

## Doctoral Education and Skills Development: An International Perspective

*Educación doctoral y desarrollo de competencias: Una perspectiva internacional*

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### Resumen

La educación doctoral ha vivido durante los últimos años cambios drásticos equivalentes a los vividos por nuestra sociedad. Durante las últimas dos décadas, el mundo ha sido testigo de una ola de reformas educativas del mundo doctoral, alimentada por recortes gubernamentales, la comercialización, internacionalización y racionalización del sector universitario, la evaluación de la calidad de la educación doctoral, a la vez que por las crecientes demandas por parte de empleadores y graduados, de formar a los doctorandos para un mundo laboral competitivo y cambiante. Un mundo laboral que va más allá de los muros del mundo académico.

Presentando una visión histórica de la educación doctoral a nivel internacional, y prestando especial atención al proceso de Bolonia que está teniendo lugar en Europa, este artículo investiga la naturaleza de los distintos modelos de doctorado, y cómo su conceptualización inicial ha evolucionado y se ha diversificado en nuevos modelos de educación doctoral, relevante para nuestra sociedad actual, debido a cambios en política educativa y en formas de financiar al sector universitario. Comenta, desde un punto de vista internacional, cómo distintas instituciones universitarias están proporcionando competencias transferibles o genéricas, además de específicas, para educar investigadores activos y sostenibles para la sociedad internacional del conocimiento del siglo XXI.

**Palabras clave:** educación doctoral, competencias, Bolonia, reforma, pedagogía, profesionalización, empleabilidad, historia

### Abstract

Doctoral education has undergone, in recent years, a revolution paralleling changes in modern society. In the last two decades, the world has witnessed a wave of doctoral education reforms driven by government funding cuts, commercialization, rationalization, internationalization, quality assurance, as well as by increasing demands from employers and doctoral graduates to train doctoral students for an ever-changing competitive job market, which goes beyond the walls of academia.

With an historical view of doctoral education at international level, and paying special attention to the process of Bologna taking place in Europe, this paper investigates the different models of doctoral education developed, as well as how its initial traditional conceptualisation has evolved and diversified, driven by educational policy and changes to higher education funding, into new models of doctoral education relevant to our current society. It discusses, from an international perspective, how different higher education institutions are approaching the task of equipping doctoral students with transferable or generic skills, as well as specific skills, in order to educate active and sustainable researchers for the competitive international knowledge based societies of the 21<sup>st</sup> century.

**Keywords:** Doctoral education, skills, Bologna, reform, pedagogy, professionalization, employability, history

## **Introduction**

This paper presents an international insight into doctoral education. This is an important theme as the professional future of researchers, in and outside academia, depends on it. First, it reflects on early conceptualizations of doctoral education and how new models of doctoral have been developed in the last two decades. Then, it discusses how, in the last quarter of the century, doctoral education has expanded in America, Europe and Australasia, and made its way into the Asian universities of countries like India and China where its demand is increasing at an extraordinary—and some would say alarming—rate (Brushan, 2007; Powell & Green, 2007). Further on, it discusses the factors driving the international doctoral reforms around the world –internationalization, quality assurance, diversification, commercialization, rationalization, accountability, doctoral student employability and professionalization.

The current debate on what doctoral education should include is also documented – with a particular focus on skills development, as well as the quality assurance debate on how doctoral education resources should be managed, and how doctoral training should be delivered to prepare early stage researchers to work successfully in academia and the private sector of the 21<sup>st</sup> century competitive knowledge-based society. Finally, the future perspectives of doctoral education are discussed in the conclusion section.

## **Doctoral Education: Expansion, Crisis, and Initial Reforms**

During many years, the early 19<sup>th</sup> century German model, the traditional Ph.D.by thesis, and the American model, a blended course work and Ph.D. thesis model, introduced in 1861, coexisted in different universities from around the world (Albatch, 2004; Nerad, 2007; Grundmann & Rowan, 2008). It was not until 1960 that new Ph.D. models developed. For example, in the UK, the Ph.D.by Publication was introduced. Though this model was also based on the traditional supervised research project, substantial changes were made. The content and structure of the thesis, as well as the examination process, were changed. Thus, a Ph.D. thesis by publication was examined on the basis of a peer-reviewed academic paper, published or accepted for publication, accompanied by an over-arching paper presenting the overall introduction and conclusions (Robins & Kanowski i, 2008). Though the model was introduced in the UK, it became very popular in Australia in the 21<sup>st</sup> for the reasons that will be explained later.

During the 90s, some universities learnt that higher education was a privilege, as they were pushed into the deep end of the pool of lack of financial support, where they had to transform rapidly to survive (Neumann, 2007; Powell & Green, 2007). As in Australia, Canada, and the US, doctoral education in the UK had to evolve rapidly to respond to policy changes leading to funding cuts, resulting from changing the operational funding from being based on Ph.D. student enrolments to being based on Ph.D. completions (Neumann, 2007; Powel & Greens, 2007; Taylor, 2004). This change resulted in universities engaging actively in recruiting more doctoral students through diversifying their programs to reach more students, at the same time making sure that they select the potential candidates carefully, that is selecting those that would be likely to complete their doctoral degrees in a timely manner, ideally in less than four years full time (Walker, 2008). As many embraced their business nature, they started to view the delivery of higher education as a commodity that one could buy, rather than a human right (Bok, 2003). As a result, they started to focus on quality assurance to improve the

competitiveness of their doctoral educational programs to consolidate and expand existing national markets and to reach new international ones.

Towards the end of the 90s, calls for doctoral reform came from US leaders of business and industry, as well as from inside, as faculty and administrative members, and leaders of professional associations and higher education, as they questioned the value of the traditional practices of doctoral education (Golden & Dore, 2001, pp. 2-3). Thus, in 1999, a national survey was conducted in the United States with 4,114 doctoral students (from 11 science and arts disciplines) from 27 universities and one Compact.

The US survey found that the majority of doctoral students wanted to become academics. However, it also found that they were very concerned for their future prospects of finding a job in academia. They expressed concerns about the working conditions in academia, where they saw poor conditions of faculty work, a “problematic nature of the tenure process, onerous workload expectations, difficulty of obtaining research funding, and low salaries” (*ibid*, p. 9). Not an ideal working world. In addition, the doctoral graduates surveyed expressed that their research training was not comprehensive; it was not effective at preparing them for the wide range of careers they could pursue in and outside of academia. Some mentioned not to have received adequate information about all aspects of research. Others reported not to have been prepared to publish, or have developed the confidence to get published. Moreover, more than half reported not having received the opportunity to take progressively responsible roles in research projects.

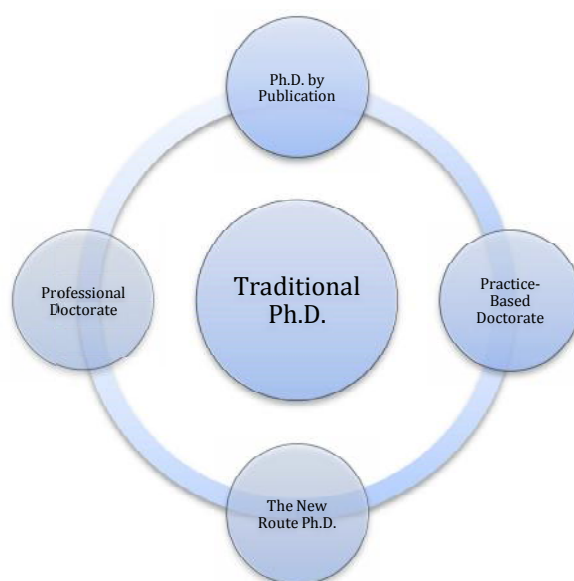
These were very alarming findings, in particular because the main aim of doctoral education is to prepare students to become researchers. Given that, the US report concluded that the careers doctoral students were prepared for were not the ones that they would assume, nor were these the careers that students wanted (*ibid*, p. 44). They realised that, to increase the quality and competitiveness of their doctoral education in the US, an integrated and collaborative response was required to review it, as “the responsibility for changing doctoral practices lies with all of the parties engaged in doctoral education: students, faculty, and administrators (Golden & Dore, 2001). Thus, communication and cooperation were identified as the core engines of the long-due US doctoral reform.

The 1999 US national survey was part of the beginning of the doctoral education reform wave, creating a ripple effect which has had an international impact on doctoral education. Not long after the US national survey on doctoral education, other countries surveyed the doctoral learning experiences of their students. For example, in Australia, Pearson, Evans and Macauley (2004) investigated the working life of doctoral students, identifying that the challenges they were facing with their research education and training were similar to those reported by Golden and Dore (2001) in the US.

Thus, consequently, universities worldwide were being posed with new challenges never faced before as they faced the findings of their national surveys. With the increasing pressures to reach a larger and more diverse doctoral student cohort, came the challenge of managing their “doctoral programs to optimise their productivity and minimise the risk of failure, costliness and/or litigation” (McWilliam, Singh & Taylor, 2002, p. 119). As a result, the established traditional Ph.D. model was being challenged once more, as new types of doctoral degrees were being born and raised (Park, 2005). Once again, the UK, due to its high doctoral international doctoral student population, took the lead in innovation. This resulted in the introduction of three new doctoral education models to reach more national and international students.

The new models included the “professional doctorate”, developed to reach professionals working, the “practice-based doctorate”, which aimed to reach artists, and the “new route Ph.D.” that targeted to increase the international market (see Figure 1). The first model, the “professional doctorate”, is based on a combination of course work and a supervised research project, which is intended to be smaller than the traditional Ph.D... It is more applied, as well as work-based or work-focused. The written thesis, as well as the work

conducted in the course work, is examined. The second model, the “practice-based doctorate”, is based on a supervised research project, normally from the performing arts, where the output is creative (such a novel, a portfolio of artistic work, a film) and a written piece (shorter than the traditional Ph.D. thesis, and includes context and reflections). The creative output and the thesis written on the output are both examined. Finally, the last model developed in 2001, the “new route Ph.D.”. This doctoral education model aims to provide integrated learning experience for international students, and it has been conceptualised to respond to their specific needs. The programme provides research training, as well as personal and professional development opportunities, and contains significant formative assessment items based on course work, which the student has to learn to pass (Robins & Kanowski, 2008). Thus, nowadays, there is more diversity than ever before, the typology of Ph.D. models has increased to five, though the traditional Ph.D. is still the dominant one across the world. Nowadays, also, doctoral education accessibility has also being increased around the world, as new technologies have been used to reach more through providing different modes of online delivery.



**Figure n. 1.** Doctoral Education Models

Each Ph.D. model has its advantages and disadvantages. Nonetheless, from a financial point of view, the main advantage of the traditional Ph.D. and the Ph.D. by publication is that they are cheaper to deliver as they rely heavily on research supervisors. However, as reviews around the world pointed out, a doctoral education model that relies heavily on supervisors may also have as major disadvantage high levels of doctoral attrition. This is because the classical Ph.D. model remains remarkably close to the monastic times of academia – when one supervisor was all the doctoral candidate saw during his or her research learning prior to becoming a researcher (Powell & Green, 2007; Roberts, 2002; Sadlak, 2004; Stephenson & Challis, 1998). Therefore, the need to reform doctoral programs and faculties, at local and national levels, to increase accountability and to guarantee their quality was raised in some countries (Golde & Walker, 2006; Walker, 2008), in an attempt to make doctoral education meaningful, relevant and competitive.

## **The Brave New World of Doctoral Education**

Social, political and economic factors, influenced by a rapidly changing high tech world, are the engines that have driven the doctoral education reform taking place around the globe (Austin, 2009; Brooks & Heiland, 2007; Neumann, 2007; Rubio & Hooley, 2009; Powell & Green, 2007).

## Changes in Funding Arrangement and Focus on Commercialization

In a new century where the limitations of distance have been overcome by the effective use of new technologies, knowledge based societies expect more than ever from their universities (Baschung, 2010; Michavila Pitarch, 2011; Pearson, Evans & Macauley, 2008). They expect them to run efficiently, as public-subsidised but largely self-funded businesses (Neumann, 2007; Walker, 2008). But in return for public funding, they expect them to contribute to their societies in a prolific way in dual streams, not just training future professionals, including researchers, but also generating knowledge, which in time may be able to be transformed into wealth.

In a high technology, knowledge-based, post-industrial capitalist world, where funding is increasingly scarce, universities have truly met the spirit of the industrial era, having become knowledge factories. They are viewed “as agents of economic growth” (Boud & Tennant, 2006, p. 294). While for some countries around the world the commercialization of doctoral education may have taken them by surprise (Bratianu, 2004; Kwiek, 2004; Juchacz & Kwiek 2007), for others this has been the reality for the last two decades. Reaching more markets of doctoral programs at national and international levels has been a concern for some countries since the 90s, as a shift from government-funded models of doctoral education to more university self-funded models took place (Neumann, 2007; Powell & Green, 2007; Walker, 2008; De Weert, 2004). In countries like the US, Australia, Canada and the UK, with higher education systems developing a dependency on international markets, the changes in the doctoral education funding formula have forced them to diversify their doctoral programs to reach more national and international students (McWilliam, Singh & Taylor, 2002; Park, 2007; Pearson & Brew, 2002; Pearson, 2005). For instance, in 2007, the national science and individual finances of many universities in the UK depended heavily on the contribution of their international student population, making up to 46 per cent of their postgraduate population (Green & Powell, 2007).

As higher education funding formulas keep rapidly changing around the world, something that has become clear is that publications and research student completions do count now more than ever. Doctoral students’ publications are increasingly being financially rewarded by governments in an attempt to speed up and enlarge knowledge productivity to keep ahead in the international knowledge innovation race, as well as for universities to improve their place in the international university rankings. Thus, while the uptake of the Ph.D. by publication model in countries like the UK has been limited (Powell, 2004), for countries like Australia, the Ph.D. by Publication model has become more appealing than ever. Since the 1990s, the model has spread rapidly through Australia since it has a double advantage, by securing the completion of doctoral graduates, and by enlarging the overall institutional research output with doctoral publications (Evans, 2007; Kamler, 2008).

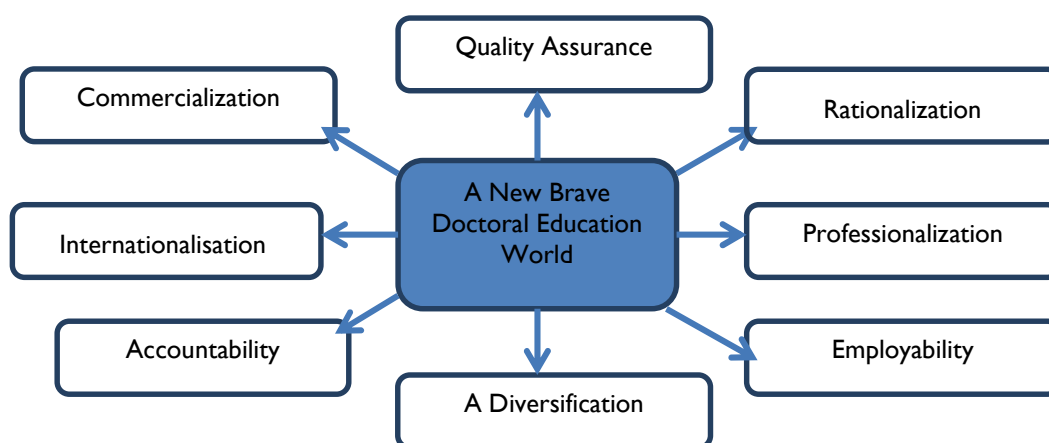


Figure n. 2. Factors Driving International Doctoral Education Reforms

## **Internationalization and Diversification**

In the current doctoral education context growth has taken place at an extreme rate in the last decade, but this is not about to change. Growth at an alarming rate is also planned for the near future, not only in the developed countries, but also in the developing countries. Some countries are aiming to double their doctoral population in the near future (Powell & Green, 2007), and other countries, like China and India, catching up with the development of their doctoral study infrastructure rapidly (Brushan, 2007; European University Association, 2010; Zhuang, 2007).

As international competition and the global financial crisis have both raised and hardened expectations, some universities around the world have been repositioning themselves strategically to compete globally for an internationally competitive higher education sector, while others have just started to realise the new challenging reality of the doctoral education world (Brooks & Heiland, 2007; Millett, Rock, Bell, McAllister, 2010; Morcillo Sánchez, 2011).

The developed university world now recruits internationally for doctoral students. This is becoming a real concern for the developing world for what has been described as “the brain-drain” (Powell & Green, 2007), as some argue, students may never go back to their home countries after obtaining their doctorates due to higher salaries. Consequently, this helps countries with more advanced economies, like Australia, Canada, US and UK, to overcome their shortages in doctoral students and post-docs, in particular in areas of science and technology (Powell & Green, 2007, p. 240). However, it may disadvantage the developing world.

The international doctoral educational market is going to expand further. There are doctoral plans for doctoral education from countries with large populations of undergraduate students like India, with more than 10 million enrolled, and China, where doctoral education started in 1981, and with Brazil and Thailand also showing similar trends in demand of doctoral education, cannot be underestimated (Brushan, 2007; Chittmittrapap & Luksaneeyanawin, 2007; Janine Ribeiro, 2007; Powell & Green, 2007). Thus, there will be future demands for doctoral education from those countries, while they build that their national doctoral education infrastructure. This is opening opportunities for collaboration among different countries.

The education that leads to a doctoral qualification across the world is very diverse in terms of length, delivery and assessment processes (Lincoln, 2004; Powell & Green, 2007). There is no globally uniform doctoral experience. In some countries, like Germany, Spain or Italy, backed by over half a millennia of experience in the delivery of doctoral education, the doctoral experience is, not surprisingly, quite different than that to be had in regions like China, with barely a quarter century of heritage to lean on (Kehm, 2007; Moscati, 2004; Ruiz-Rivas, 2004; Zhuang, 2007).

In Europe, the reform, initiated by the Bologna Declaration in 1999, was targeting increasing European citizen mobility, making higher education in the European Community transparent, harmonious, equitable, mobile and competitive, and which as a result introduced the concept of the European Credit Transfer System (ECTS) in universities of its different members (González, Trevitt & Carter, 2011). However, some argue that the desired goals have not been achieved, by saying that this was only a “face lift” and that the reform was not deep enough (Michavila Picharch, 2011). Others argue that its educational effects still remain within the new developed European Higher Education Area (González, Trevitt & Carter, 2011). However, nothing could stop its influential processes shifting into the third cycle of higher education.

Once the Bologna Process started in the third cycle of higher education, the Bergen Communiqué (2005) condensed the views of the European ministers, responsible for Higher Education, on the important role of higher education plays as a contributor to enhancing

research. They believe that research underpins higher education for the economic and cultural development of societies and for social cohesion in Europe. Moreover, the Bologna process is seen as important to strengthening research and innovation as to improve the quality of teaching. Thus, a commitment was made to put efforts into maintaining and improving the competitiveness and attractiveness of research and research training in the EHEA, with an aim to become more competitive in the international higher education market. For this purpose, the full alignment of doctoral level qualifications with the EHEA overarching framework for qualifications, using an outcomes-based approach, was recommended. In an attempt to increase the number of doctoral students, and to make doctoral education more responsive to new labour and educational market demands, its aims and process has been described as:

“The core component of doctoral training is the advancement of knowledge through original research. Considering the need for structured doctoral programmes and the need for transparent supervision and assessment, we note that the normal workload of the third cycle in most countries would correspond to 3-4 years full time. We 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. We need to achieve an overall increase in the numbers of doctoral candidates taking up research careers within the EHEA. We consider participants in third cycle programmes both as students and as early stage researchers”. (Bergen Communiqué, 2005, pp. 3-4).

However, the potential problems that European Community members could face to achieve consensus-building on doctoral education in the European educational space have also been discussed. These have become “the ten Salzburg principles”, which underpin the development of doctoral education in the context of the Bologna Process (Koch Christensen, 2005, pp. 2-10). This was done with the ultimate purpose to make Europe into a more competitive player in the global competitive market, and enable it to compete with graduate schools in the USA and other non-European countries.

### **Increasing Accountability for Doctoral Graduate Employability and Equity**

In the same way as the US, countries in The Russian Federation and in Europe also conducted national surveys to monitor the quality of their doctoral programs, which pointed out, as in the States, that their doctoral education structures were inadequate to prepare doctoral students as researchers able to perform in multiple careers (Commission of the European Communities, 2003; Park, 2007; Knyazev, 2004). Overall, some countries and fields of study, like the social sciences and humanities, displayed higher doctoral graduate unemployment figures than others (Ahola, 2007; Yamamoto, 2007; Research Council UK, 2010). This triggered the European doctoral reform, which was driven by the needs to improve the quality of engagement of doctoral students with learning how to be researchers for the 21<sup>st</sup> century, as well as by the need to become more competitive in the recruitment of international students and consolidate existing markets (Bok, 2003; Evans & Kamler, 2005; Neumann, 2007).

As a result, the career development of researchers started to be considered while developing and establishing the new European Research Area (ERA). With education ministers from the different European countries meeting in 2003, in Berlin, to activate the Bologna process entitled “European Higher Education Area (EHEA) and European Research Area (ERA)– two pillars of the knowledge based society”, a report that highlighted key role of doctoral programmes and research training in the knowledge society. Equally important was the first European policy report, dealing with the nature of researchers, entitled “Researchers in ERA: one profession, multiple careers” (2003). This highlighted the need to provide complementary training for Ph.D. students, to increase their employability prospects, not only in academe but also outside it, in industry.

The UK was one of the first European countries to respond to the call from the Bologna process. In 2002, Sir Gareth Roberts' chaired a policy report entitled "SET (Science, Engineering and Technology for Success)", and one of its major recommendations was that at least two weeks of training per year in transferable and generic skills should be provided for all doctoral and postdoctoral researchers. The main aim was to improve their employability prospects. This was the foundation of the doctoral education reform in the UK. As a result, the UK became one of the leaders in doctoral education for the 21<sup>st</sup> century. The implementation of the recommendations made in the Roberts' report (2002) was supported by a budget of around £120 million. This funding made possible for higher education in the UK to develop transferable skills for doctoral and postdoctoral researchers. In 2010, eight years later, an evaluation of the impact of the response to the Roberts' report and "Roberts' moneys", as it was known, was conducted. This found that the outcomes of the financial incentive went beyond expectations, not only contributing to making their young researchers more competitive, but also to making British doctoral education more attractive to international students. Most importantly, it was also found that the activities funded initiated a much needed cultural change in the level of provision of skills and career support for doctoral and postdoctoral researchers in UK higher education Institutions (Hodge, 2010, p. 1).

However, even though the cultural change initiated in the UK seemed to be successful, there were still some concerns, mainly linked to the sustainability of the reforms implemented, due to the uncertainty linked to funding mechanisms. Thus, the evaluative report conducted by Hodge (2010) recommended ways of increasing external funding to support the changes implemented by "engaging with stakeholders outside academia, particularly the employers and potential employers of those who have trained as researchers, to find and optimise the ways in which future development may benefit all involved in relatively shorter timescales" (p.2). Put another way, this shows clearly the current pressure on UK universities to increase links with their communities of interest, as government funding to support new models of doctoral education is becoming an issue.

Training researchers for a wider employment market was also high on the list of the Canadian doctoral education reform. For instance, Maheu (2007) explains that in his country there are concerns with inequalities in the access to doctoral education by Aboriginal students, while it was mentioned that the representation of women in doctoral programmes was more equal to men's. Overall, worldwide, equity awareness is rising, in particular in countries like Finland, Australia, India and the US (Ahola, 2007; Evans, 2007; Gupta, 2007; Nerad, 2007), as well as in countries like South Africa, where some groups were found to be under-represented, in particular black graduates (Bawa, 2007; Chava, 2011).

## **The Doctoral Student: The Early Stage Researcher**

The increasing focus on doctoral graduate employability has resulted in recent attempts worldwide to identify the knowledge and skills that doctoral education should provide to students from different disciplines for them to become effective early stage researchers able to work in academia and outside of it.

### **Focus on Doctoral Skills Development around the world**

While the skills development movement is, somehow, new to the third cycle of tertiary education, this has been operational in the first cycle for some time. It was initially developed in the early 90s, resulting from undergraduate students being dissatisfied with their education-job match (Chevalier, 2000), and employers expressing their discontent with the type of education graduates received from universities (Rosenbaum & Blinder, 1997), as well as a need to deal with lack of financial support for the higher education sector. The skills development



movement engaged governments around the world in reviewing their higher education (BOE, 2011; Clanchy & Ballard, 1995; European Commission, 2010; Fernández-March, 2010; Stephenson & Challis, 1998; Yániz, 2007; Yániz & Villardón, 2006; Torra Bitlloch, de Corral Manuel de Villena, Martínez Martínez, Gallego Fernández, Portet Cortés & Pérez Cabrera, 2010).

However, besides all attempts made by many universities, the undergraduate employability issue is still alive. Not only does the public opinion continue exhibiting concerns about the undergraduates not being adequately educated for the work force (Guardian Careers Blog, 2012; Harris, 2012; Vasagar, 2011), but this concern has also spread to the skills development of doctoral students and the quality of their learning experience to become researchers (Anonymous, 2011). This anxiety is spreading to the point that some countries, like the UK, have conducted surveys of first destinations of doctoral graduates by subject, to identify what researchers do (Vitae, 2009), as well as other surveys to identify employer practice, and to create wider links between universities and future employers, as well as to examine how these links can be strengthened to increase doctoral graduate employability (Rubio & Hooley, 2010). According to this survey, employers, on average, ranked researchers' relative competence in the following order: data analysis, problem solving, drive and motivation, project management, interpersonal skills, leadership, and commercial awareness. Overall, employers had the expectation that doctoral graduates "would be stronger in technical areas that are related to their research and to expect that they may have to develop their soft skills" (p. 6). This finding encouraged the UK to create a careers and advisory centre to support universities to make doctoral students more employable in and outside academia (McWhinnie, 2010).

Overall, the way in which different universities around the world are approaching the development of a postgraduate attributes or skills has many commonalities but some points of difference (Australia Skills website, 2012; Chambaz, Biaudet & Collonge, 2007; Green & Powell, 2007; Hilleman-Delaney, Hargreaves & Walsh, 2012; Irish Universities Association, 2006; Melin & Kerstin, 2006; Purcell, Elias & Tzanakou, 2008). From their educational contexts, the way in which they view the skills that a researcher needs to be able to perform effectively, in academia or outside of it, remains subtly different. For example, in those universities where English is not the first language of their students, the ability to communicate effectively in English as a transferable skill appears to be considered worthwhile developing to be an effective researcher as many of the benchmarking research is made available in English (Agudelo, Bretón-López, Ortiz-Recio, Poveda-Vera, Teva, Valor-Segura & Vico, 2003; Powell & Green, 2007). Overall, those universities were more likely to include the development of intercultural awareness as one of the skills needed by their doctoral students.

In the Netherlands, as Bartelse *et. al.* (2007) pointed out, the focus on doctoral skills development had an impact in curriculum development. Thus, more coursework was introduced in doctoral programs as transferable skills gained importance in the training process, thus, resulting in "a shift from the master-apprentice model to the professional model of doctoral education" (p. 7). In France, Chambaz, Biaudet and Collonge (2007) reported that the recent focus on training doctoral students in generic transferable skills seemed to be contributing to changing the public perceptions of doctoral graduates "as the self-reproduction of the old-fashioned scholar and/or as a leading-edge expert in a highly narrow speciality" (p. 67). In Japan, the doctoral reform also recommended a focus on training researchers "for R&D who are rich in creativity and imagination", as well as "professionals with highly sophisticated skills, academics with good teaching and research skills, and highly talented people who can play an active role in a knowledge-based society" (Yamamoto, 2007, p. 191).

## **The Design of International Doctoral Skills**

Overall, the articulation of doctoral skills has varied from country to country, and from university to university, though, in some cases, national guidelines have been provided. For instance, the Irish Universities Association (2006), in response to the Bologna process initiated with the Bergen Communiqué (2005), made available online a list of the desired learning outcomes and skills that could guide Irish universities, and inform students and future employers on what to expect from doctoral training (Irish Universities Association, 2006). The skills proposed were fully compatible with the European Universities Association's Salzburg principles (2005). In their list, they identified seven categories of doctoral skills. Some were the classical ones, such as "ethics and social understanding" and "research skills and awareness", and some skills were of more relevance to the fast moving world, in which we live nowadays, such as "time management". Other skills, relevant to our current society, were categorised under "communication skills", including writing and publishing skills. This indicated the need for future doctorates to be productive in the knowledge generation front. In addition, the skills of "teaching, personal effectiveness/development, team-working and leadership, career management" are also considered important in the training of doctorates, as well as the development of "entrepreneurship and innovation", one of the most important ones nowadays, for early stage researchers to be able to contribute in a productive way to their societies (Irish Universities Association, 2006).

Another example of how the doctoral skills have been articulated differently is provided by The Catholic University of Leuven (2012), in Belgium. There, an online tool has been developed to promote the acquisition of doctoral skills development to help doctoral students to gain employment. The tool has taken the form of a competence profile matrix, which is available online to all doctoral students. This is intended to help them to evaluate their competence on a number of "non-academic skills", more transferable skills, during the course of doctoral research, such as communication and management. The transferable skills are divided into five categories: intellectual competencies, self-management competencies, relational competencies, leadership and change management, and academic and technical competences.

In the UK, Employer practice surveys began to appear to inform further the choice of doctoral skills in doctoral programs and to provide data on doctoral employment pathways (Rubio & Hooley, 2009). In Australia, doctoral programs were also reconceptualised, following the steps of North America and Europe, to account for the employability of its graduates, and a review of the national innovation system was conducted (Evans, 2007). The Ph.D. graduates that surveyed five to seven years after their graduation in Australia showed a mismatch between the skills and capacities acquired with their traditional Ph.D. and the skills that employment market required. This resulted in the articulation of transferable or generic skills, such as "communication, team work, and project management", which were missing from their doctoral training in Australia (Western, Kubler, Western, Clague, Boreham, Laffan & Lawson, 2007). In addition, the Australian Wissler report (2008) concluded that changes to policy and practice needed to take place to help the reconceptualization of the traditional Ph.D., with its singular focus on in-depth-knowledge. According to the report, doctoral education should "provide a core of generic capabilities experience for all Australian Ph.D. s, whatever their research area". Therefore, it should focus on helping students to develop multiple capabilities, thus expanding the research skills to be acquired, not only to include research skills specific to their fields of study, but also to include the acquisition and development of generic skills "related to the productivity of graduates' future career and to labour market requirements for innovation" (Wissler, 2008).

With a focus on developing research standards for the research skills identified, in Australia, Willison and O'Regan (2007) constructed a conceptual model for the development of student researcher skills called the Researcher Skill Development (RSD) framework. The proposed framework intersects seven levels of research autonomy with six facets of research (The University of Adelaide, 2012). The six facets of research include:

1. Embark on enquiry and so determine a need for knowledge/understanding.
2. Find/generate needed information/data using appropriate methodology.
3. Evaluate information/data and the process to find/generate this information data.
4. Students organize information collected and manage the research process.
5. Synthesise and apply and analyse new knowledge.
6. Communicate knowledge and the processes used to generate it, with an awareness of ethical, social and cultural issues.

Thus, Willison and O'Regan' RSD framework adds the dimension of standards into the articulation of doctoral skills. Therefore, adding depth and accountability to its implementation.

### Teaching, English, Wellbeing, Equity and Doctoral Skills

When reviewing the skills proposed by different countries for doctoral students, it is interesting to note that a major point of difference in the doctoral skills proposed was linked to the development of teaching skills, the acquisition of second or foreign language proficiency, and wellbeing skills (see Figure 2). Encouraging doctoral students to learn how to teach is viewed favourably in countries where the doctoral students make an important contribution to the teaching load of their universities, like Australia, the US, Canada and Finland. Thus, it is seen as a benefit as they may end up working in academia, where their teaching skills would be valued (Powell & Green, 2007). This shows that the development of doctoral skills is unique to each socio cultural context, and that one set of skills does not fit all.

With regards to acquiring a second or foreign language, some countries, with English as a first language, like Australia, do not view the need for their doctoral students to learn a second language. Hence, they do not recommend it as a skill to develop. In contrast, other countries from around the world, where English is not their first language, perceive learning English as an important skill for a successful researcher. This is the case of Spanish, Thai and Portuguese universities—however, some English speaking countries certainly do not reciprocate (Agudelo, Bretón-López, Ortiz-Recio, Poveda-Vera, Teva, Valor-Segura & Vico, 2003; Chittmittrapap & Luksaneeyanawin, 2007). This is probably because, as Powell and Green (2007) explain, the English language is playing a more important role in the international academic world, in particular “in the sciences where English is now the common international language of the scientific community” (p. 11)



Figure n. 3. Different Doctoral Skills Considered Worldwide

Another point of difference in the international articulation of doctoral skills, worthwhile mentioning, is that while many universities around the globe described the skills proposed as contributing to lifelong learning, very few attended to the development of wellbeing skills to help to maintain a good life/work balance, a set of skills that may contribute to the development of long term sustainable, and well balanced, productive researchers.

In this way, some researchers from Australia (Poyatos Matas, 2009; Muurlink and Poyatos Matas, 2011) and England (Marshall & Morris, 2011; Morris, 2010) have been advocating the importance of incorporating wellbeing education into the training of doctoral students. Thus, in 2006, a program on Academic Life Balancing Skills for doctoral students was run in Australia (Poyatos Matas and Tannoch-Bland, forthcoming). This stream of thinking acknowledges the corporal and psychological development of graduates, through the provision of opportunities for Ph.D. students to gain academic life balancing skills—a stream that has also been embraced, for example, at England’s Brighton University (Morris, 2010). This leading university acknowledged the importance of the development of skills contributing to academic wellbeing. As Brighton University’s Professor Gina Wisker (2011) explains, they are committed to wellbeing in its widest sense of equipping people with the resources and skills to make a meaningful contribution to society, a “state of wellbeing in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community” (Foreword).

Thus, a genuine and real reform of doctoral education is required, not a face-lift, if international higher education is going to train effective and sustainable researchers able to contribute actively to local and international knowledge economies in the long run. Universities should be contributing actively to the improvement of the current conditions of doctoral students, at all levels, as well as to help them to increase their awareness of employability matters, but also of life/work balance. However, for the doctoral reforms to be sustainable, how to support better research supervisors should be considered seriously, thus, regulating better their working loads to allow them to be able to contribute actively to the education of effective doctoral graduates.

Another point of concern that needs to be expressed here, one rose by Powell and Green (2007), is that the raising focus in generic skills training “is in danger of shifting the focus of doctoral education to a functionalist, skills-led perspective. The emphasis is typically on a business or team skills approach....the doctorate’s purpose is to do with learning about research through the advancement of knowledge not with the building of rafts and playing management games” (p. 259). Thus, it is important that an adequate balance between skills based and knowledge based approaches to doctoral education is maintained.

### **Towards the Professionalization of Early Stage Researchers**

Doctoral education is about learning how to research, as Powell and Green (2007) explain, but it should also include learning how to be researchers and academics, in particular, in those cases, where they gain early experience as employees not only students. This is because doctoral education is the first step towards the professionalization of early stage researchers, who would eventually work inside or outside academia.

The status of “doctoral candidates as early stage researchers” has also being recognised in Europe, where the fourth principle of Salzburg (2005) states that doctoral students “should be recognised as professionals – with commensurate rights - who make a key contribution to the creation of new knowledge” (p. 2).

The recent debate on doctoral skills and employability has been advanced further in Europe by Evans (2010), who articulated research skills into a professional development framework.

Her intention was to develop a professional development model for European early career researchers or doctoral students. The framework proposed identifies a “researcher professionalism continuum”, inspired by the heuristic professionalism models for school teachers developed by Hoyle (1975). The researcher continuum ranges from a “restricted” to “extended” end (see Table I). She argues that the progression between one end and the other represents the essence of the professional development of researchers (p. 9). As she explains, a researcher located at the ‘restricted’ end of the professionalism continuum would typically display different attitudes, skills, knowledge and understandings, which she condensed into the thirteen characteristics. In time, as the researcher became more experienced and gained further competence in these characteristics, they evolved into the characteristics described in the “extended” end of the model proposed. As Evans (2010) explains, in time, a researcher progresses in the researcher professionalism continuum, thus, become an analytical researcher. Therefore, a doctoral student would be in the restricted end of the continuum, as a new researcher in the early developmental stages.

Further on, Evans (2010, p. 9) claims that her framework provides “potential qualitative and motivational yardsticks” to develop and foster “a world-class European research culture of extended professionalism”. This is, according to Evans, because it has the potential to inform the development of European doctoral education and provide comparable quality standards.

<b>The Researcher Professionalism Continuum</b>	
<b>Restricted End</b>	<b>Extended End</b>
<ul style="list-style-type: none"> <li>• conducts research that lacks rigour;</li> <li>• draws upon basic research skills;</li> <li>• fails to develop or extend her/his methodological competence;</li> <li>• utilises only established research methods;</li> <li>• fails to develop basic research findings;</li> <li>• perceives research methods as tools and methodology as a task-directed, utilitarian process;</li> <li>• applies low level analysis to research data; strives constantly to apply deep levels of analysis to research data;</li> <li>• perceives individual research studies as finite and complete;</li> <li>• perceives individual research studies as independent and free-standing;</li> <li>• struggles to criticise literature and others’ research effectively;</li> <li>• publishes mainly in ‘lower grade’ academic journals and in professional journals/magazines;</li> <li>• is associated mainly with research findings that fall into the ‘tips for practitioners’ category of output; and</li> <li>• perceives research activity as separate and detached from wider contexts requiring interpersonal, organisational and cognitive skills.</li> </ul>	<ul style="list-style-type: none"> <li>• conducts highly rigorous research;</li> <li>• draws upon basic and advanced research skills;</li> <li>• strives constantly to develop and extend her/his methodological competence;</li> <li>• adapts established research methods and develops methodology;</li> <li>• generates and develops theory from research findings;</li> <li>• perceives research methodology as a field of study in itself;</li> <li>• strives constantly to apply deep levels of analysis to research data;</li> <li>• recognises the value of, and utilises, comparative analysis, meta-analysis, synthesis, replication, and so forth;</li> <li>• constantly reflects upon, and frequently revisits and refines, his/her own studies;</li> <li>• has developed the skill of effective criticism and applies this to the formulation of his/her own arguments;</li> <li>• publishes frequently in ‘high ranking’ academic journals;</li> <li>• disseminates ground-breaking theoretical issues and contributes to, and takes a lead in developing, discourse on theory; and</li> <li>• recognises the applicability to a range of contexts (including, in particular work contexts) of generic skills developed within and alongside research activity.” (p. 8)</li> </ul>

**Table n. I.** Framework for the Professional Development of Researchers (Evans, 2010, p. 8)

Thus, now more than ever, in a high tech knowledge-based world where financial support for universities is decreasing and performance accountability is increasing, training future researchers is an important key for universities to prevail and continue influencing their societies. This is a goal that only an integral whole university strategy, involving all stakeholders, as it has been discussed here, would be able to achieve (Walker & Golde, 2008). In response, doctoral education quality issues, as well as cultural organizational and academic development issues, need to be considered to be able to support the development of optimal and sustainable research learning environments able to educate and train efficiently doctoral students (Millett *et. al.*, 2010; Commission on the Future of Graduate Education in the United States, 2010, Research Councils UK, 2010, 2011, and 2012).

## **Doctoral Education Quality Assurance: Efficiency and Accountability**

While much attention was given to the reform of undergraduate education in an attempt to commercialise it through improving its quality, doctoral education remained, in many cases, neglected, thus contributing to the painfully ever-escalating attrition rates of Ph.D. students (Ali & Kohun, 2007; Boud & Tennant, 2006; Powell & Green, 2007; Richert Bair & Grant Haworth, 2004). The need to review the quality of doctoral programs was a long-standing one, and one that required attention worldwide (Brooks & Heiland, 2007; Green & Powell, 2007; Pearson *et. al.*, 2008; Walker, 2008).

In some countries, like Australia, Canada, UK and the USA, attrition rates among doctoral students were between 30 per cent and 50 per cent (Ali & Kohun, 2007; Commission on the future of graduate education in the US, 2010; McAlpine & Norton, 2006), while in other countries, like Spain, attrition rates were reaching 90 per cent as doctoral students were not completing the final step towards their Ph.D. theses (Becerra 2007). With these concerns, quality accountability started to raise its head (Becerra 2007; Boud & Tennant, 2006; Brookes & Heiland, 2007; McWilliam, Singh & Taylor, 2002) leading to a number of reviews being conducted in different countries, as discussed earlier, to assess the state of doctoral education and its professional outcomes (Albatch, 2004; Taylor, 2004; Mälher, 2004; Hufner, 2004). As a result, changes to educational policy were made (Boud & Tennant, 2006; Newmann, 2007; Powell & Green, 2007), as well as changes to the organization of doctoral learning resources and supervisory practices, with a stronger focus on effective doctoral pedagogy, aiming to find a solution for the expensive problem of doctoral attrition, as well as to gain an edge in the increasingly competitive international doctoral market.

## **Rationalization of Doctoral Education Resources**

Research graduate schools are being established around the world in response to educational policy promoting the organizational transformation of doctoral programs, more structured doctoral/research/graduate schools, as well as the development of supportive academic communities, connected to their societies and able to support doctoral students with their academic and career development.

In the European Community, the doctoral education reform among the members of the EC is taking place since 2005, when the sixth principle of the Salzburg principles (2005) highlighted the expected doctoral education reform proposal from different institutions could “range from graduate schools in major universities to international, national and regional collaboration between universities.” (p. 2). While the Bologna process acknowledges that the transformation of the organization of doctoral programmes in Europe towards more

structured doctoral research graduate schools would need financial support, just like the successful reform that took place in the UK with “Roberts’ moneys”, one cannot avoid to wonder how this the current EC financial crisis may impact on the European doctoral reform. As Christensen (2005) explained, the reform would require “higher financial investments than traditional individual doctoral training” (p.9). Thus, as the UK experience of doctoral reform has demonstrated, the availability of funding is a vital element if doctoral reform is going to succeed across Europe. Further on, it is also acknowledged that individual responses would be articulated by different higher education contexts, as Christensen (2005) said, to take into consideration issues like the size of the country.

While some countries worldwide have had a long experience with graduate schools (De Weert, 2004; European Commission, 2010; Powell & Green, 2007), other countries have just started to experiment with them in response to educational policy. As mentioned earlier, in some countries there is little involvement of the state in funding and running doctoral education, nonetheless, in others, like Poland, Italy and Spain, there is more. For instance, in Spain, the Department of Education is currently driving the doctoral education reform with the recently published 2541 Royal Decree 99/2011, included in the Boletín Oficial del Estado (2011). The Spanish Royal Decree states the aims, organization and processes that doctoral studies should follow in Spain to increase the quality of their doctoral studies, as well as to internationalise their doctoral education. As in other countries of the world, the Royal Decree conceptualises a doctoral program as a group of learning activities that can promote the acquisition of skills and competences needed to conduct scientific research of quality. It also introduces the notion of “doctoral school” to the national university landscape, as a unit comprising several universities, in possible collaboration with other organisations, centres, institutions and entities with activities of I+D+i (Implementation, Development and Innovation), national or international, in one or several areas of knowledge or with interdisciplinary nature. Thus, establishing the educational policy to bring into alignment the Spanish third cycle of higher education with other European universities, as agreed in the Bologna process (European University Association, 2005). As a result, as the Spanish case documents, new doctoral schools emerging in Europe (Europress.es, 2012). Indeed, this is the case of the graduate school which has just been introduced by the Universidad Politécnica de Catalunya in Barcelona (UPC Sala de Prensa, 2012).

Around the world, three different organizational structures have come under the banner of “graduate school”, with a “diversity of structure, purpose, funding and authority” (Powell & Green, 2007, p.246). The first graduate school model is “the university-wide graduate school”, which aims to standardise quality expectations and procedures between disciplines. In contrast, the second model is “the discipline-specific graduate school”, which aims to enable differentiation according to the needs and demands of the different disciplines. The third model, “the nationwide discipline specific graduate school”, aims to “increase uniformity of student expectations and yet allow discipline-specific issues to be addressed” (ibid, p. 247). Some countries, such as the US and Australia, have a great deal of experience with graduate schools, as well as some countries in Europe, such as the Netherlands and Denmark, with a strong focus on doctoral training. Siggaard Jensen (2007) explains that graduate schools were created in Denmark because “there was certain scepticism about the existing research infrastructure, where the individual university department was the nucleus. There had to be a new focus on critical mass, on internationalization, on quality in courses” (p. 28). Similarly, in the Netherlands, the Dutch government stimulated the creation of graduate schools in 1991, following a national review, to respond to calls for more structured research training and to create more places for doctoral students. Bartelse, Oost and Sonneveld (2007) explain that “research schools were envisioned to be organizations of adequate size that provide (1) a scientifically stimulating environment for carrying out high-quality research and (2) a curriculum for the doctoral candidate tuned to specific subject fields” (p. 66).

In some cases the roles and functions of graduate schools vary according to countries and individual universities (Powell & Green, 2007). For example, in the USA, Nerad (2007)

identified that their role may include: monitoring student progress, grants, collecting dissertations and approving new degree programmes, raising money from philanthropic sources for doctoral student fellowships, establishing procedures for financial support, being an advocate for the intellectual development of students, supporting faculty and academic staff in their roles as advisers, monitoring function. Moreover, they also focus on issues linked to “access and equity, student retention and progress, time-to-degree, career development and doctoral educational outcomes.” (p. 137). Thus, they carry a huge responsibility for the delivery of efficient and accountable doctoral education in their universities.

## **Towards the Professionalization of Doctoral Supervisors**

The important role that supervisors have in the doctoral education experience, and the training of skill relevant for the doctoral student, is becoming documented in the research literature, starting to explore the connections between research supervision and doctoral study performance and research productivity (Agudelo, Bretón-López, Ortiz-Recio, Poveda-Vera, Teva, Valor-Segura, & Vico, 2003; Grover, 2007; Jiranek, 2010; Powell & Green, 2007). The training of supervisors is becoming a common feature of academic development in many countries (Powell & Green, 2007). This is because supervision is viewed as an “act of pedagogy, not of research”, as doctoral students are learning “about how to do research” (ibid, p. 253).

In some countries and universities, there is only one supervisor, while in other cases there may be more than one, depending on the research supervision capability of the institution. However, a main disadvantage of these models is that they are very intense and demanding on supervision, and if the supervision is not adequate, for whatever reason, the students could end up being part of the doctoral students’ attrition rates. Students are also likely to suffer from academic isolation, which in time may discourage them from reaching completion. That is why, in recent years, more emphasis has been placed on research supervisor professional development, as well as pedagogical issues involved in effective doctoral education, and doctoral student employability in and outside academia (Borthwick & Wissler, 2003; Commission of the European Communities, 2003; Iris University Association, 2006; Park, 2007; Putnan, 2000; Walker, 2008).

When doctoral supervision is viewed as a specific and specialized type of professional work, it is very important to provide professional development for doctoral supervisors to improve their quality, as this would lead to improving the quality of doctoral education in an international and competitive higher education sector (Halse & Malfroy, 2009, p. 89). Research supervision pedagogy is different from that of teaching under-graduates because the doctoral student is expected to reach a level of mastery of knowledge, superior to that of her/his supervisor (Wisker, 2005). Thus, it requires new pedagogy (Powell & Green, 2007, Wisker, 2007; Wisker, Antoniou, Ridley, Morris & Exley, 2008).

The workload of supervisors is also an issue affecting quality assurance, Powell and Green (2007) explain, in that it “concerns many countries and which links implicitly to the quality of the student experience, it appears that numbers are much higher, in particular in the social sciences and the humanities” (p. 253). In some countries, like the UK, US and Australia, supervisors can carry a very heavy supervising load, at times up to more than ten doctoral students. In contrast, in other countries like France, there are regulations that limit the number of research students that any supervisor can have at any one time to two (Maheu, 2007). Thus, to a certain degree, focusing on quality at the expense of quantity.

The choice of the wrong supervisor is also another factor contributing to doctoral attrition. Many countries are facing a shortage of potential supervisors, some due to very few members of faculty being involved as research supervisors, some due to lack of the requirements needed to act as supervisors, others due to reasons unknown (Agudelo, Bretón-López, Poveda-Vera, Teva, Valor-Segura & Vico, 2003). As a result, some may be overloaded



with research supervision, an area of academic work that, according to recent doctoral education reviews around the world, needs to be better acknowledged. Based on a national study on doctoral thesis productivity, Agudelo, Bretón-López, Poveda-Vera, Teva, Valor-Segura & Vico (2003) identified the most productive Ph.D. supervisors in the area of psychology between 1991 and 2002. After that, they interviewed 21 successful research supervisors to find out their views on how to complete a Ph.D. successfully. Their study concluded with 16 recommendations to improve doctoral education in psychology. One of them was to reduce the workload of research supervisors, who are also involved in other academic duties. While reducing the load of existing active supervisors is important, first defining very clearly “what being active means”, it is also important to acknowledge their contribution to knowledge generation through their supervisory work.

### **Increasing Doctoral Education Pedagogical Innovation**

In Europe, as in other parts of the world, doctoral education is viewed by many as a stepping stone into the professional world (European Commission, 2008; European University Association, 2010; Europe 2010 Flagship Initiative Innovation Union, 2010; Irish Universities Association, 2005; B.O.E, 2011; Walker et al., 2008). With this in mind, the type of education that a doctoral student receives can determine, to a certain extent, the type of researcher that she or he could become. Thus, the higher education reform that is taking place rapidly in the Western world is resulting in new student-centred learning approaches, as well as graduate schools, being introduced in universities in an attempt to provide doctoral students with skills for the 21<sup>st</sup> world, including research and transferable skills. It is also resulting in the development of new approaches to doctoral education, informed by educational theories, such as socio-constructivism and transformative learning leading to an increased presence of new approaches and new models of doctoral education being trialled, and paying more attention to the role that social network learning and theories of academic social capital may play in doctoral education (Bourdieu, 1988; Lin, 2001, 2006; Muurlink & Poyatos, 2011; Pilbeam & Denyer, 2009).

While this traditional Ph.D. model was adequate for the monastic times of academia in the Middle Ages, it is no longer adequate for the 21<sup>st</sup> century society. This master-apprenticeship model is out-dated. This is a transmission model, where the apprenticeship learns from the master by observation, as it promotes power inequality behind closed doors, and can limit the learning experience of new researchers, who may end up feeling isolated and lost, to the point where they may become part of the alarming worldwide doctoral student attrition statistics.

From a pedagogical point of view, the models with course work provide a more structured doctoral learning environment, as well as opportunities to belong to a wider social environment, in which the doctoral student may not feel so isolated (Muurlink & Poyatos Matas, 2011). However, the offer of Ph.D. models with course work requires a higher human and financial investment, as courses need to be developed and evaluated with academic rigour to support quality doctoral training. Moreover, the professional doctorate model and the Practice-based doctorate model seem to be more applied, as they give the doctoral student the opportunity to research an area relevant to their working practice, and for which employer’s financial support may be available. In addition, new modes of doctoral education are being implemented in different part of the world. The use of web-based platforms and online communication tools, like Skype, are becoming more common. Thus, they are reaching new doctoral markets, national and international, as well as adding to the doctoral world professionals who would have never been part of it previously.

The doctoral education literature is starting to document not only issues linked to doctoral education policy, or issues affecting doctoral attrition, but also new doctoral pedagogical models and approaches. There is more focus on research student-centred learning

and supervision, where research centres or schools are playing a main role in supporting doctoral education. This is the case in countries like Netherlands, Finland, Denmark and UK, amongst others, where the Bologna Process, as well as their own internal educational reforms, has led to important changes in doctoral education supported by educational policy changes, restructuring and professional development for research supervisors (Ahola, 2007; Bartelse, et. al., 2007; Siggaard Jensen, 2007; Green & Powell, 2007).

In other countries like the US and Australia, there are also advances in doctoral pedagogy (Bruce et al, 2009). In the US, Austin (2008) believes that during the doctoral years students are learning “what the academic career involves, the norms, values, and ethics embedded in their disciplines, and the expectations of work habits that they would be expected to meet” (p.173). She points to the problems in the American doctoral experience related to the lack of explicit knowledge on what being a researcher is, that is being available. Thus, she suggests that cognitive apprenticeship should be adopted to make explicit the implicit. This approach informed by theories of networked learning and transformative learning, involves five key steps: coaching, scaffolding, articulation and reflection, and finally, promoting transfer of learning. She also emphasises the importance of the social learning context in promoting motivation and supporting learning (p. 176). From Australia, Poyatos Matas (2009) also supports Austin’s ideas, while proposing an approach to research learning and supervision described as the “whole person action based research learning and supervision approach”—an approach that places the research student at the centre of the learning process, and is complemented with a portfolio approach to help everybody involved in the supervisory process to monitor and evaluate progress towards completion, as well as skills development. She emphasises the role of holistic student wellbeing in promoting academic outcomes. Thus, the ultimate goal of doctoral education is to develop “optimal research learning environments” able to help students to become successful researchers inside or outside academia.

The pedagogical changes that are taking place in doctoral education around the world, in the majority of cases, are supported by government funding, like in the case of the UK (Green & Powell, 2007). These changes have helped universities find out what students need to acquire discipline knowledge, specific research skills, as well as generic skills to empower them to pursue an effective research career (Hodge, 2010). However, the evaluation of this reform has also shown the need for universities to communicate better with potential employers to help them to understand the knowledge and skills gained by research students (Walker, 2008). Moreover, universities are increasingly realising the importance of including doctoral students into communities of research practice, the “social inclusion factor”, thus, attempting to embed students into academic networks through the research schools. This is an attempt to bring together doctoral students, or early stage researchers, with more experienced researchers, supervisors, and members from their wider research community at local, national and international levels. Therefore, this raises the need to build doctoral programs able to build bridges to connect their doctoral students with their communities, who could benefit from their research (Braisfold, 2010; Neumann, 2007; Powell & Green, 2007; Rubio & Hooley, 2009; Walker, 2008; Walker et al., 2008). Thus, one of the secrets to the future success of doctoral education lies on academic networking, and the ability of universities to connect their doctoral students to their local academic communities, as well as to the national and international ones, as well as to potential labour markets.

## **Conclusions and Future Perspectives**

The tradition of the Middle Ages, when the main purpose of training Ph.D. students was to develop knowledge gatekeepers able to continue the traditions initiated by their academic masters, has not completely died. In some universities and in some departments around the world, Ph.D. supervisors are still viewed almost as intellectual gods, and Ph.D. education takes

place in private spaces, where one academic is the master of one academic apprenticeship or Ph.D. student. In the middle ages, in a world with very limited intellectual resources, the traditional model of doctoral education, which was based on a supervisor-centred model, was adequate. However, in a 21<sup>st</sup> century higher education world this model is completely inadequate.

Drastic cuts to government doctoral education funding and alarming doctoral student attrition statistics worldwide have contributed to the doctoral education crisis, which has resulted in calls for doctoral education reforms to take place around the world. Calls, led by leaders from academia, industry and government bodies, as well as students themselves, were made to realise that doctoral education is a stepping stone for doctoral students to make their way into academia or the research world. With an unspoken essence of duty of care, this has resulted in universities recognising the need to conduct a deep reform into the doctoral education sector. As these reforms are finding their way into universities around the world, they are bringing with them changes to the content and delivery of doctoral education in an attempt to develop “optimal research learning environments”, or research schools, able to make the learning experience of doctoral students meaningful, effective and productive, as well as providing a networking opportunity enabling them to become aware of potential career paths and to connect to potential employers and future international collaborators.

Each university has responded differently to the calls for reform, very much depending on their organizational culture and resources, as well as their cultural and language context, in a general international move towards more structured doctoral education able to formalise the different elements involved in providing doctoral education resources, including doctoral supervision. As a result, in recent years, more attention has been given to the type of education that doctoral students should receive. A rolling worldwide review of doctoral programs, and higher education policy, has seen institutions, to a greater or lesser extent, embrace structural and curricular changes and pedagogical innovation in universities to bring the knowledge and skills provided to doctoral graduates into alignment with the needs that different societies may have. Up to five Ph.D. models are currently available in some countries (Ph.D. by publication, Ph.D. , the new route Ph.D. , professional doctorate, practice-based doctorate, in addition to the traditional Ph.D. ) to diversify doctoral education. In many cases, these are offered in different modes of delivery, in an attempt to reach more students nationally and internationally. The need to focus on the professionalization of research supervisors has also become clearer, and more professional development is being provided worldwide. In addition, a recent emphasis has been placed on the low employability of doctoral students. Thus, raising the need for students to develop the right doctoral skills to help them to make a smooth transition into work, in academe or outside of it, even though, as discussed here, there are international differences in the way in which doctoral skills have been articulated. Nonetheless, it is important that in the current international movement towards reforming doctoral education, we do not become bland, and lose perspective of the importance of the humanities and social sciences in the training of future critical and highly ethical researchers.

In a highly competitive international doctoral market living a global financial crisis, good communication and collaboration at all levels, local, national and international, is going to be the real key to the doctoral education reform success. Thus, we need to work together, at all levels, to support doctoral students, academics and their universities, through the transition into sustainable doctoral education models that are meaningful and effective for their students. More than ever, a move towards doctoral education innovation is necessary to design optimal research learning environments able to educate and train efficiently early stage researchers that will be able to inspire and influence positively our ever changing world, with their knowledge, creativity and adaptability, through times of wealth and through times of crisis. But, most important, early career researchers that will be able to balance their work and personal life, and to be sustainable researchers for the long and, ever escalating, competitive international race that is taking place in the world.

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