Fostering Innovation Skills as Key Competences for Improving Employability of Phds in SMEs

María del Carmen Osuna López[1], Catarina Neto[2], Gonçalo Meireles[3]

Abstract

In recent decades, higher education institutions have expanded at the doctoral level, yet we behold a growing generation with doctoral degrees in Europe. However, studies show that most doctorate holders work in the public sector and particularly in higher education institutions, with few exceptions in Europe such as Belgium and Finland where the distribution of PhDs between higher education institutions and business is more balanced.

In fact, many countries emphasize the importance on achieve high indices of doctorate holders in order to become competitive in the global economy; nevertheless, there still exists a mismatch between formal education and labour needs, that are not fulfilled by higher education curricula.

iSkills project supports the effectiveness of programs from the European Commission and induces the employability opportunities of doctoral holders in European SMEs by developing an e-assessment methodology (immersive game) that can be implemented at formal, no formal and informal learning contexts.

The idea of the project was based on the partners´ experience with university students and graduates, business context and consultancy, which clearly identified a gap in the innovation skills in PhD students and doctoral holders that limit their opportunities of employability in the private sector as well as the lack of ICT based innovative learning and assessment methods to effectively deliver innovation skills at formal, no formal and informal contexts.

Thus, a common framework will identify and organize skills that PhD students and researchers need to acquire to promote their innovative talent in SMEs, promoting the exchange of innovative pedagogies based on ICT to foster each one of these skills for innovation.

1. Introduction

iSkils – Fostering Innovation Skills as Key Competences for improving Employability of PhDs in SMEs is a project financed by the Transversal Actions (Key Activity 3 – Information and Communication Technologies) under the Lifelong Learning Programme from the European Commission (project no. 543128-LLP-1-2013-1-ES-KA3-KA3MP).

Between November 2013 to October 2015, this project will be carried out by eight institutions from five countries in the European Union, namely: Spain (Fundación General Universidad de Granada Empresa – as project coordinator –; EMOTOOLS S.L.; Scienter CID), Finland (Aalto University School of Arts, Design and Architecture, Western Finland Design Centre MUOVA), Germany (NTL Neue Technologien Und Lermen e.V.), Portugal (Advancis Business Services Lda.) and Greece (Militos Emerging Technologies and Services; Crystal Clear Soft – CCS).

This project intends to contribute to the development of innovation skills of PhD students and doctoral holders by developing an e-assessment methodology (immersive game) that can be implemented at formal, no formal and informal learning contexts.

The idea of the project was based on the partners´ experience with university students and graduates, business context and consultancy, which clearly identified a gap in the innovation skills in PhD students and doctoral holders that limit their opportunities of employability in the private sector as well as the lack of ICT based innovative learning and assessment methods to effectively deliver innovation skills at formal, no formal and informal contexts.

Thus, a common framework will identify and organize skills that PhD students and researchers need to acquire to promote their innovative talent in SMEs, promoting the exchange of innovative pedagogies based on ICT to foster each one of these skills for innovation.

---

[1] Fundación General Universidad de Granada Empresa, Spain
[2] Advancis Business Services, Portugal
[3] Advancis Business Services, Portugal

2. Innovation skills

Countries have long recognized that education and skills of the labour force are the underpinnings of innovation. Learning, employability skills and the so-called "transversal skills" are increasingly important to contribute to organizations´ innovation performance, but not the only topics to consider as need to be complemented with innovation skills that put more emphasis on creativity and continuous improvement skills, risk-taking skills, relationship building skills and implementation skills.

Innovation skills can be defined as the set of abilities, proficiencies, competences or attributes that contribute to the implementation, transference and management of new products, processes, marketing methods, or organizational methods in the workplace (OECD, 2011).

Actually, according to the OECD (2011), the issue of identifying a targeted group of "skills for innovation" remains.

In fact, many innovation and skills surveys (OECD, 2011) have identified important innovation skills shortages in high qualified workers in firms. For example, INSEAD (2009) judged Europe to be underequipped with "*global knowledge economy*" talent, including capacity to innovate, ability to lead in cross cultural environments, ability to manage teams, and capacity to address new issues.

The low level of innovation skills of high qualified individuals and the difficulties of SMEs to recruit qualified and suitable human capital are today common concerns for all European countries as it has been recognised in European Commission communications.

Then, the importance of improving innovation skills and reducing the skills mismatch between education and labour market are part of the European Strategy 2020 once addressing the innovation skills acquisition by PhD students and doctoral holders is a way to improve their labour insertion in SMEs.

3. Employability of doctorate holders in SMEs

In the last 10 years, Portugal, Spain and Greece experienced the highest growth of the doctoral degrees in Europe (OECD, 2010). However, the transfer of PhDs to the business sector is still very low in these countries. Contrary, European countries such as Finland, Belgium and Germany have the highest level of employability of doctoral holders (OECD, 2009) and more balanced distribution of PhDs between higher education institutions and business contexts (OECD, 2010).

These data prove that although there has been an important growth in the rate of doctoral degrees in Europe, the capacity of labour market to incorporate them is reducing. As main contractors of doctorate holders, Universities and the academic context in general were reached by the current economic crises forcing a straight reduction of resources.

SMEs can contribute to prevent the waste of high qualified human resources at the same time that improve their competiveness in the global economy. In fact, SMEs play a key-role in most economies, in that they constitute the largest business block and provide the bulk of employment. However, despite doctorate holders count with high level of technical knowledge that allow them to become good researchers in the academy context, they lack many innovation skills demanded by firms to be competitive (such as managerial and entrepreneurial skills).

One of primary barrier to innovation faced by SMEs is finding qualified, suitable human capital (Tiwari et al. 2007). At some extent, these difficulties can be related to the lack of applicants with specific knowledge and qualifications, but they also reflect broader concerns about a lack of well rounded candidates with innovation skills.

Still, the recruitment of PhD students and doctoral holders by SMEs is a key mechanism of knowledge and innovation transfer from academia to society that needs to be fostered.

4. ICT based assessment and innovation skills

E-assessment or ICT based assessment is a field with widely researches in US and Canada but that still needs to be explored in Europe, especially more advanced forms of e-assessment methodologies such as immersive games. Immersive games for learning are defined as "applications using the characteristics of video and computer games to create engaging and immersive learning experiences

for delivering specified learning goals, outcomes and experiences" (Freitas, 2006); related or synonymous terms include educational games, video games, serious games, game based learning and instructional games.

As an innovative pedagogical method, e-assessment or ICT based assessment methodologies allows learners to develop a set of skills in virtual environment that properly retracts real life conditions. "Embedding learning and assessment into computer simulations, virtual laboratories and games takes the learning process even further by enabling students to develop their scientific enquiry, analysis, interpretation and reflexion skills in a real-life contexts" (EC Working Document, 2012).

Although there are evidences of a growing trend towards curricula based on transversal competences across European higher education institutions, changes to curricula have not totally consider assessment methodologies yet.

The current assessment of key competences and innovation skills is still much focused on traditional methodologies such as standardised tests and attitudinal questionnaires, very effective for summative purposes, but very limited for encouraging the development of these specific innovation skills by learners. Moreover, these traditional methodologies are not effective when they are used outside of the formal learning contexts (such as the working context).

In fact, studies show that by simulating real life contexts as well as trial and error in repeatedly sampling performance, immersive games offer plenty of opportunities for assessing (summative role) and fostering (formative role) skills in a pleasant and highly effective manner. Moreover, experts point out these more complex forms of e-assessment methodologies as more adequate to be applied to innovation skills (such as risk-taking, relationship-building, creativity, etc) and to be implemented at any learning context (Universities and working context).

5. iSkills - Objectives and main results

iSkills aims ultimately to contribute to the development of innovation skills of PhD students and doctoral holders by developing an e-assessment methodology (immersive game) that can be implemented at formal, no formal and informal learning contexts in order to promote the employability opportunities of these individuals in SMEs and, finally, to contribute to the effective implementation, transference and management of innovation processes in these organizations.

Dedicated to understand the phenomenon of innovation skills lacks in doctoral students and holders and to devise a proper response by making use of the resources that the new ICT can provide, iSkills project consortium proposes to:

a. Define a list of the most relevant capacities for innovating (i-skills) that should be acquired by PhD students and researchers to improve their employability in the private labour market, especially in the SMEs.

b. Validate these i-Skills with the companies (SMEs), starting from the demands and expectations these companies might have in relation to the key competences required for the innovation.

c. Identify best practices in the use of advanced forms of e-assessment (mainly immersive games, but also computer simulations and virtual laboratories or worlds) for the development of i-skills within formal, non formal and informal learning contexts in European and non European countries.

d. Design and develop an e-assessment methodology (immersive game) to foster the selected innovation skills in PhDs students and researchers and that can be implemented at formal (Higher Education), non formal and informal learning contexts (work).

e. Perform several pilot experiences with real academic groups (PhDs students and doctoral holders) within the partners´ Universities with a goal of collecting the real experiences and looking for a validity confirmation within the target groups involved.

f. Create the final version of the e-assessment methodology (adjusting contents and technical requirements in base to the piloting results) in order it can be replicable, scalable and

accessible to other individual learners across Europe in formal, non formal and informal learning environments.

g. Elaborate a toolkit for i-skills facilitators with practical information sheets and recommendations to be used by University professors, trainers, managers, Human Resource Management professionals at SMEs, PhD students and doctoral holders interested for implementing the e-assessment methodology in academic and business contexts.

h. Organize national workshops and a final teleconference at European level in order to disseminate the results and to facilitate the training in i-skills framework and the i-skills e-assessment methodology to key actors at national and European level.

i. Design a web based community of practice to promote an active exchange of experiences and to facilitate the access to these innovative practices to other European learners, University managers and teachers, HRM professionals and policy makers. This portal will contribute to create a community of experts and professionals interested in this topic in Europe that can be sustained after the project life.

6. Discussion and Conclusions

Some of the most common strategies and policies to improve labour markets responsiveness in Higher Education area include the use of workplace training components, the involvement of employers and unions in curriculum development, the exchange of trainers and teachers between Higher Education Institutions and industry and the strengthening career services within Universities to promote knowledge about scientific careers with a business orientation.

However, this seems to be short, answering to high indices of doctorate holders and low indices of their employability.

Thus, there has been made many advances in the definition and implementation of frameworks of transversal competences (such as the European e-Competences Framework, SHL Universal Competence Framework, Dublin Descriptors, EU Framework of Key Competences for Lifelong Learning, the European ESCO framework, etc), though Europe still lacks an agreed framework of specific skills for innovation in SMEs that can be applied to any level of education and training.

Therefore, improvements with the referred agents – HEIs, SMEs and doctoral holders - should be performed as the current situation can be considerably improved, by acting in two main directions: answering to the mismatch between doctorate holders actual skills and SMEs needs; and, the purpose of SMEs to improve their productivity and competitiveness as result of the improvement of the innovation abilities of their human capital.

7. References

[1] European Commission (2007). EC Communication: e-Skills for the 21st century: fostering competitiveness, growth and jobs. EC, available at http://ec.europa.eu/enterprise/sectors/ict/files/comm_pdf_com_2007_0496_f_en_acte_en.pdf (accessed 14 December 2012).

[2] European Commission (2010). Communication from the Commission: EUROPE 2020 - A strategy for smart, sustainable and inclusive growth. EC, available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF (accessed 14 December 2012).

[3] European Commission (2011). EC Communication: Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems. EC, available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0567:FIN:EN:PDF (accessed 14 December 2012).

[4] European Commission (2012). Commission Staff Working Document: Assessment of Key Competences in Initial Education and Training. EC, available at http://ec.europa.eu/education/news/rethinking/sw371_en.pdf (accessed 14 December 2012).

[5] Freitas (2006). Learning in Immersive worlds: A review of game-based learning. JISC e-Learning Programme, available at http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/gamingreport_v3.pdf (accessed 14 December 2012).

[6] INSEAD (2009). European e-Competence Curricula Development Guidelines. INSEAD, available at http://www.insead.edu/facultyresearch/centres/ecompetences/library/documents/EeCCGFinalReport16Mar10.pdf (accessed 14 December 2012).

[7] OECD (2009). OECD Science, Technology and Industry Scoreboard 2009. OECD publications, (Chapter 5).

[8] OECD (2010). Careers of Doctorate Holders: Employment and Mobility Patterns. OECD, available at http://www.uis.unesco.org/ScienceTechnology/Documents/44893058.pdf (accessed 14 December 2012).

[9] OECD (2011). Skills for Innovation and Research. OECD publications, (Chapter 5).

[10] Tiwari, R., & Buse, S. (2007). Barriers to Innovation in SMEs: Can the Internationalization of R&D Mitigate Their Effects? EC, available at http://iri.jrc.ec.europa.eu/concord/2007/papers.html (accessed 14 December 2012).