

- [13] O-Saki, K. M (2007b). Science and Mathematics teacher preparation in Tanzania: 1966-2006: Lessons from teacher improvement projects in Tanzania, 1965-2006. In: International Journal of Education, Naruto University, Japan. Vol 2, 51-64.
- [14] Krotto, H., Why science education is an ethical issue; The Independent newspaper, (UK) 12 May, 2011



## WOMEN, SCIENCE AND ENTREPRENEURSHIP. HOW THE ACADEMY CAN (OR NOT) CHANGE THEIR LIVES? X

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**Abstract.** *Entrepreneurship brings new and important challenges to the University that are related to their ability to develop an entrepreneurial mindset and entrepreneurial culture and innovation. In turn, the profile of the graduate in Portugal is mainly female in many areas of knowledge. However, according to a recent study on promotion of innovative women and entrepreneurship, one of the main obstacles that explains the lower participation of women in entrepreneurial activities of innovative nature are related to educational choices pursued in the formal education system, perspectives and traditional stereotypes about women, science and innovation. It is our goal to discuss how the academy can (or not) change the life of graduates considering the fact that social capital remains crucial in the choice of innovative sectors and of intensive knowledge for starting-up a business, and that women's options continue to remain anchored in the traditional sexual division of labor.*

**Keywords:** Entrepreneurial potential, Higher education, Social and sexual division of the labor market, Gender.

### 1. Introduction

The promotion of skilled female entrepreneurship policies, despite its economic and social relevance, is in an early stage of development in most of European States members. In terms of public policies in economic and business, promoting female entrepreneurship emerges as a factor of mobilization of women for

active economic life, as well as a strategy to support business initiatives, particularly as factor conducive to the promotion of equality between men and women. According to a recent study on the promotion of innovative women and entrepreneurship [1], one of the main obstacles that explains the lower participation of women in entrepreneurial activities of an innovative nature are related to educational choices pursued in formal education systems and persistency of traditional stereotypes about women, science and innovation. Also, in comparison to men, women not only possess a lack positive attitude about their own personal capacities or inclinations for starting businesses, but also have less personal contact with entrepreneurs [2].

In Portugal, the situation doesn't present itself different. In fact, the main indicators available in the Operational Program for Human Potential (POPH 2017-2013) show an insufficient and unequal participation of women compared to men in the industries of high and medium high-tech, knowledge-intensive services and science and technology. Furthermore, the evolution of graduates in Portuguese universities in recent years reveals the growing demand for higher qualification on the part of women in specific scientific areas, namely, for instance, education, art, humanities, social sciences, law and health care. Moreover, since the 1990's, graduates and postgraduates have been facing major changes in the transition from university to the labor market and also in employability profiles, particularly female graduates [3].

This means that entrepreneurship brings new and important challenges to the University related to its capacity, together with other collective institutional actors (e.g. economic, social and political), to develop an entrepreneurial mindset and a culture of innovation in order to change the pattern of productive Portuguese specialization. Plus, entrepreneurship as an alternative professional career for young graduates could be an important way of facing current difficulties related to the access to the labor market as well as protecting against the (risk of) unemployment, especially for those seeking employment, or even for those who are in a vulnerable situation of potential exclusion from the labor market (e.g. females, young or older workers).

Current debates about the feminization of higher education and the modalities of flexible specialization and a productive economy have sustained the recurrence of "male imperialism" in

domains linked to top technologies and innovating sectors and based on 'desirable' attributes such as income, prestige and job stability [4]. Therefore, facing a predominantly female graduate profile in many areas of knowledge of higher education, it is important to analyze the relationship between entrepreneurial characteristics, academic, social and cultural backgrounds, bearing in mind that the arrangements for access to employment, the development of a career and cultural patterns associated with organizations are still strongly dominated by a patriarchal and male rationality [5, 6].

In this paper, we make use of some empirical evidence focused on women, science and entrepreneurship in the scope of the ongoing project "*Potential for entrepreneurship at the University of Minho. Careers after higher education*" (2010-2012)<sup>1</sup> in which it was intended, firstly, to address the shortcomings of existing empirical studies on the topic of entrepreneurship, through a research of the entrepreneurial potentials of higher education graduates; and secondly, to understand the important role of higher education in developing knowledge and skills that influence the manner in which they shape the processes of professional transition.

The methodological design combined both quantitative and qualitative approaches. In the first methodological stage, an online survey was applied to a universe of 1,419 graduates from the University of Minho (North of Portugal), who terminated their course between 2002 and 2008. These graduates are from 43 courses that were grouped into six scientific areas, according to the Portuguese National Classification of Education and Training Areas (2008) as: "Education", "Humanities", "Social Sciences and Law", "Science and Computing", "Engineering" and "Health and social care". The obtained sample resulted in a 20% share quota, totaling 283 valid surveys. In the second methodological stage, in-depth interviews of the graduates who participated in the first stage of this research, especially those with "high entrepreneurial potential" (in total 8 interviews) took place.

<sup>1</sup> It is a study on the theme of entrepreneurial potentials among young graduates at the University of Minho (North of Portugal), developed by Spin-off Laboratory MeIntegra and CICS/UM (Research Centre for the Social Sciences, University of Minho). More information about the MeIntegra Lab in the website: <http://www.meintegra.ics.uminho.pt/>.

It is our goal to discuss how the academy can (or not) change the life of graduates considering the fact that social capital remains crucial in the choice of innovative sectors and of intensive knowledge for starting-up a business, and that women's options continue to remain anchored in the traditional sexual division of labor. Specifically, we intend to analyze the contribution of both social capital and gender variables for the explanation of different perceptions and experiences in relation to employment and entrepreneurship.

In fact, to some extent, empirical results indicate that the intention of becoming an entrepreneur varies according to several factors, mainly by the sex of the graduates. Also, gender differences provide insight into how unequal they stand in relation to entrepreneurship, in particular on aspects such as the propensity for entrepreneurship, enterprising, the activity sectors and motivations for self-employment, among others.

This paper is organized in three main parts. In the first, we point out significant changes in the (re) configuration of higher education and in the professional transition process emphasizing the role of entrepreneurship education. In the second, the exploration of substantial information allows us to characterize the socio-graphical profile of graduates, including their main motivations and preferred sectors for an entrepreneur activity. In the third, we present the structure of disposition for entrepreneurial activity by graduate's profile perceptions in order to highlight two main portraits.

## 2. Entrepreneurship and transition to work

Entrepreneurship education and transition to work are central whether in the context of transnational processes of human resource qualifications and job creation whether in the framework of a de-regulation of wage relationships and the increasing rates of sub-employment and unemployment.

The expansion of higher education and the gradual increase of graduates have been followed by empirical evidence that points to the possibility of obtaining a qualified job linked to higher instruction levels. We may presume that many of these young workers in the beginning of a career and holders of high academic qualifications, base their professional performances on autonomy and creativity, and that they also hold high organizational and

professionals expectations, particularly in highly competitive and innovative sectors.

However, access to the labor market does not present itself as being uniform and stable to most young adults. Research on academic and labor markets tends to focus on both the persistency of gender segregation and on social inequalities in access to employment and career. As many research publications on socialization show, particularly those focused on family and school, young women have made and continue to make "bad" choices concerning degrees and/ or specialization courses, with obvious impacts on their employment [7]. Indeed, the largest and best academic qualifications attained by women have not reflected improvements in their participation in the job market, continuing to maintain horizontal and vertical segregation, particularly reflecting negatively, the access to managerial positions and equal remuneration. There are a huge proportion of females in humanities and social sciences, which clearly explains the strong link between gender and professional activities, closer to the traditional definition of feminine tasks (e.g. administrative staff, public relations, marketing, teaching, health care). Such choices have therefore led to the exclusion of women from positions of authority and responsibility in domains such as economics, finance and politics, or linked to top technologies and innovating sectors with economic and symbolic prestige

In fact, the majority of European countries have already pointed out a range of specific challenges and obstacles faced by innovative women in setting up, running and expanding a business, including within the science and technology sectors [1]. One of them is related with women's educational choices, and women's horizontal and vertical segregation in employment. For instance, the number or stock of women that could potentially set up a business in science and technology or turn an invention into a profitable market product is lower than the number of men. Also science and technology, innovation and inventions are concepts mostly associated with men and male areas making these fields less attractive to women, resulting in women-related invention and innovation being less recognized as valuable business ideas. Furthermore, many of the stereotypes about women's credibility and professionalism mainly in male dominated sectors like in science and technology remain untouched. In fact, there continues to persist,

traditional points of views regarding women's roles in society and in private life, especially related to the domains of domestic and family responsibilities.

For that reason, in last few years at both the European and national levels, public policies have been directed towards promoting female entrepreneurship, in order: 1) to put an end to gender inequalities, 2) to overcome stereotypes in the labor market, promoting a better balance between work and private life and 3) to strengthen and promote equality between men and women. Actually, the European Commission has developed several initiatives that promote female entrepreneurial activities, such as, for example: European Network of Mentors for Women Entrepreneurs; Female Entrepreneurship Ambassadors; Law of SME (Small Business Act); Promoting opportunities through Women's Entrepreneurship Portal (e.g. mentoring schemes to foster entrepreneurship among women graduates, fostering benchmarking exchange); and Financial support by specific programmes.

Additionally, it is important to include in this discussion the current (re) configuration of the professional transition processes of graduates which cannot be dissociated from the "new" emerging risks [8] of individualization, precariousness and vulnerability of employment relationship. Therefore, we are witnessing phenomena regarding the extension in the time of studies (initial training and lifelong learning), as well as intermediate and precarious positions until the achievement of a stable position in the labor market [3]. The duration of these processes becomes itself a structuring factor of occupational transition, defined by the diversity of situations, statutes or conditions (e.g. fellow researcher, trainee, independent worker) that prevail in recurrent situations of vulnerability and precariousness in relation to employment. Also, these practices and references related to professional transition extend through non-linearity, resulting in a desynchronization of the various axes of professional emancipation, personal and family life. In fact, the demarcation lines between work, leisure, education and care have been blurred, leading to increased mobility and flexibility, de-standardization of the course of life and to an overall focus on employability. In this context, the instability, risk and uncertainty to predict or plan the future, as well as the increasing of flexibility/ precariousness of the labor market, have forced a change of

attitudes in the career choices of young adults, providing a favorable environment for the creation of self-employment, which explains the renewed interest in entrepreneurship as an alternative for professional transition or facilitating the access of graduates to the labor market. The basis of their choices strengthen the motivation structures based on the difficulties in their integration into the labor market of their specific professional area, in the absence of specific enterprises and also in the attraction for autonomy and independence. Moreover, the lack of well-known reference models in society, the current image projected by the media regarding entrepreneurs and SMEs, and the weak encouragement from educators may be an obstacle to entrepreneurship by young people.

As a result, education institutions and more specifically higher education institutions play an important role in overcoming the barriers to achieving these options throughout schooling paths. In fact, substantial increases in qualified unemployment, the difficulties in accessing employment combined with the need to provide a higher employability profile to graduates, have forced higher education institutions to encourage and train not only good employees for organizations, but also good entrepreneurs able to create new companies and detect business opportunities. Therefore, as agents of change, these institutions can adopt a more systematic strategy of education for entrepreneurship, namely on one hand by encouraging the development of technical-scientific and cross-cutting skills through training activities (formal, non-formal and extracurricular), and on another hand by fostering an entrepreneurial and innovation culture in students or graduates that allow them to respond successfully to the challenges of the labor market [9].

### 3. Characterization of entrepreneurial potentials of graduates

Focusing our analysis on the entrepreneurial potentials of graduates, we depart from the social characterization of individuals, following by analyzing graduates' motivations for an entrepreneurial activity.

We have defined "high entrepreneurial potential" for those graduates who have thought/ wished in some point of their educational trajectory to be a business person (entrepreneur) or an independent work (self-employment).

The exploitation of socio-graphic data of graduates from the University of Minho confirms that we face a relatively young population with an average age around 29 years old. The structure of the sample by gender shows a significant difference between women (60%) and men (40%), revealing a high rate of feminization in courses at the University of Minho (North Portugal), following the current trend in national higher education. Indeed, the unequal presence of women in the entrance and exit of the higher education system can be explained by the prevalence of gender stereotypes, anchored in a process of "naturalization" of gender roles [10], contributing to a diversified presence of academic pathways by gender. As a result, this confirms the major presence of women in Education and Social Sciences, although there is a clear segregation by course, since the courses of English/ German Teaching (100%), Education (88%), Media (88%) Psychology (81%) and Sociology (80%) had a higher weight of female participation. However, there are courses where there is a more even balance between men and women as is the case of Optometry and Vision Sciences (both sexes with 50%), Civil Engineering (46% for males and 54% for females) and Management (47% for males and 53% for females).

The data collected in research allows us to assume a high entrepreneurial potential by the graduates, - the majority (73%) of graduates reveal that at some point of their academic path wish/think to create their own business or self-employment. However, this trend is different, even if not very large, by sex, with female graduates possessing a relatively lower propensity for self-employment (67,9%) as opposed to their male colleagues where this percentage rises to 79,8%. Female graduates of the "Humanities" area (50%) were those that demonstrated a lower propensity for starting-up a business project. The higher disposition for entrepreneurship has become more evident in the areas of "Social Sciences and Law" (77%), "Engineering" (75%), Education (73%) (Table 1).

It is also important to note that the higher education system remains selective by the social backgrounds of families, as well as by the sex of younger candidates. Indeed, more than 40% of the parents of young graduates have only four years of schooling and developed skills or

unskilled activities namely as dependent employees. Young people whose families hold an academic degree still present a lower weight: father (17%), mother (19%) (Table 2).

**Table 1.** Thought/ wished self-employment (only yes answers %). Source: Potential of entrepreneurship at UM Survey (2010)

Scientific area	Education	72,9
	Humanities	50,0
	Social Sciences, Trade and Law	76,9
	Sciences and informatics	67,3
	Engineering	75,0
	Health and Social Protection	66,7
Sex	Male	79,8
	Female	67,9
		(N) 197

**Table 2.** Entrepreneurial potentials by father's socio-professional categories (%). Source: Potential of entrepreneurship at UM Survey (2010)

Parents profession	Yes	No
Businessperson, Leaders and Independent Workers	77,5	22,5
Professionals and Technicians Specialists	82,1	17,9
Traders and small sellers	38,9	61,1
Workers (labourers)	76,2	23,8
Unskilled Workers	53,3	46,7
Others (not classifiable)	75	25
Total	(N) 130	(N) 49

As result, it is possible to stress as a main feature of this sample a critical segmentation of graduates by course/ scientific area considering both sex and social backgrounds of families of the respondents.

**Table 3.** Motivations for an entrepreneurial activity (%). Source: Potential of entrepreneurship at UM Survey (2010).

Female	Male
Desire for new challenges (54%)	Desire for new challenges (61%)
Difficulties to find a job in course scientific area (31%)	Perspective of earning more money (48%)
Perspective of earning more money Reconciliation between work and private life (both 24%)	Idea for a new product or service (29%)

Finally, the motivation for entrepreneurial activity is also different by sex. Thus, the

difficulty in finding a job (31%) and better balance between work and family life (18%) as important reasons for starting a company were more present in women than in men, in turn, when the base is the individual opportunity (desire for new challenges/be your own boss and the perspective of earning more money (instrumental dimensions of work), although there was no sex gap, this dimension gathers most significant weight in men (Table 3).

Regarding the sectors which preferred-oriented entrepreneurial activities, respondents chose the following: 29,4% in education, health and social care; 27,4%; in culture, tourism, communication, technology, marketing, biotechnologies, etc.; 17,3% in trade, accommodation and restaurants; 14,2% financial activities, renting and services to enterprises.

In the next section, we will deepen our knowledge related to the structure of gender-perceptions by using information gathered through in-depth interviews.

#### 4. Entrepreneurship potential: two main portraits

Today, finding a job is also becoming more difficult for young graduates. However, the options for self-employment or starting-up their own company can be perceived as an alternative for inclusion in the labor market.

Based on a simple statistical analysis, we divided the potential entrepreneurs in two standard profiles. Table 4 summarizes the distribution of entrepreneurial graduates into different groups: traditional and innovative ones.

Profile 1 entitled – “Traditional entrepreneur potentials” - is mainly composed by women graduates from two scientific areas: “Social Sciences and Law” and “Education”. This profile includes young graduates who belong to families of workers and not qualified workers, which have lower educational levels. The sectors more attractive for an entrepreneurial activity are feminized sectors, such as – “Education, Health and Social Work” and “Trade, Accommodation and Food Services”. The difficulty to find a job in course and the better conciliation between work and private life, are the main reasons pointed out by graduates to advance into a self-employment project.

**Table 4. Structure of entrepreneurial dispositions by type-profile. Source: Potential of entrepreneurship at UM Survey (2010)**

	Profile 1 Traditional entrepreneur potentials	Profile 2 Innovative entrepreneur potentials
Gender	Female	Male
Social background	Lower educational level of parents From families of Workers and unqualified Workers	Parent's higher scholar capital From families of Business people, Leaders and Independent workers Middle and Senior Technical Staff
Scientific area	Social Sciences Education	Engineering
Preferential sector for self- employment	Traditional, unskilled and feminized sectors: Education, Health and Social Care; Trade, Accommodation and Food Services	Innovators, skilled and masculinised sectors: S&T; Financial Activities, Consultancy, Renting and Services to enterprises
Motivation for self- employment	Means to ensure economic survival: difficulties to find a job in course scientific area; better conciliation between work and private life.	Opportunity and Innovation, ambition to apply the knowledge acquired during the course: desire for new challenges; autonomy (being your own boss); perspective of earning more money; idea for a new product / service.

Otherwise, profile 2 - Innovative entrepreneur potentials – is mostly composed by young male graduates from Engineering courses. They belong to families of business people, directors/leaders and independent workers, and their parents have higher education levels. As its name suggests, this profile has graduates who aim to develop businesses in innovation domains, choosing to create their own business project in knowledge-intensive sectors such as, for example: “Biotechnology”, “ICT – Information and Communication Technologies”, among others. Their main motivation is opportunity – (the desire for new challenges, autonomy, being your own boss, earning more money) and the will to innovate (through ideas for new products or services). From the in-depth interviews of graduates who participated in the first stage of our research, we intended to deepen some information considering

three analytical dimensions: 1) projects and motivations for self-employment; 2) favorite activity sectors for self-employment; 3) perception of obstacles in entrepreneurial process.

Analyzing interview data we can check cleavages by gender in the motivations for self-employment as we have already explained in previous section. For example, in the 1st statement – this man stressed that the motivation for self-employment does not come from the lack of employment, but rather by the desire for new challenges. He underlined: “I can give several reasons to advance, but none is a matter of employability. It is really for enjoyment (...) I’m just not able to teach, I can do other things, and I have a talent for that (...)” (I2, Man, Biology/Geology Teaching).

In the opposite direction, the 2nd woman interviewed revealed that the choice for entrepreneurship appears as an alternative to unemployment: (...). Look... I’d liked, for example to start-up a FTA Leisure Centre (Free Time Activities), or a kindergarten. For now, because I really love children... and I think it is increasingly difficult to find employment (...) and I am going to have a son and I know it is increasingly difficult to find a kindergarten, for example, (I3, Female, Sociology).

In the statement of another interviewed woman, it is possible to highlight the difficulty of taking risks alone, which explain the option of searching for a job and working for someone else. In fact, she said: “Alone I felt that I was not in a good financial position, nor personal, nor professional, to start-up a project by myself, so I chose not to do it and I opted to search for a job in a company” (E7, 30 year old female, Education).

Considering the professional sectors preferred for self-employment, the interviews corroborate the same trend of our typological essay. Men and women choose different options. Women choose traditional feminized sectors, mostly related to the care services; on the other hand, men tend to choose entrepreneurial activities in technological and innovative sectors. We can therefore underline this trend looking at the following statement obtained from a woman graduate in the Education course who wants to create a business in the cloth trading area. Her main propose is not to create anything new. In fact, she said: “My business sector is clothing, that is, creating a clothing line (...) we will bet on this project

because we have a certain facility, in other words, financial facility, (this project) did not require much investment (...). This project is small, i.e., is not anything new... we are trying something and seeing if it works" (E7, 30 year old Female, Education).

In contrast, a man from an engineering course aims to provide environmental services in the area of training: "I chose to create a company related to environmental engineering services, because of the basic training and knowledge that I have in this area (...) I thought that we could foster better services. I also had personal research and development projects so it made sense for us to launch this service "(E8, 30 year old male, Environmental Engineering).

Finally, considering the perceptions of those interviewed about obstacles or critical factors for entrepreneurial activities, it is possible sustain those two portraits of entrepreneurial potentials.

In fact, the male interviewed from the Sociology area remarked that the only way to overcome obstacles is by taking risks: (...) you must not be complacent; you must always want new challenges, new experiences, learn a lot... learn more, even if you may need to take risks, I believe this is the only way we have to overcome obstacles, isn't it? Taking risks... " (E4, 29 year old male, Sociology). On the other hand, the other male interviewed from the Environmental Engineering area thinks that the main obstacles are related with the development of the business project (funding, clients, competition, etc.). He said: "These are issues of funding, to attract new customers, validation of our products and distinguishing them from the competition, issues of price, because there is some unfair competition in these technical services... essentially..." (E8, 30 year old man, Environmental Engineering).

The last statement by a woman from the Education course is very important because she has acknowledged the existence of gender stereotypes in the business world. About this, she said: "I think that when a woman presents herself (in the business world) and, in quotation marks, wants to assume leadership like a man... people are more receptive to a man than a woman, I think this stereotype is still accepted broadly in society however, there have been changes and mentalities will change (...) but... I'm not exactly afraid of that "(E7, 30 year old female, Education).

Based on these statements, in this paper we intended to answer the following question: How the Academy can (or not) change their lives? How do women and men who belong to different scientific courses perceive and justify their strategies regarding a potential entrepreneurial activity? This paper aims at deconstructing the main stereotypes, preferences, prejudices and entry barriers to the job market [4] that continue to influence women and men's "choices", which profoundly determine their relationship with employment and entrepreneurship.

#### 4. Final Remarks

Entrepreneurship can play the logic of segregation (in horizontal and vertical) of the labor market and at the same time constitute an obstacle to innovation. Furthermore gender inequalities spill over into all aspects of life, raising significant questions regarding either the structuring of labor markets and its efficient utilization of human resources, or of the reconciliation of work and family life, and of wider social aspects such as justice and citizenship. It is also important to consider other factors besides the social background, such as gender and degree course (among others).

Given the information systematized in two main portraits of potentials entrepreneurs, namely traditional and innovative ones, it is important to highlight the following key ideas: first, there are cleavages by gender, scientific areas/courses and social background; second, opportunity vs. need to structure main motivations for the choice of entrepreneurial careers; third, gender-persistency of activity sectors more attractive to self-employment/business (male and female oriented sectors); perceptions of obstacles and critical factors in the entrepreneurial process (e.g. lack of companies/ jobs, insufficient support and financial incentives, infrastructures, models of organization and management and organizational culture) and the entrepreneurial education effects in career paths namely in decisions on future career alternatives.

Therefore, despite the growing feminization of the labor market, data on graduate profiles by course/ scientific area, as well as personal expectations regarding an entrepreneurial activity were exploited in this paper. However, this analysis reveals why it is important to move towards research designs that highlight how some activities (curricular and extracurricular) in an academic context can foster the

entrepreneurial spirit, as well as contribute to reflections on the importance of higher education to foster the entrepreneurial potential and the development of cross-cutting skills for enhancing employability of graduates. In fact, further research and monitoring and evaluation mechanics are required regarding the relationship between the university and the labor market, productive/ professional and domestic/ family spaces in order to understand and explain structural, organizational, interactive, and symbolic-cultural persistency of social and gender asymmetries.

### 5. References

- [1] European Commission Enterprise and Industry: Evaluation on policy: promotion of women innovators and entrepreneurship. Final Report, GHK, EC Enterprise and Industry; 2008. [http://ec.europa.eu/enterprise/newsroom/cf/\\_getdocument.cfm?doc\\_id=3815](http://ec.europa.eu/enterprise/newsroom/cf/_getdocument.cfm?doc_id=3815) [18/03/2010]
- [2] Kelley Donna J, Brush Candida G, Greene Patricia G, Litovsky Yana: 2010 Report: Women Entrepreneurs Worldwide; 2011. <http://www.gemconsortium.org/docs/download/768> [28/07/2012]
- [3] Marques AP, Alves, MG, editores, Inserção Profissional de Graduados em Portugal. (Re)configurações Teóricas e Empíricas. Famalicão: Editora Humus Lda./ CICS – Universidade do Minho; 2010.
- [4] Bettio F, Verashchagina A: Gender segregation in the labor market. Root causes, implications and policy responses in the EU. European Commission's Expert Group on Gender and Employment (EGGE), European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities; 2009.
- [5] La Domination masculine. Bourdieu P. Editions du Seuil; 1989.
- [6] Hirata H, Rogerat C. Technologie, qualification et division sexuelle du travail. *Revue française de Sociologie* 1988; XXIX:171-192.
- [7] Reimer D, Steinmetz S. TEINMETZ, Gender Differentiation in Higher Education: Educational Specialization and Labor Market Risks in Spain and Germany. Working Paper (99). Universität Mannheim 2007.
- [8] Risk Society: Towards a New Modernity. Beck U. London: Sage Publications; 1992.
- [9] Marques AP, Moreira, R. Empreendedorismo na Universidade do Minho. O potencial empreendedor dos diplomados do ensino superior numa perspectiva educativa. In *Actas do II Encontro de Sociologia da Educação; Instituto de Sociologia FLUP e Secção de Sociologia da Educação da APS*; 2011. pp 373-386. <http://hdl.handle.net/1822/15247>.
- [10] Marques AP, Moreira, R. Transição para o mercado de trabalho: empreendedorismo numa perspectiva de género. In *Actas do XVII Encontro Nacional de SIOT; APSIOT*; 2011. edição em Cd-Rom.



### PRI-SCI-NET AND THE IMPORTANCE OF TEACHER QUESTIONS IN INQUIRY BASED SCIENCE

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The essence of the PRI SCI Net initiative is inquiry based. The project aims to promote the Inquiry-Based approach in Science Education (IBSE) with young children of ages 3-11 years across Europe. It aims to achieve this through providing educational material as well as professional development opportunities for teachers in various ways. The project aims to achieve these objectives by developing hands on science activities, networking teacher and academics across Europe and recognizing and celebrating successful practice and research on IBSE with young children.

Involving learners in the active instruction of their understanding was brought to the attention of science educators by Driver (1983) in her seminal book. Thus Inquiry based science is not new. I was teaching primary and middle school science through challenge-based approach in the 1980s (e.g. Tunnicliffe, 1990). Inquiry based science is however found in a variety of forms ranging from teachers giving the learners an inquiry to follow directing their actions and the equipotent they use through guided inquiry here the resources are provided and an outline given through to real inquiry where the active learners have a challenge or problem and are free to think about what they already know devise an action plan including the human resource and logistic