined, along with a range of stakeholder organisations involved as consultative members.

There is full and active partnership with higher education institutions, represented by the European University Association (EUA) and the European Association of Institutions in Higher Education (EURASHE), students represented by the European Students’ Union (ESU), academics represented by Education International (EI), as well as the European Association for Quality Assurance in Higher Education (ENQA), and Business Europe representing employer organisations.

2. The Ministerial Conferences

Since 1998, six ministerial conferences devoted to mapping out the Bologna process have been held in different European cities, namely Paris (at the Sorbonne University), Bologna, Prague, Berlin, Bergen, London, and Leuven/Louvain-la-Neuve.



2.1 Sorbonne Declaration (1998)

The basic precepts of the Bologna process date back to the Sorbonne Joint Declaration on Harmonisation of the Architecture of the European Higher Education System, signed on 25 May 1998 by the education ministers of four countries: France, Germany, Italy and the United Kingdom.

The Sorbonne Declaration focused on:

- Improving the international transparency of programmes and the recognition of qualifications by means of gradual convergence towards a common framework of qualifications and cycles of study;
- Facilitating the mobility of students and teachers in the European area and their integration into the European labour market;
- Designing a common degree level system for undergraduates (bachelor degree) and graduates (master and doctoral degrees).

2.2 Bologna Declaration (1999)

The Bologna Declaration on the European Higher Education Area, largely inspired by the Sorbonne Declaration, was signed in June 1999 by ministers responsible for higher education in 29 European countries. This Declaration became the primary document used by the signatory countries to establish the general framework for the modernisation and reform of European higher education. The process of reform came to be called the Bologna process.



In 1999, the signatory countries included the then 15 EU Member States, three EFTA countries (Iceland, Norway and Switzerland) and 11 EU candidate countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia). International institutions, such as the European Commission, the Council of Europe and associations of universities, rectors and European students also participated in drafting the Declaration.

The Bologna Declaration also formulates the objective of increasing the international competitiveness of the European system of higher education and stresses the need to ensure that this system attracts significant attention from around the world.

In the Bologna Declaration, ministers affirmed their intention to:

- Adopt a system of easily readable and comparable degrees;
- Implement a system based essentially on two main cycles;
- Establish a system of credits (such as ECTS);
- Support the mobility of students, teachers, researchers and administrative staff;
- Promote European cooperation in quality assurance;
- Promote the European dimensions in higher education (in terms of curricular development and inter-institutional cooperation).

2.3 Prague Communiqué (2001)

In May 2001, the meeting in Prague was convened to assess the progress accomplished to date (particularly as indicated in the respective national reports) and identify the main priorities



that should drive the Bologna process in the years ahead. 33 countries participated, with Croatia, Cyprus and Turkey accepted as new members. Liechtenstein was also included, having committed to the process between the Bologna and Prague conferences, and the European Commission also became a member.

The education ministers also decided to establish a Bologna Follow-up Group (BFUG) responsible for the continuing development of the process. The BFUG is composed of representatives of all signatory countries and the European Commission and is chaired by the rotating EU Presidency. The Council of Europe, the European University Association (EUA), the European Association of Institutions in Higher Education (EURASHE) and the National Unions of Students in Europe (ESIB), later renamed the European Students Union (ESU), take part as consultative members in the work of the BFUG.

The Prague Communiqué emphasised three elements of the Bologna process:

- Development of lifelong learning;
- Involvement of higher education institutions and students;
- Promotion of the attractiveness of the European Higher Education Area.

2.4 Berlin Communiqué (2003)

Held in September 2003, the Berlin Conference was an important stage in the follow up to the Bologna Process. With the inclusion of seven new signatory countries (Albania, Andorra, Bosnia and Herzegovina, the former Yugoslav Republic



of Macedonia, Holy See, Russia, Serbia and Montenegro), 40 countries were then involved.

In the Berlin Communiqué, ministers charged the BFUG with preparing detailed reports on the progress and implementation of the intermediate priorities and organising a stocktaking process before the following ministerial conference in 2005. UNESCO/CEPES joined the work of the BFUG as consultative member.

With the Berlin Communiqué, the Bologna Process gained additional momentum by setting certain priorities for the next two years:

- Development of quality assurance at institutional, national and European levels;
- Starting the implementation of the two-cycle system;
- Recognition of degrees and periods of studies, including the provision of the Diploma Supplement automatically and free of charge for all graduates as of 2005;
- Elaboration of an overarching framework of qualifications for the European Higher Education Area;
- Inclusion of the doctoral level as the third cycle in the Process;
- Promotion of closer links between the European Higher Education Area and the European Research Area.

2.5 Bergen Communiqué (2005)

By May 2005, the Bologna Process extended to 45 signatory countries with the inclusion of Armenia, Azerbaijan, Georgia, Moldova and Ukraine. The ministers responsible for higher education met in Bergen to discuss the mid-term achieve-



ments of the Bologna Process. The Bergen Conference also marked the adoption of the Standards and Guidelines for Quality Assurance in the European Higher Education Area, and the Framework of Qualifications for the European Higher Education Area.

The European Association for Quality Assurance in Higher Education (ENQA), the Education International Pan-European Structure and the Union of Industrial and Employers' Confederations of Europe (UNICE, later to become Business Europe) joined the BFUG as consultative members.

In the Bergen Communiqué, ministers enlarged their priorities for 2007, which now also include:

- Reinforcing the social dimension and removing obstacles to mobility;
- Implementing the standards and guidelines for quality assurance as proposed in the ENQA report;
- Developing national frameworks of qualifications in compatibility with the adopted Framework of Qualifications for the European Higher Education Area;
- Awarding and recognising joint degrees;
- Creating opportunities for flexible learning paths in higher education, including procedures for recognition of prior learning.

2.6 London Communiqué (2007)

The London Ministerial meeting, held on 17 and 18 May 2007, provided a landmark in establishing the first legal body to be created through the Bologna process – the European Quality



Assurance Register (EQAR). This is to become a register of quality assurance agencies that comply with the European Standards and Guidelines, and are therefore legitimate to work in the European Higher Education Area.

London also saw developments in two key areas – the social dimension, where Ministers agreed to develop national action plans with monitoring of their impact, and the global dimension, where Ministers agreed on a strategy to develop the global dimension of European higher education.

The country membership expanded to 46 with the recognition of the Republic of Montenegro as an independent State in the European Higher Education Area.

2.7 Leuven/Louvain-la-Neuve Communiqué (2009)

The Leuven/Louvain-la-Neuve Ministerial meeting, held on 28 and 29 April 2009, took stock of the achievements of the Bologna process and laid out the priorities for the European Higher Education Area for the next decade.

Looking back to ten years of European higher education reform, Ministers emphasised the achievements of the Bologna process, highlighting in particular the increased compatibility and comparability of European education systems through the implementation of structural changes and the use of ECTS and the Diploma Supplement. Acknowledging that the European Higher Education Area is not yet a reality, the Leuven/Louvain-la-Neuve Communiqué also established the priorities for the decade until 2020.

The organisational structures of the Bologna process were endorsed as being fit for purpose, and ministers decided that



in the future the Bologna process would be co-chaired by the country holding the EU presidency and a non-EU country.

In the Leuven/Louvain-la-Neuve Communiqué, ministers agreed that

- Each country should set measurable targets for widening overall participation and increasing the participation of under-represented social groups in higher education by the end of the next decade;
- By 2020 at least 20% of those graduating in the EHEA should have had a study or training period abroad;
- Lifelong learning and employability are important missions of higher education;
- Student-centred learning should be the goal of on going curriculum reform.

Mobility of students and teachers	Mobility of students, teachers, researchers and administrative staff	Social dimension of mobility	Portability of loans and grants	Attention to visa and work permits	Challenges of visa and work permits, pension systems and recognition	Benchmark of 20 % by 2020 for student mobility
A common two-cycle degree system	Easily readable and comparable degrees	Fair recognition Development of recognised joint degrees	Inclusion of doctoral level as third cycle Recognition of degrees and periods of studies	FQ-EHEA adopted National Qualifications Frameworks launched	National Qualifications Frameworks by 2010	National Qualifications Frameworks by 2012
		Social dimension	Equal access	Reinforcement of the social dimension	Commitment to produce national action plans with effective	National targets for the social dimension to be measured by 2020
1998	1999	2001	2003	2005	2007	2009
Sorbonne Declaration	Bologna Declaration	Prague Communiqué	Berlin Communiqué	Bergen Communiqué	London Communiqué	Leuven/Louvain-la-Neuve Communiqué

Timeline of the Bologna Process / 1



		Lifelong learning	Alignment of national lifelong learning policies Recognition of Prior Learning	Flexible learning paths in higher education	Work towards a common understanding of the role of higher education in lifelong learning Partnerships to improve	Lifelong learning as a public responsibility requiring strong partnerships Call to work on employability
Use of credits	A system of credits (ECTS)	ECTS and Diploma Supplement	ECTS for credit accumulation		Need for coherent use of tools and recognition practices	Continuing implementation of Bologna tools
	European cooperation in quality assurance	Cooperation between quality assurance and recognition professionals	Quality assurance at institutional, national and European level	European Standards and Guidelines for quality assurance	Creation of the European Quality Assurance Register	Quality as an overarching focus for EHEA
Europe of Knowledge	European dimensions in higher education	Attractiveness of the European Higher Education Area	Links between higher education and research areas	International cooperation on the basis of values and sustainable development	Strategy to improve the global dimension of the Bologna process adopted	Enhance global policy dialogue through Bologna Policy Fora
1998	1999	2001	2003	2005	2007	2009
Sorbonne Declaration	Bologna Declaration	Prague Communiqué	Berlin Communiqué	Bergen Communiqué	London Communiqué	Leuven/Louvain-la-Neuve Communiqué

Timeline of the Bologna Process / 2

3. The Three-Cycle Structure

At the heart of the Bologna Declaration lies the commitment of the signatory countries to create the European Higher Education Area by 2010 through adapting higher education systems so that they are more uniformly structured and their qualifications more understandable.

A three-cycle structure was already in place (at least in certain fields) in a number of countries before the signing of the Bologna Declaration in 1999, and the challenge was to widen this practice and increase the convergence among the different models in place.

In many countries practices are necessarily diverse as particular institutions, programmes or disciplines respond to their mission in different ways, but in the majority of countries



there is clearly a reference model that is applied to the majority of programmes.

Since then, the remaining countries have introduced the new structure and at the beginning of 2009, the new Bologna three cycle structure has been extensively introduced in most institutions and programmes in all countries. Medical studies and related fields, architecture and engineering, are examples of study fields where long study programmes are often still on offer.

Despite on going debate about the implementation of these fundamental reforms, it is possible at this stage to identify commonalities between higher education systems concerning the workload/duration of the majority of programmes at Bachelor and Master Level.

It is a common misconception of the Bologna process that the duration of each of the three cycles has been rigidly prescribed.

In reality, the Bologna Declaration (1999) states only that first cycle studies should last a 'minimum of three years' while subsequent Bologna discussions on the second cycle have concluded that a master qualification may range between 60-120 ECTS.

Typically, first cycle qualifications should comprise 180-240 ECTS credits, and second cycle qualifications 90-120 ECTS credits with a minimum of 60 credits, at master's level.

While the doctoral level has been a focus of increasing attention since 2005, developments remain at a relatively early stage, and, as they are largely being driven from within au-



onomous universities, dominant national patterns are quite difficult to discern.

Nevertheless, most third-cycle degrees last officially between three and four years (with a slight official preference for the three-year model) and only five countries report the use of ECTS within doctoral programmes – presumably for taught elements of third-cycle programmes. Most countries also emphasise that in reality most doctoral candidates take longer than the foreseen time to complete their doctoral degree.

Meanwhile developments in the third cycle have, to a large extent, been left in the hands of universities, with no attempt to introduce further regulation within the Bologna process.

These positions are also reflected in the overarching Framework for Qualifications of the European Higher Education Area (FQ-EHEA), as defined in Bergen (2005), which comprises the three cycles (including within national contexts, the possibility of intermediate qualifications), generic descriptors for each cycle based on learning outcomes and competences and credit ranges in the first and second cycles.

Over this same period, changes in policy priorities reflect developments in the emphasis laid on different action lines in the ministerial communiqués. In 1999, just after the Bologna Declaration, implementing Bologna degree structures or acceding to the Bologna process itself were among the main policy goals for thirteen countries.

This Bologna priority was, however, much less prominent in 2008/09, when the focus had shifted to other Bologna issues, particularly quality assurance and the development of National Qualification Frameworks. Questions of mobility, access, participation and funding remain consistently important over time when looking at all Bologna countries. The general shift in



national higher education policy priorities also indicates that countries have already begun to look forward to giving reality to the European Higher Education Area in the next decade.

Lifelong learning has recently re-emerged at the forefront of the Bologna process agenda. In 2009, the ministers emphasised that widening participation shall also be achieved through lifelong learning as an integral part of our education systems.

Lifelong learning has become a recognised mission of higher education institutions in nearly all countries during the Bologna decade, but nevertheless remains a peripheral concern in many countries. Approximately half of the Bologna countries have taken measures to stimulate cooperation between higher education institutions and business/industry in the field of lifelong learning.

4. The Bologna Tools: ECTS, Diploma Supplement, Student Mobility, and National Qualification Frameworks

On the structural level, the Bologna process has led to greater convergence in the architecture of national higher education systems. The overall broadness of the guidelines expressed in communiqués and related texts, however, allows countries and institutions to maintain specific characteristics for most programmes. In order to help the development of comparable and understandable degrees and systems, a number of pre-existing 'tools' were introduced in the Bologna process to foster transparency and mutual recognition. These aim to make



education systems and programmes more transparent and render them understandable for all.

4.1 The European Credit Transfer and Accumulation System (ECTS)

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Through the lifetime of the Bologna Process, the ECTS system has clearly established itself as a central element in the process of making European higher education more transparent and understandable. The system was developed at the end of the 1980s to be used essentially for credit transfer to facilitate student mobility within the Erasmus Programme. The aspiration to create a European Higher Education Area was agreed a decade later, and since then ECTS has gradually developed to become a core instrument supporting its implementation.

Under the European Credit Transfer and Accumulation System (ECTS) credits are awarded to individual students upon successful completion of the learning activities required by a formal period of study. The number of credits ascribed to a period of study is based on its weight in terms of the workload students need in order to achieve learning outcomes in a formal context.

The importance of ECTS with regard to student mobility has often been stated, and the Communiqués of the conferences of ministers responsible for higher education indicate significant development in the system.

In the Berlin Communiqué, the signatory countries were encouraged to apply ECTS no longer just as a credit transfer system but also as a credit accumulation system. In the Bergen Communiqué, attention was drawn to the use of ECTS in the first and second study cycles, with special emphasis on its importance in the overarching Framework for Qualifications in



the European Higher Education Area (EQ-EHEA), which was adopted at the conference. Meanwhile the London Communiqué concentrated on the implementation of ECTS based on workload and learning outcomes. In Leuven/Louvain-la-Neuve, the ministers noted that there has been progress in the implementation to increase transparency and recognition.

Based on the commitments made by the ministers in the various communiqués, ECTS is regarded as fully implemented when more than 75 % of institutions and programmes use the system for credit accumulation and transfer, and when it satisfies the requirements of credits being awarded on the basis of defined learning outcomes and/or student workload.

In the majority of countries/regions, ECTS has been introduced through national legislation – although in many systems this is only the first step towards implementation in reality. However, at this level, ECTS can be shown to be a strong feature of education systems. It is also gradually replacing more and more national credit systems, even those that are fully compatible with ECTS.

4.2 The Diploma Supplement

The Diploma Supplement (DS) was developed by the European Commission, Council of Europe and UNESCO/CEPES. It is a document produced in a standardised template that is attached to a higher education diploma and provides a description of the nature, level, context, content and status of the studies that were successfully completed by the individual named on the original qualification. A description of the national higher education system within which the individual



named on the original qualification graduated also has to be attached to the DS.

The purpose of the Diploma Supplement (DS) is to improve understanding of the knowledge, skills and competences acquired by the learner and thus to facilitate mobility and to aid employers. The relevance and importance of the DS has been seen to increase through the Bologna decade particularly following the commitment of the Ministers of Education in the Berlin Communiqué 2003 that, as of 2005, all graduating students should receive this document automatically, free of charge and in a widely used European language.

The Diploma Supplement has been implemented in most signatory states and is being issued in English and/or the language of instruction. In 2005, eight countries (Belgium–Flemish Community, Estonia, Finland, France, Latvia, Liechtenstein, Luxembourg and Slovenia) issued it to all students. By 2009, this number had grown to 25.

4.3 Student Mobility in the European Higher Education Area

Despite the high profile of mobility issues in the Bologna Ministerial meetings, and the sustained growth of European programmes promoting and funding different forms of mobility – including exchange programmes and work placements through Erasmus, and mobility in joint degree programmes in Erasmus Mundus – there is still little collated information on mobility in the European Higher Education Area. Information on the reality of student mobility is incomplete, and the factors affecting mobility flows are also difficult to gauge with certainty.



The Bologna Process has brought issues of mobility and internationalisation to the centre of European higher education policy discussion, and indeed the Bologna Declaration set this agenda by emphasising a common commitment to overcome ‘obstacles to the effective exercise of free movement with particular attention to ... access to study and training opportunities and to related services’.

The available data, flawed as they are, reveal significant findings. Most importantly, there are extremely significant national differences within an overall picture of relatively low student mobility.

Indeed in eighteen countries less than 3% of students are enrolled abroad, and Russia, Ukraine and the United Kingdom report the lowest outbound mobility rates with less than 1% enrolment abroad. At the other extreme, there are ten countries – Albania, Andorra, Cyprus, the former Yugoslav Republic of Macedonia, Iceland, Ireland, Liechtenstein, Luxembourg, Malta and Slovakia – where more than 10 % of students are enrolled abroad.

For several countries, the incoming and outgoing mobility maps represent a clear mirror image: in three major countries – France, Germany and the United Kingdom – the apparent high levels of incoming mobility are combined with seemingly low levels of outgoing mobility, and these data should be a source for national policy discussion.

The opposite situation – high rates of outgoing mobility combined with low rates of incoming mobility – can be observed in Croatia, the former Yugoslav Republic of Macedonia, Georgia, Moldova and Slovakia, and again the reality behind these statistics requires further investigation, particularly given the



geographical concentration of these countries in Central and Eastern Europe, and the question of brain drain that may be associated to these data.

Of equal concern are the countries which have low rates of both incoming and outgoing mobility, and here Poland, Russia, Turkey and Ukraine are the prime examples. Many other countries, constituting the European norm, have fairly low levels of both incoming and outgoing mobility. Only four small countries – Andorra, Cyprus, Iceland and Liechtenstein – manage to combine high levels of incoming and outgoing mobility, but this finding is perhaps related to the small number of students concerned.

European policy and programme developments have been an extremely important catalyst for national action on student mobility.

While most countries have some financial measures in place to support student mobility, the economic disparity between countries in the European Higher Education Area creates major problems for the less wealthy countries and citizens. Relatively few countries have set targets for mobility as a part of their higher education development strategy.

4.4 National Qualification Frameworks

The third tool to have been introduced and developed in the Bologna process is the National Qualifications Framework (NQF). It is a tool for describing and clearly expressing the differences between qualifications in all cycles and levels of education. Ideally NQFs work in close conjunction with the aforementioned ECTS and Diploma Supplement.



The development of National Qualifications Frameworks has been encouraged in recent years by a range of initiatives and processes. In Bergen European ministers of education adopted the overarching Framework for Qualifications of the European Higher Education Area (FQ-EHEA) and committed to the development of NQFs.

National Qualification Frameworks should include a reference to the three-cycle structure and the use of generic descriptors based on learning outcomes, competences and credits for the first and second cycle.

This task was made more challenging by the later adoption in the context of the EU Lisbon strategy of the European Qualifications Framework for Lifelong Learning (EQF), which is structurally compatible to the FQ-EHEA, but has different descriptors.

Thus the task for countries when developing or adapting their national qualifications frameworks is far from simple: not only should these new national instruments reflect the shift from traditional input-based approaches of categorising qualifications to a focus on learning outcomes, credits and the profile of qualifications, but care should also be taken to ensure that national developments are compatible with both overarching European frameworks.

5. Quality Assurance

In higher education, quality assurance can be understood as policies, procedures and practices that are designed to achieve, maintain or enhance quality as it is understood in a specific context.



The growth of external quality assurance in higher education has been one of the most notable features of the Bologna decade.

European cooperation in quality assurance is exemplified by agreement on European Standards and Guidelines and the creation of a European Quality Assurance Register.

In the majority of EHEA countries, quality assurance is concerned with granting permission to higher education institutions or programmes to operate on the basis of threshold quality standards. Only a minority of countries exclusively follow an improvement-oriented approach.

During the Bologna period, quality assurance in higher education has been clearly linked to establishing stakeholder confidence. Indeed the following principles outlined in the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) adopted in May 2005 stress stakeholder interest, institutional autonomy and minimum burden on higher education institutions.

There is a rapid rise of external quality assurance in Europe. Ensuring and improving quality of higher education and establishing quality assurance systems remains a high priority for many countries.

However, measures taken to strengthen quality within institutions (*i.e.* internal quality assurance) are beyond the scope of the national level sources that inform this report. While it is a moot question whether quality in higher education has improved during the past Bologna decade, there is no doubt whatsoever that quality assurance has seen dramatic developments.

Thus Quality Assurance should focus on:



- The interests of students as well as employers and the society more generally in good quality higher education;
- The central importance of institutional autonomy, tempered by a recognition that this brings with it heavy responsibilities;
- The need for external quality assurance to be fit for its purpose and to place only an appropriate and necessary burden on institutions for the achievement of its objectives.

Although nearly all Bologna countries now have a system of external quality assurance in place, usually with one or more independent agencies charged with prime responsibility, a quick glance through the dates of establishment of these bodies shows that this is a recent and fast-developing phenomenon.

Indeed only a handful of countries had already established clear external quality assurance systems prior to the Bologna process.

During the Bologna decade, 22 countries have established national agencies for quality assurance, with half of these being set up since 2005. Few countries have stayed outside this quality assurance revolution. Thus, countries with a small higher education sector such as Cyprus, Liechtenstein, Luxembourg and Malta have not established agencies.

The European debate on quality assurance during the last decade has emphasised the importance of establishing agencies that are able to perform their work in an independent manner. In most cases, this has led to the development of agencies that are legally and operationally independent from governments as well as from higher education institutions. Only six countries – Azerbaijan, Iceland, Moldova, Slovakia,



Turkey and Ukraine – have maintained a system of central management for quality by ministries.

Meanwhile, the situation for two countries – Bosnia and Herzegovina and Italy – is currently in a process of transition. Notwithstanding these exceptions, it is clear that the European Higher Education Area is now largely full of national external quality assurance systems with independent agencies.

Although practically all Bologna countries have established some form of external quality assurance system, there are significant differences in the philosophy and approach behind systems. Common Standards and Guidelines have been agreed for the EHEA, yet systems are still quite diverse in their orientation.

The main element that distinguishes the orientation of systems in this representation is whether or not the QA agency or national body is invested with the power to grant permission for institutions or programmes to operate. Although certain national system features make this reality more complex (for example, whether or not governments retain the power to issue degrees at central level), these orientations give a good sense of the approach to quality assurance.

In systems where responsible QA bodies/agencies have the power to permit or refuse programmes and/or institutions to operate, quality assurance can, in broad terms, be perceived as supervisory in character, and generally aims to ensure that minimum quality thresholds are met. Agencies may of course play other roles – including giving advice on the enhancement of quality. This is indeed specifically mentioned in a number of countries, but all these additional roles are likely to be subordinate to the decision of permitting programmes and/or institutions to operate.



In other systems, QA agencies report on institutions' management of quality, and although having 'only' an advisory role, aim to support quality enhancement. In such a construction, the primary emphasis is thus on empowering higher education institutions with responsibility for quality improvement. These are systems that will be more likely to use 'light touch' external quality assurance processes, aiming to ensure that necessary measures to improve quality have been established within institutions, and interfering less in the decision-making processes at institutional level.

It is interesting to note that, despite the growing emphasis on autonomy for higher education institutions in European-level discourse on higher education, three-quarters of countries – including those that have most recently established their external quality assurance system – have constructed their QA systems in the logic of supervision and ensuring minimum standards, while only 14 higher education systems currently follow an improvement-oriented approach, placing the primary responsibility for improving quality at institutional level.

This finding suggests that the development of external quality assurance systems has been a central feature of evolving governance structures in higher education. Whereas institutions were previously 'supervised' directly by the state, the steering mechanisms now are much more likely to involve quality assurance agencies.

Moreover, just as there has been increasing convergence towards particular models of degree structures, so too there appears to have been convergence towards a particular model of external quality assurance. No doubt this has been facilitated by the increased communication between governments,



agencies and other quality assurance actors throughout the Bologna period.

Developments at national level have also been accompanied by major changes at European level. The European Association for Quality Assurance in Higher Education (ENQA) was established in 2004 after four years as a more informal network. It works to promote European co-operation in the field of quality assurance.

The launch of the European Quality Assurance Register for Higher Education (EQAR) in March 2008 represents the culmination of efforts to promote European cooperation in quality assurance through the Bologna process. EQAR aims at enhancing trust and confidence in European higher education by listing quality assurance agencies that operate in Europe and have proven their credibility and reliability in a review against the Standards and Guidelines for Quality Assurance in the EHEA (ESG).

After less than two years of existence, EQAR includes 17 quality assurance agencies based in ten European countries. EQAR is also notable for its governance structures, as it is governed and supported by an international non-profit association that comprises all major European higher education stakeholders and European governments.

This inclusive approach to governance is a strong symbol of the close partnership that has developed through the Bologna process and offers a model for other world regions.



DEFINITIONS ON THE BOLOGNA PROCESS

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Source:

European Commission

Directorate General on Education and Culture

Executive Agency Education, Audiovisual and Culture

Eurydice – Information on Education Systems and Policies in Europe

Thematic Studies:

- Focus on the structure of higher education in Europe. National trends in the Bologna Process – 2006/07 Edition (11/05/2007)

- Focus on higher education in Europe 2010: The impact of the Bologna Process (08/03/2010)



1. Bologna Experts

Professionals active in higher education who offer advice on a peer-to-peer basis on the implementation of the Bologna reforms. Experts include stakeholder representatives – such as academic and student representatives, international relations officers, higher education and quality assurance experts. Some also function as ECTS/DS counsellors whose task is to support the implementation of Bologna reforms in these areas. The European Commission funds several projects to support the European activities of national Bologna experts.

2. Bologna Follow-up Group (BFUG)

The Bologna Follow-Up Group consists of ministerial representatives of all 46 Bologna signatory countries and the European Commission as full members. Consultative members include the Council of Europe, the European University Association (EUA), the European Students' Union (ESU), the European Association of Quality Assurance in Higher Education (ENQA), the European Association of Institutions in Higher Education (EURASHE), the UNESCO European Centre for Higher Education (UNESCO/CEPES), Business Europe (formerly known as UNICE) and Education International.

The BFUG is convened at least twice a year and is chaired by the EU Presidency, with the host country of the next conference of education ministers as vice-chair. The role of the BFUG is to follow up on the recommendations made at the ministerial conferences and on the general implementation of all issues covered in the Ministerial Communiqués. In addition, the BFUG produces a work programme which includes a series of conferences and other activities related to the Bologna pro-



cess. A Board, also chaired by the EU Presidency with the next host country as vice-chair, prepares the agendas for the BFUG and monitors progress between BFUG meetings. Overall follow-up is supported by a Secretariat which is provided by the country/countries hosting the following ministerial conference.

For further information, visit

<http://www.ond.vlaanderen.be/hogeronderwijs/Bologna/>

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3. European Credit Transfer and Accumulation System (ECTS)

A student-centred credit system based on the student workload required to achieve specified learning outcomes. ECTS was originally set up in 1989 in order to facilitate the recognition of periods of study abroad. More recently, it has been developing into an accumulation system to be implemented in all programmes at institutional, regional, national and European levels.

Further information can be obtained from the ECTS Users Guide published by the European Commission

http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm

4. ECTS – Compatible Credit Systems

A national credit system is compatible with ECTS when it is based on student workload and learning outcomes and is suitable and used for both credit transfer and accumulation. Cred-



its are allocated only after the learning has been successfully completed and assessed. Credit systems based on other concepts – such as contact hours for example – are not compatible with ECTS.

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5. Diploma Supplement (DS)

A document attached to a higher education diploma that aims to improve international transparency and facilitate academic and professional recognition of qualifications. Developed by the European Commission, the Council of Europe and UNESCO/CEPES, the DS consists of eight sections describing in a widely spoken European language the nature, level, context, content and status of the studies that were pursued and successfully completed. The DS provides additional information on the national higher education system concerned, so that the qualification is considered in relation to its own educational context.

6. International Standard Classification of Education (ISCED 1997)

The International Standard Classification of Education (ISCED) was designed by UNESCO and aims to offer a set of criteria suitable for compiling statistics on education internationally.

ISCED 5: Tertiary education (first stage)

Entry to these programmes normally requires the successful completion of ISCED levels 3 or 4. ISCED level 5 includes tertiary programmes with an academic orientation which are largely theoretically based (ISCED 5A), and tertiary pro-



grammes with an occupational orientation which are typically shorter than the academic programmes and designed for entry to the employment market (ISCED 5B). Only ISCED 5A programmes give access to doctoral programmes at ISCED level 6.

ISCED 6 Tertiary education (second stage)

This level is reserved for tertiary programmes that lead directly to the award of an advanced research qualification (e.g. a doctorate).

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7. Proposed ISCED 2011 – for Consideration at the 36th General Conference of UNESCO

Programmes at ISCED level 6, or 'bachelor or equivalent', are often designed to provide participants with intermediate academic and/or professional knowledge, skills and competencies, leading to a first degree or equivalent qualification. Programmes at this level are typically theoretically based but may include practical components and are informed by state of the art research and/or best professional practice. They are traditionally offered by universities and equivalent tertiary educational institutions.

Programmes at ISCED level 7, or 'master or equivalent', are often designed to provide participants with advanced academic and/or professional knowledge, skills and competencies, leading to a second degree or equivalent qualification. Programmes at this level may have a substantial research component, but do not yet lead to the award of a doctoral quali-



cation. Typically, programmes at this level are theoretically based but may include practical components and are informed by state of the art research and/or best professional practice. They are traditionally offered by universities and other tertiary educational institutions.

Programmes at ISCED level 8, or 'doctoral or equivalent', are designed primarily to lead to an advanced research qualification. Programmes at this ISCED level are devoted to advanced study and original research and typically offered only by research-oriented tertiary educational institutions such as universities. Doctoral programmes exist in both academic and professional fields.

8. Quality Assurance

An all-embracing term referring to an on going, continuous process of evaluating (assessing, monitoring, guaranteeing, maintaining, and improving) the quality of a higher education system, institution or programme.

9. National Qualifications Framework (Higher Education)

The single description, at national level or a particular level of an education system, which clarifies and explains the relationship between higher education qualifications. National qualifications frameworks are internationally understood and clearly describe all qualifications and other learning achievements in higher education and relate them coherently to each other.



10. Framework for Qualifications of the European Higher Education Area (FQ-EHEA)

An 'overarching' framework for the entire European Higher Education Area that clarifies and explains the relationship between the national higher education frameworks of qualifications that are now being developed in the Bologna Process and the qualifications that they cover. It was adopted at the 2005 Conference of European ministers responsible for higher education in Bergen. The FQ-EHEA has descriptors for each of the three cycles of qualifications and includes ECTS credit ranges for the first two cycles.

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11. European Qualifications Framework (EQF)

The European Qualifications Framework is a common European reference framework which enables European countries to link their qualifications systems to one another. It was adopted by the European Parliament and Council on 23 April 2008. The EQF uses eight reference levels based on learning outcomes that are defined in terms of knowledge, skills and competences. It shifts the focus from input (lengths of a learning experience, type of institution) to what a person holding a particular qualification actually knows and is able to do.

For further information, see

http://ec.europa.eu/education/lifelong-learningpolicy/doc44_en.htm#doc



12. European Association for Quality Assurance in Higher Education (ENQA)

The association of quality assurance agencies in the European Higher Education Area was set up in 2000. It aims to disseminate information, experiences and good practices in the field of quality assurance in higher education. Membership of the association is open to quality assurance agencies in the signatory states of the Bologna declaration. Full membership of ENQA represents recognition that an agency complies with the European Standards and Guidelines for quality assurance in higher education. Compliance with these standards is checked every five years through an independent review.

For more information, visit

<http://www.enqa.eu/about.lasso>

13. European Quality Assurance Register for Higher Education (EQAR)

The Register aims at increasing transparency of quality assurance in higher education across Europe. It has been founded in 2008 by the European Association for Quality Assurance in Higher Education (ENQA), the European Students' Union (ESU), the European University Association (EUA) and the European Association of Institutions in Higher Education (EURASHE). EQAR publishes and manages a list of quality assurance agencies that substantially comply with the European Standards and Guidelines for Quality Assurance (ESG) to provide clear and reliable information on quality assurance agencies operating in Europe.



For more information, visit <http://www.egar.eu/>

14. Lisbon Recognition Convention

The Convention on the Recognition of Qualifications concerning Higher Education in the European Region was developed by the Council of Europe and UNESCO and adopted in 1997 in Lisbon. It aims to ensure that holders of a qualification from one European country have that qualification recognised in another.

For more information, visit

http://www.coe.int/t/dg4/highereducation/Recognition/LRC_en.asp



POSITION PAPERS

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1. Salzburg Principles, 2005

Source:

- European University Association Publications, February 2005

Ministers meeting in Berlin in September 2003 added an Action Line to the Bologna process ... that underlines the key role of doctoral programmes and research training in this context.

“ Conscious of the need to promote closer links between the EHEA and the ERA in a Europe of Knowledge, and of the importance of research as an integral part of higher education across Europe, Ministers consider it necessary to go beyond the present focus on two main cycles of higher education to include the doctoral level as the third cycle in the Bologna Process. They emphasise the importance of research and research training and the promotion of interdisciplinarity in maintaining and improving the quality of higher education and in enhancing the competitiveness of European higher education more generally. Ministers call for increased mobility at the doctoral and postdoctoral levels and encourage the institutions



concerned to increase their cooperation in doctoral studies and the training of young researchers."

Research training and research career development - and the need to increase the number of highly qualified graduates and well trained researchers – are also becoming increasingly important in the debate on strengthening Europe's research capacity and in the discussions on FP7.

In order to raise awareness of the issues and provide a solid basis for the discussions, the EUA launched in 2004 a Socrates funded Doctoral Programmes Project to analyse key issues related to structure and organisation, financing, quality and innovative practice in doctoral programmes. 49 Universities from 25 countries are involved in this project that demonstrates the commitment of the universities and their desire to contribute directly to the wider policy debate on this important issue.

Aware of the importance of this topic for both governments and universities and bearing in mind that research training forms a core mission of universities across Europe, the Austrian Federal Ministry of Education, Science and Culture, the German Federal Ministry of Education and Research and the European University Association have taken the initiative to organise a 'Bologna Seminar' in Salzburg on doctoral programmes in order to reach a set of conclusions, identify key challenges and make recommendations for action to be undertaken.

From the discussions in Salzburg a consensus emerged on a set of ten basic principles as follows:

The core component of doctoral training is the advancement of knowledge through original research. At



the same time it is recognised that doctoral training must increasingly meet the needs of an employment market that is wider than academia.

Embedding in institutional strategies and policies. Universities as institutions need to assume responsibility for ensuring that the doctoral programmes and research training they offer are designed to meet new challenges and include appropriate professional career development opportunities.

The importance of diversity. The rich diversity of doctoral programmes in Europe – including joint doctorates – is a strength which has to be underpinned by quality and sound practice.

Doctoral candidates as early stage researchers. Should be recognized as professionals – with commensurate rights – who make a key contribution to the creation of new knowledge.

The crucial role of supervision and assessment. In respect of individual doctoral candidates, arrangements for supervision and assessment should be based on a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors and the institution (and where appropriate including other partners).

Achieving critical mass. Doctoral programmes should seek to achieve critical mass and should draw on different types of innovative practice being introduced in universities across Europe, bearing in mind that different solutions may be appropriate to different contexts and in particular across larger and smaller European countries. These range from graduate schools in major universities to international, national and regional collaboration between universities.



Duration. Doctoral programmes should operate within an appropriate time duration (three to four years full-time as a rule).

The promotion of innovative structures. To meet the challenge of interdisciplinary training and the development of transferable skills.

Increasing mobility. Doctoral programmes should seek to offer geographical as well as interdisciplinary and intersectoral mobility and international collaboration within an integrated framework of cooperation between universities and other partners.

Ensuring appropriate funding. The development of quality doctoral programmes and the successful completion by doctoral candidates requires appropriate and sustainable funding.

2. Coimbra Group Universities Position Paper, 2007

Source:

- Coimbra Group Universities Publications, January 2007

- High quality doctoral training can only be provided in high quality research environments.
- There should be only one doctoral degree. The quality requirements defined for candidates ... should be the same for all doctoral students.



- The admittance level ... must always be at a high internationally recognised academic level. While a preceding master's degree is often the standard model, universities can define other admittance levels.
- Full-time doctoral programmes are normally of 4 years' duration ... The research component should be of 2.5 years in duration, including the thesis work.
- The doctoral thesis should be submitted for oral defence. At least one of the examiners ... should be from outside the university, and preferably from another country.
- Only universities can award doctoral degrees.

The predominant component in the doctoral degree is research training. A doctoral study programme can contain coursework elements, training in transferable skills and obligatory teaching elements ... Teaching must be predominantly research-based and contain instruction in basic research methodology and research skills. It is the aim of doctoral study programmes to provide the doctoral student with the skills necessary for him to engage in independent, critical knowledge production based on the relevant methods of research and documentation.

The doctoral level has a special character compared to the first and second cycles in being research training and therefore cannot be seen as yet another study level ... One of the acute questions certain to arise in connection with defining the doctoral level as a cycle with its own special character, will be the question of recognition measures, not only in connection with exchanges of researcher students across borders but also in relation to sector mobility. This is a question of quality assurance offered by the degree-awarding universities.



3. ORPHEUS Position Paper, 2009

Source:

- ORPHEUS, Fourth European Conference, April 2009

- Admission should normally be on the basis of a previously obtained master's degree. Studies or work experiences bringing a candidate to master's level may also be accepted.
- Length of the programme: 3-4 years full time commitment.
- Structure: original research and scientific training; formalized courses up to *ca.* 30 ECTS credits, consisting of general courses, specialized up-to-date elective courses, training in transferable skills.
- Supervision should be tailored to meet the requirements of the individual student and his development. There should be at least one co-supervisor with explicit responsibility.
- The evaluation of theses should enhance internationalization.



4. *Lisbon Declaration Europe's universities beyond 2010: diversity with a common purpose*

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Source:

- European University Association Publications,
13/04/2007

Strong universities for Europe: Europe expects its universities to perform a wide role, enabling civil society to meet the challenges of the twenty-first century.

Universities and the Knowledge Society: The central task is to equip Europe's populations to play their part within the Knowledge Society, in which economic, social and cultural development depend primarily on the creation and dissemination of knowledge and skills.

A diversified university system: Institutions will increasingly offer different kinds of study programmes leading to a wide spectrum of graduate qualifications that allow progression routes from one institution to another.

The fundamental importance of university autonomy: For universities, the adaptability and flexibility required to respond to a changing society relies above all on increased autonomy and adequate funding, giving them the space in which to find their place.

Universities and an inclusive society: Europe's universities accept their public responsibility for promoting social equity and an inclusive society. Success in this task requires partnership with governments and other parts of the educational system.



Refocusing on key goals for building the European

Higher Education Area: Universities and government need to re-engage in order to ensure that a stronger student focus, employability, mobility, attractiveness and social inclusion are firmly embedded as characteristics of the emerging EHEA.

A stronger student focus: Additional efforts are needed to meet the challenges of the shift towards student-centred learning. This involves encouraging use of learning outcomes, but also critical thinking and the active engagement of students.

ECTS: ECTS provides a basis for trust within and between institutions, cycles and disciplines. Universities strongly urge the European Commission to build on the achievements of ECTS in the further development of proposals for a credit system for vocational education and training.

Creating a supportive learning environment: Universities will seek to ensure high quality student support services are accessible to all students.

Employability: Universities will seek to engage more consistently in dialogue with employers, provide better information on the competences and learning outcomes of their graduates, and put in place systems to track graduate employment.

Lifelong Learning: Universities understand the urgent need to make lifelong learning a reality in the years to come. The Bologna tools provide opportunities to the development of systems to enable the recognition of prior informal and work-based learning.

Internationalisation of the European Higher Education Area and the “Bologna Trademark”: The Bologna reforms



make European HE attractive because they have an underlying philosophy and methodology and use transparent tools such as ECTS.

Institutional strategies for internationalisation: Universities are increasingly developing international strategies and profiles that encompass both teaching and research activities, seek to balance cooperation and competition and target specific geographic areas.

Further developing internationalisation: Universities, through EUA, should develop a code of conduct for international cooperation and exchanges in the EHEA. The European Commission and national governments are urged to support this internationalisation process.

Linking higher education and research: Institutions should ensure that a research component is included and developed in all cycles. This also applies in relation to the acquisition of a broad range of transferable skills.

Embedding high quality doctoral programmes in universities: Building upon the outcomes of this Salzburg 2011 report, EUA will establish a permanent framework for the further development, cooperation and exchange of good practices between doctoral programmes and schools across Europe.

Quality processes and institutional mission: Universities reconfirm their commitment to continuous quality development and improvement in all aspects of their institutional mission. Quality systems should take into account these aspects as starting points of any evaluation.

The link to external accountability: External quality mechanisms should be linked to but not duplicate internal processes, so as to ensure their wide-spread acceptance with-



in the university, benefit from synergies and keep bureaucracy at a minimum.

The European dimension of quality: The European QA dimension should be developed in a partnership with higher education institutions, students, QA agencies and governments.

Conclusion: Europe's universities are a major force in shaping the Europe of Knowledge. In return, they ask that civil society should recognize their responsibility to enable universities to secure their resources. Universities welcome the opportunity to help to shape Europe's future.

5. Aarhus Declaration 2011 *Investing today in talent tomorrow*

Source:

- European University Association Publications, May 2011

Universities – crucial for the future of Europe: Through research-based education at all levels universities provide the high-level skills and innovative thinking our modern societies need and on which future economic, social and cultural development depends.

Universities – motors for economic recovery: Universities are increasingly central to future growth and to the consolidation of Europe's knowledge society, with their reservoir of highly-trained and flexible citizens able to respond to changing labour markets



Universities – central to the success of the EU2020 agenda: Every euro spent at European level on universities will add value by bringing people together, pooling knowledge and creating synergies that could not be achieved at national level alone.

Universities – addressing complex problems that need innovative solutions: European universities have a crucial role to play in addressing global challenges through their contribution to new knowledge, and to educating talented individuals to be creative and search for innovative solutions.

Universities – smart people for smart growth requires long-term commitment: Universities need to be able to continue to invest in their future academic and research activities. Financial sustainability is conditional on reliable and sufficient public funding.

Universities – need financial sustainability: Financial sustainability is crucial and conditional on reliable, sufficient public funding, and the required autonomy to be able to explore additional funding options.

Universities – European commitment and added value: Europe's future will depend largely upon its capacity to increase substantially the number of highly-trained people across the continent and to attract others from abroad.

Widening access and increasing capacity to respond to the needs of more diverse student populations: A starting point should be broad, flexible and adaptable Bachelor programmes that, for most disciplines provide a suitable entry point to the labour market and to all further learning.

Developing distinctive research portfolios: A rich variety of unique environments that stimulate interdisciplinary ap-



proaches, are supported by competitive research funding, and strengthened by cooperation mechanisms.

Ensuring that university staff and students identify with the university and its specific mission: This is a basis for generating and maintaining a vibrant university environment.



OUTCOMES FROM THE GLOBAL STRATEGIC FORUM ON DOCTORAL EDUCATION

Aarhus University, Denmark, 11-12 April 2011

Source:

- European University Association Publications, April 2011

The global research community: Universities have a key role to play in producing research that can address the challenges faced globally and in each region of the world. Doctoral education nurtures the roots of this global research community.

Critical mass and capacity building: Attaining a critical mass of research is central to developing doctoral education. Doctoral schools have proven an effective vehicle for implementing institutional strategies. Development and circulation of talent is paramount in terms of cultivating research capacity; however, asymmetric circulation of talent is a concrete and urgent problem.



Stakeholder dialogue: Dialogue with stakeholders raises the awareness of the value of doctoral education as well as highlighting the diverse range of career paths for doctorate holders. Successful development of doctoral education requires public investment; the support of stakeholders is central to developing doctoral education which can make a significant impact on society.

Conclusion: Universities have a unique mission in producing and disseminating knowledge and cultivating the research mind-set. Doctoral education occupies a central position in fulfilling these important roles.



DESCRIPTORS

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1. Dublin Descriptor, 2004

Qualifications that signify completion of the third cycle are awarded to students who

- have demonstrated a systematic understanding of a field of study and mastery of the skills and methods of research associated with that field;
- have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity;
- have made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication.



2. Budapest Descriptor, 2005

Third cycle (doctoral) degrees in chemistry are awarded to students who

- have demonstrated **a systematic understanding** of an aspect of the science of chemistry and **mastery of those skills and methods** of research associated with the topic of this research;
- have demonstrated the ability to conceive, design, implement and develop **a substantial process of research in chemical sciences** with rigour and integrity;
- have made a contribution through **original research** that extends the frontier of knowledge **in chemical science** by developing a substantial body of work, some of which merits national or international refereed publication;
- have competences which fit them for **employment as professional chemists in senior positions in chemical and related industries**, or for a progression to a career in academic research.

Such graduates

- **are capable of critical analysis, evaluation and synthesis** of new and complex ideas;
- **can communicate** with their peers, the larger scholarly community and with society in general about their areas of expertise;



- **can be expected to be able to promote**, within both academic and professional contexts, scientific and technological **advancement** in a knowledge based society.



ON DOCTORAL EDUCATION – A SURVEY

Evangelia A. Varella

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1. General Statements

- Doctoral education is an individual journey.
- Doctoral education is about conducting an original research project under academic supervision from one or more experienced researchers
- Doctoral education is not cumulative like teaching-based education.
- Doctoral education is preparing candidates both as future scientists and as scientifically trained professionals who will valorize their doctoral expertise and competences in a non-academic context.
- Doctoral education is ... developing independent and critically minded researchers.



2. The Parameter of Internationalisation

2.1 General Concerns

-Ministers call for increased mobility at the doctoral and post-doctoral levels.

-Quality research is international.

-Doctoral programmes should seek to offer geographical mobility and international collaboration within an integrated framework of cooperation.

-The international agenda should be a key part of any research environment.

-The evaluation of theses should enhance internationalisation.

2.2 Specific Proposals for Realizing Internationalisation

-Research students must demonstrate an ability to present and discuss research and research results with authority in an international context.

-Doctoral candidates should participate in international scientific conferences.

-A formative study period abroad of at least 6 months, though not mandatory, is recommended.

-Typically to be included within the research project shall be a study period at another suitable research institution, either in the country or abroad.

-The second out of three years is aimed at providing the candidate with an experience of research in a foreign institution.



- At least one of the examiners of the doctoral thesis should be from outside the university, and preferably from another country.

International doctoral programmes are designed to internationalise doctoral studies by:

- authorising joint international degrees;
- facilitating the integration of foreign students and guest professors;
- encouraging and supporting, both institutionally and financially, research periods abroad and international cooperation;
- accepting theses written in a largely spoken foreign language;
- making available tutoring programmes for foreign doctoral students;
- proceeding to a targeted advertisement policy abroad.

-Development of international collaboration is achieved by:

- direct participation in doctoral schools of foreign institutions;
- agreements and actions to attract teachers and students;
- collaboration agreements for certain programmes;
- joint doctoral programmes;
- participation in Erasmus Mundus projects;
- development of international excellence programmes;
- international theses as to language and jury.

2.3 Internationalisation Strategies

-Internationalisation of doctoral theses



- International collaborative doctoral programmes
- International joint doctoral programmes
- The responsibilities of supervision, evaluation and examination for joint degrees should be established before the beginning of any individual doctoral study.

3. Employability Issues

3.1 General Concerns

- Ministers appreciate that enhancing provision in the third cycle and improving the status, career prospects and funding for early stage researchers are essential preconditions for meeting Europe's objectives of strengthening research capacity.
- Ministers urge universities to ensure that their doctoral programmes promote interdisciplinary training and the development of transferable skills, thus meeting the needs of the wider employment market.
- Ministers invite HEIs to develop appropriate career paths and opportunities for doctoral candidates and early stage researchers.
- Doctoral training must increasingly meet the needs of an employment market that is wider than academia.
- Research students must demonstrate a potential to contribute to the development of society and support other people's learning, both in the field of research and education and in other advanced professional contexts.



-Qualifications that signify completion of the third cycle are awarded to students who can be expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society.

-Third cycle degrees in chemistry are awarded to students who have competences which fit them for employment as professional chemists in senior positions in chemical and related industries, or for a progression to a career in academic research.

3.2 Specific Proposals for Addressing Employability Issues

-Ministers invite the European Universities Association to continue to support the sharing of experience ... on crucial issues such as transparent access arrangements, supervision and assessment procedures, the development of transferable skills and ways of enhancing employability.

-It is an institutional responsibility to provide support structures for professional careers, and take measures to facilitate cooperation with sectors that benefit from the skills of doctorate holders.

-The research project is following and complemented with continued transferable and professional skill training.

3.3 Strategies for Enhancing Employability

-Training in transferable and professional skills

-Inter sectoral doctoral programmes



-Doctoral programmes may take the form of applied research doctoral projects, generating professional experience as an integral part of the research process. The professional doctorates bear a clear lifelong learning perspective; while the industrial doctorate is based on university-industry collaborative efforts.

4. Transparency in Supervision

4.1 General Concerns

-In respect of individual doctoral candidates, arrangements for supervision and assessment should be based on a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors and the institution (and where appropriate including other partners).

-The research component of the programme is performed by the doctoral student with a large degree of autonomy, but under supervision of at least one recognised, active researcher.

-The supervisors have the responsibility to create a stimulating environment in terms of intellectual challenge, methodological approach, international contacts, and financial support for the doctoral student.

-Supervision should be tailored to meet the requirements of the individual students and his development.

-For doctoral students who participate in research groups or who work with their supervisor(s) the group should develop a protocol defining the contribution to the hypotheses, data and research findings of each individual member.



-In inter sectoral doctorates different kinds of division of labour can be envisioned between an academic supervisor and external co-supervisors. The main supervisor should be a recognised, active researcher with academic credentials and affiliation to a university.

-Developing a transparent supervision culture shared by supervisors and doctoral candidates, and defining clearly responsibilities, should be a priority for doctoral schools.

-Each student should have at least one co-supervisor, the responsibilities of each supervisor being explicit.

-It is expected that the supervisor has some formal training as such.

4.2 Specific Proposals for Achieving Transparency in Supervision

-Joint supervision includes two supervisors and a mentor advising for attaining professional excellence.

-The arrangements for the supervision and for the courses are laid out in a training and supervision scheme. The scheme specifies the extent, mode and frequency of supervision.

-Achievement/participation certificates are normally issued by the research supervisor on the course completion form.

-The candidate must submit and successfully defend a doctoral dissertation that is assessed positively by two supervisors and pass doctorate examinations.

-A consortium of five universities in four countries offering the joint degree and further three participating academic institu-



tions set up multiple supervision, consisting of three tutors originating from three different countries.

-A crucial component of doctoral education is access to good and experienced supervisors. In order to assist the environments in strengthening the competence of supervisors seminars and competence development programmes for supervisors are organized.

4.3 Strategies for a Transparent Supervision

- Individually adapted supervision
- Multiple supervision
- Training and supervision scheme/agreement

5. Admission Prerequisites

5.1 General Concerns

-The admittance level required for doctoral programmes must always be at a high internationally recognised academic level. While a preceding master's degree is often the standard model, universities can define other admittance levels.

-Access to doctoral studies is generally restricted to applicants who have successfully completed a second cycle programme at ISCED level 5A.

-Admission should normally be on the basis of a previously obtained master's degree. Studies or work experiences bringing a candidate to master's level may also be accepted.



-With reference to technical college graduates, additional modules to be taken may be identified.

-It is important that admission criteria are not too narrowly defined with respect to the subject/discipline, since this would restrict cross-disciplinary transitions between master's and doctoral programmes. Integrated master's/doctoral programmes offer advantages in terms of study time calculated, but from the point of view of mobility and interdisciplinarity it is recommended that entrance criteria to doctoral programmes be sufficiently flexible to allow master's students to switch to other institutions/programmes for their third degree.

5.2 Specific Proposals for Admission Prerequisites

-The prerequisite for admission is successful completion either of a relevant master's or other appropriate degree programme; or of a relevant degree or master's programme from a technical college with an obligation for additional courses.

-A preparatory course is designed for students holding an excellent B.Sc. degree, who intend to start their doctorate studies without a M.Sc.

-Admissible degrees are master's, German diploma or international equivalents; technical college graduates may be admitted if they achieve an above-average final result, and complete a preliminary course.

-The programme consists of a two-semester preparatory course and a six-semester research course; students holding a Diploma or a master's degree are usually admitted directly to the research course.



-Basic requirements for admission are either a degree at master's level; or completed courses equivalent to at least 240 ECTS credits, of which 60 must be at master's level; or the equivalent knowledge or qualifications obtained in some other way in any country.

5.3 Strategies for Harmonizing Admission Criteria

-Qualification equivalent to second cycle ISCED level 5A.

-Additional course modules to be taken by graduates of non-university tertiary institutions at ISCED level 5B.

6. Quality Assurance

6.1 General Concerns

-Quality assurance encompasses quality of doctoral training; and quality of research.

-Doctoral programmes guarantee minimum quality standards and transparent quality measurement.

-The quality requirements defined for candidates, doctoral training, supervision committees, theses, and the defence, should be the same for all doctoral students regardless of their research orientation.

-High quality doctoral training can only be provided in high standard research environments, such as research universities with strong credentials of academic research, where it is possible for doctoral students to be members of state-of-the-art



groups, benefit from research schools and a critical mass of researchers.

6.2 Specific Proposals for Third Cycle Quality Assurance

-Institutions should develop indicators based on institutional priorities.

-Universities engaged in joint degrees must establish aims, quality criteria, and the regulatory basis of the programme before the beginning of the training for the joint degree.

-The question of recognition measures, not only in connection with exchanges of researcher students across borders, but also in relation to sector mobility, is a question of quality assurance offered by the degree-awarding universities.

6.3 Strategies for Proceeding to Quality Assurance

-Cooperation with national bodies or regional/international quality assurance networks, as well as the European Association for Quality Assurance in Higher Education.

-Development of evaluation and accreditation criteria and methodologies, for both quality of doctoral training, and quality of research.



7. The Need for Critical Mass

7.1 General Concerns

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-Ensuring critical mass of and critical diversity in research environment is central to successful doctoral education.

-Institutions must develop a critical mass of research.

-Achieving the critical mass for an inspiring research environment, and support it by transparent procedures is the main challenge for structured programmes.

7.2 Specific Proposals on Achieving Critical Mass

-Doctoral programmes should seek to achieve critical mass and should draw on different types of innovative practice being introduced in universities across Europe, bearing in mind that different solutions may be appropriate to different contexts and in particular across larger and smaller European countries. These range from graduate schools in major universities to international, national and regional collaboration between universities.

7.3 Strategies for Achieving Critical Mass

-Creation of institutional interdisciplinary doctoral programmes.

-Creation of local/regional or national doctoral programmes or networks within specific disciplines.

-Enhanced creation of hybrid doctoral programmes combining on-line and in-campus lecturing and tutoring.



8. Structuring Doctoral Programmes

8.1 General Concerns

-Ministers consider it necessary to ... include the doctoral level as the third cycle in the Bologna Process.

- Doctoral level qualifications need to be fully aligned with the EHEA overarching framework for qualifications using the outcomes-based approach.

-Structured doctoral studies are about achieving flexible structures to develop creativity and autonomy, to meet individual needs, and build responsibility capabilities.

-The doctoral level has a special character compared to the first and second cycles in being research training and therefore cannot be seen as yet another study level.

- ECTS credits are not appropriate for individual assessment of personal development.

8.1.1 Duration of Doctoral Studies

- Ministers note that the normal workload of the third cycle in most countries would correspond to 3-4 years full time.

- Doctoral programmes should operate within an appropriate time duration (three to four years full-time as a rule).

- Full-time doctoral programmes are normally of 4 years' duration.

- PhD programmes normally have a duration equivalent to 3-4 years full time commitment. It is important that the programme has a clear time limit.



8.1.2 Taught Component of Doctoral Studies

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-Credits can be useful for the taught components of doctoral education, especially in joint programmes.

-Doctoral students must learn research methodology, critical analysis and independence in their studies. Research training must therefore stimulate them to adopt a disciplinary approach, which includes the ability to formulate questions, to give structure to a scientific argument, to find adequate methods and theories for tackling problems, and to be able to reflect critically on the subject of their dissertation.

-A Ph.D programme normally consists of two parts: courses and thesis.

-The doctoral programme may include formal and informal teaching *via* seminars, workshops and other course components.

-Doctoral training is achieved by means of several activities (not necessarily formal courses), and consists of transferable skill training, and specific training for the programme research focus.

-The doctoral programme consists of project-related and trans-disciplinary academic elements. It also includes general courses on knowledge transfer and research management, and foreign language courses.

-Students are allowed to include in their curriculum courses attended at other institutes, as well as to participate in summer schools, workshops, seminars.



-Courses offered by other research institutions may be included in the doctoral programme in so far as they integrate achievements of equal value.

8.2 Specific Proposals

8.2.1 Duration of Doctoral Studies

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-The standard study period shall consist of six semesters.

-Obtaining the PhD requires at least three years of full-time work.

-The complete doctoral examination procedure should be completed within three years of admission. The maximum time allowed is five years.

-The minimum time needed to obtain a Ph.D. degree is four years of study.

-Doctoral studies last four years.

-In the four-year study the first year corresponds to taught courses and the resting three to the thesis.

-As a minimum, the research component should be of 2.5 years in duration.

-Courses are planned for the first academic year; the second year is aimed at providing candidates with an experience of research in a foreign institution, while the third year is mainly devoted to the preparation of the thesis

-The dissertation is a result of 2-3 years of research, the remaining 1-2 years is intended for courses, seminars, excursions etc.



-In a total of four years of full-time study, the doctoral thesis is to account for at least two.

8.2.2 Taught Component of Doctoral Studies

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-The number of ECTS credits for acquiring the degree is 240, out of which at least 180 are within the frame of the doctoral programme.

-The Ph.D is worth 240 ECTS. In the subject of chemistry, courses amounting to 45 to 60 credits are to be taken for a doctoral degree.

-The research project accounts for 135 out of 180 ECTS credits.

-The current standardised programme for doctoral students stipulates that a total of 180 ECTS of modules (162 ECTS of which are the dissertation) must be completed.

-In a total of 240 credits, the doctoral thesis is to account for at least 120 credits.

-16 training ECTS credits have to be taken during the three PhD years.

-Twelve 5-credit courses are planned for the first out of three academic years.

-Three fields form the structure: lectures and consultations of scientific fields with obligatory and at least 50% elective courses: 60 ECTS; work in the research process: 60 ECTS; dissertation: 60 ECTS.

-Threefold programme structure: original research training; formalized courses limited to *ca.* 30 ECTS credits, and consist-



ing of general courses and specialized up-to-date elective courses; training in transferable skills.

-In order to achieve the doctoral degree, a minimum of 180 credits are required (120 credits for research work and 60 from courses). Research credits are assigned once the student completes the dissertation. The courses are basic, specialized, and qualification courses intended to bestow technical/practical abilities on students. 37 course credits can be earned during the first year and 23 during the second; 20 out of the course credits can be earned from further formative activities, workshops and seminars.

-In a three year programme, each year allocates 40 ECTS credits for research (30 for advance research training; 10 for bibliographical knowledge), and 20 for courses and didactic activities (10 for international summer schools; 5 for seminars and courses; 5 for multimedia and distance electronic learning).

-Doctoral courses include: basic study (18 ECTS) - the objective is to advance the knowledge of research methodology and pedagogy; speciality study (37-45 ECTS) - the objective is to develop the knowledge and skills necessary for individual creative research work, communication and professional development, and the publication and presentation of research results; electives (up to 5 ECTS) are chosen by the doctoral student from among the courses offered in house or outside; the doctoral thesis (180 ECTS).

-The following classes are compulsory: interdisciplinary lecture programme; literature and methodology seminar; modern aspects of chemistry and biochemistry; scientific communica-



tion; doctoral research seminar and workshops; project development and applications; subsidiary subject lectures.

-The doctoral programme includes a pre-doctoral training period which may be a master's programme or courses (60 credits) not included in the official master's study programmes, but linked to the Doctoral Programme.

-Doctoral studies last theoretically four years: one is devoted to the Diplôme d'Etudes Approfondies preparation, and three to the PhD.

-Doctoral studies include a training period which consists of the research pathway of one or more than one university master's degree course, and consequently a research period, meaning organized research culminating in the completion and defence of a doctoral thesis.

-In general, the research project is allocated:

120 to 195 out of 240 ECTS credits;

165 to 120 out of 180 ECTS credits.

More common is an allocation of 180 and 120 ECTS credits respectively.

A pre-doctoral training equivalent up to 60 ECTS credits is as well possible.

9. Strategies for Structuring Doctoral Programmes

-The standard duration of a full-time doctoral programme should be three to four years.



-The taught component should be an integral part of doctoral studies.

-The taught component should include general and elective courses on the subject; focused-on seminars, intensive schools etc.; training in transferable skills; seminars presented by the candidate.

-ECTS credits should be allocated to all components of the doctoral programme.

-Doctoral programmes should benefit of on-line teaching and tutoring possibilities.



ON DOCTORAL EDUCATION- ANALYSIS OF THE LABOUR MARKET NEEDS

Ioannis A. Kozaris

1. Study Design and Methodology

- The study on analysis of the job market needs involved almost 250 stakeholders from research institutes and industrial companies across the Europe.
- The interface of chemistry and other scientific disciplines were chosen to represent major fields of study.
- Addresses for participants in the study of the selected fields were obtained from participating institutions, professional association membership directories, and online search.
- Questionnaires were uploaded in the Internet and made reachable between January and April 2010. Additionally they were distributed to the participants of the annual general assembly of the European Chemistry Thematic Network (April 2010, Montpellier France).



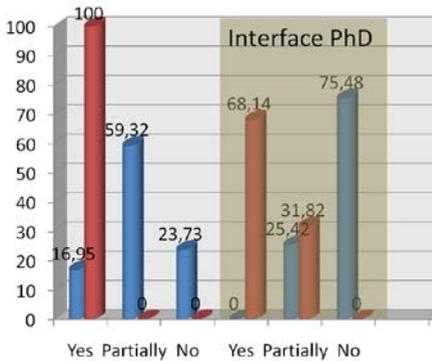
- There was a total response rate of 32% to the call to complete the online questionnaire and 38% to the printed version.
- Respondents completed a questionnaire focusing on organizational structure; recruitment policies and human resources development; experience with and expectations on interface chemistry PhD programmes; collaboration with higher education institutions.
- The 250 responders were mainly European citizens. 132 of them were employed in higher education institutions and 118 worked in non academic companies.
- In participating universities, the average total staff was approximately 100 persons.
- Company workforce were in average 200.
- All staff members at HEI held a science PhD degree.
- An average of 10% of the industry employees were holding academic degrees
 - ➔ 2% a PhD degree
 - ➔ only 1% a science PhD degree.



2. Interesting Findings

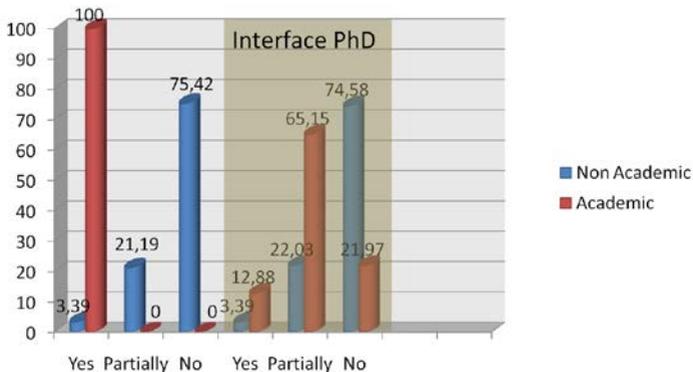
Company representatives appeared not well informed about what to expect from an applicant holding a traditional / an interface Ph.D. degree

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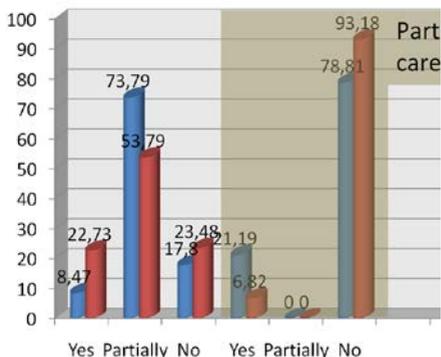


Concerning the question: *which dominate in your recruitment requirements academic or professional competences*, the answer was almost unanimously *both*.

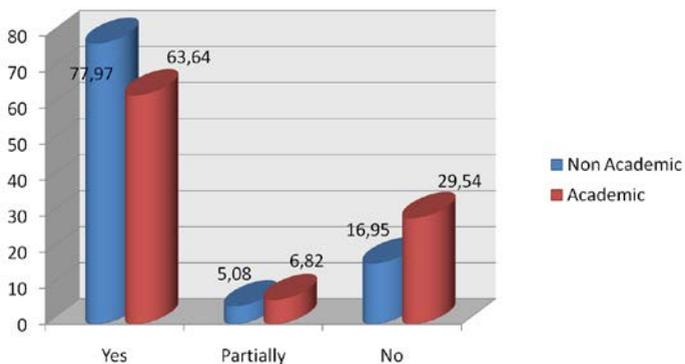
Company representatives said that in their enterprises they do not offer entry positions for PhD graduates or interface PhD graduates



Company representatives said that they partially acknowledge the interface PhD as an academic grant relevant to the job market in the field, but they cannot see particular career paths for these graduates



Both representatives' categories mainly acknowledged the higher requirements involved at interface PhD studies



A large majority of participants acknowledged that an interface chemistry Ph.D. degree –

- Meets current demands from the labour market (Non Academics 75,42% , Academics 56,06%).



- Supplies the labour market with more appropriate graduates (Non Academics 62,71%,Academics 62,12%).
- Involves transparency in the qualification of job applicants (Non Academics 81,36%, Academics 84,85%)

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Lack of collaboration with HEI was observed

Desire for collaboration with HEI was observed.

