Bridging the Entrepreneurial and Technology Gap for Women

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INTRODUCTION

In the early 21st century, there continues to be an unbalanced ratio of males to females both studying for and in technological positions in Ireland. For example, computer science is a relatively new discipline. It was hoped that in such disciplines women could establish themselves and would "break new ground in professional access and equity for women" (Pearl, 1995, p. 26). This has not been the case. It is generally accepted that about 20% or less of places in engineering and technology (E&T) courses in Irish third-level colleges are filled by women (Richardson, O'Brien, & Moore, 2002).

Furthermore, as a result of low levels of female participation in E&T jobs, there are corresponding low levels of female participation in technical self-employment. Women in Ireland are 2.6 times less likely to start a business than their male colleagues; females in Ireland are more averse to risk taking and are cautious (Fitzsimons, O'Gorman, & Roche, 2003). This can be attributed to gender-generic factors (Hynes, 1996). These factors include personal profiles, situational and personality characteristics, and self-belief that manifest as barriers to female participation in enterprising activity (GEM, 2004). To overcome this scarcity of technological knowledgeable females in self-employment, it is necessary to determine the source of this problem. This is achieved by interlinking research in these two topics, which are generally researched independently, but when researched together, they add value to and inform the debate in the Irish context. The research involves the identification of the sources of these barriers with a view of devising corrective interventions. It is suggested that the role of education is instrumental in overcoming these barriers. Consequently, in this article, we propose a framework that can be modified to suit the needs of female students.

BACKGROUND

In the Irish context, the number of females entering technology professions is still very low. In a recent report from the European Commission (2003), it is stated that "men graduates are consistently more likely than women graduates to be graduating from Engineering programmes, and, with the only exceptions of Belgium and Spain, from Science, Mathematics and Computing programmes" (p. 45).

Current Status of Female Participation in Engineering and Technical Education

In the second-level school system in Ireland, there has been an improvement in the uptake of science subjects among women. In 2000, 47% of those taking leaving-certificate higher level mathematics, 30% of those taking higher level physics, 56% of those taking higher level chemistry, and 71% of those taking higher level biology were women (Forfás, 2003a). The numbers of women in other subjects that are the basis for further study in E&T are much lower: applied mathematics (21%), engineering (4%), technical drawing (8%), and construction studies (5%). Computer science or information technology is not offered at the leaving-certificate level in Ireland. Furthermore, the number of females entering E&T courses in the third level remains low. In

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2002, in engineering or technology courses, one female accepted a place for every four males (McDonagh & Patterson, 2002).

At the postgraduate level, this downward trend continues. According to Forfás (2003b), only 17.1% of PhD researchers and 20.9% of non-PhD researchers are female. Within the engineering, manufacturing, and construction category, 22.2% of postgraduates were women (European Commission, 2003). On the positive side, while women constitute 39.6% of higher level graduates overall within Europe, their numbers are increasing by an annual average of 4.8% as opposed to 0.9% for men. The growth difference in Ireland is not as great with 6.9% growth for women and 6.0% growth for men (European Commission).

Implications for Business and Society

Although women's influence on project teams can cause significant changes in the design of products, their numbers are too small (even at 20%) to have a continuous significant effect. The construction of infrastructure, both physical and technological, is being carried out mainly by men, yet women make up over 50% of the population (Central Statistics Office [CSO], http://www.cso.ie). The late Anita Borg from Xerox has been quoted as saying, "If women were more involved in creating new technologies, cars would have a place for you to put your handbag" (Smith, 2002, p. 1). Florida (2002, p. 249) argues that "diversity and concentration work together to speed the flow of knowledge." Or, as Trauth (2002, p. 102) states, "women in the IT profession, as a group, are different from men, as a group, in the profession, albeit for sociological rather than biological or psychological reasons." Ultimately, the diversity offered by female influence during technological design is often missing.

Technology-based policies influencing society are being made without women's input. Issues such as privacy and security, the misuse of the Internet, and the location of telecommunications infrastructures are significant. Women currently in the engineering and technology workforce can exert some influence, but women's influence must become more far reaching. Indeed, in Ireland, although there is a government target to have state boards composed of at least 40% women, the figure is closer to 25% (NDP Gender Equality Unit, 2000)

For individual women who are turning their backs on technological careers, the effects are very significant. As the statistics show, the lack of mathematics skills is not a recognised hindrance. Individuals are missing out on rewarding positions offering a variety of tasks that include working with people. These jobs are often highly paid (CSO), with new learning opportunities always possible. Contrary to common belief, it is unusual for careers in this area to be "geeky," antisocial, and boring. The absence of women participating in these disciplines results in lost career opportunities for women, and on a broader scale, results in lost opportunities for industry and the general economy of Ireland.

This loss is further encountered within entrepreneurship. The potential for women to become entrepreneurs in engineering and technology, the high-tech industry, is lost. Women who are capable of pursuing technological careers in established firms fail to transfer this knowledge to the establishment of their own businesses, unlike many of their male counterparts.

Current Status of Female Participation in Entrepreneurship and Small-Business Ownership in Ireland

Statistics suggest that the level of entrepreneurial participation by Irish females at 3.7% is lower than in the United Kingdom or United States (Fitzsimons et al., 2003). In Ireland, women make up only 15% of Irish entrepreneurs, and entrepreneurial participation by women halved between 2001 and 2003 while that of males declined by 26%. This report also found that more educated women are more likely to engage in entrepreneurial activity. While the intention to start a business is high among females in relation to males, the follow up and transition to actually starting a business is much less for females (Fitzsimons et al., 2003).

This compares to an average of 29% of females in Europe who are engaged in enterprising activity (Observatory of European SMEs, 2003). In 2003, Ireland ranked 6th among the 22 OCED countries in terms of women who were thinking of starting a business. However, this ranking slips to 17th place

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