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The Environment for Women in Physics in Ireland

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Abstract. Physics is contributing strongly to the national Irish economy, with 4.5% of the Irish workforce employed in physics-based or other science, technology, engineering, and math (STEM) sectors. However, a recent national report reveals that the proportion of women working in jobs that utilize STEM skills is less than 25% of the workforce. We present data collected from the views of 1,000 female secondary school students, young women (age 18–23), secondary-school teachers and parents on what influences secondary school students' choices of subjects and in particular STEM-related subjects. In addition, benchmarking data on female student and staff ratios for the past five years is presented from all seven Irish university physics departments.

UNIVERSITY STUDENT AND STAFF FEMALE REPRESENTATION

Because of recent initiatives in Irish university physics departments, gender awareness in this sector is increasing. However, there is a lack of national benchmarking data in Ireland in relation to gender issues in physics. The seven national university physics departments are working together to gather data on an annual basis from all the physics departments in Ireland. The data collected differs from any previous data collected as it includes data on permanent academic staff, contract staff, and technical and administrative staff, in addition to research staff. It also considers staff numbers counted as full-time equivalents, thereby offering a more complete representation of female/male staff participation. In general, the participation of women in physics in Ireland is influenced partly by the numbers of females taking national state examinations in physics at the end of secondary school (26% in 2013 [1]) but largely by the numbers of females who graduate with a primary degree in physics. The percentage of females taking final-year undergraduate physics over a five-year period is 24%, while the percentage of female PhD graduates over the same period is 27%, as shown in Fig. 1a and 1b, respectively. Data collated from across the university physics departments reveals, however, that on average only 16% of permanent academic positions in 2013/14 are held by females (Fig. 1c).



FIGURE 1. Representation of females in physics in Irish universities: (a) Percentage of females taking final-year undergraduate physics; (b) percentage of female PhD graduates in physics; (c) percentage of female permanent academic staff in physics.

FEMALE PARTICIPATION IN PHYSICS/STEM CAREERS

A report commissioned by the Institute of Physics [2], identifies that 4.5% (86,000) of the Irish workforce are employed in physics-based sectors and contribute 5.9% of the total economic output. The Central Statistics Office reports that there are approximately 117,800 people nationally working in jobs that utilize STEM skills, and the proportion of women employed in such roles hovers at less than 25%. A recent report, conducted by Accenture [3], into why there are so few women in jobs that utilize STEM skills and what challenges this poses for Ireland has presented the views of 1,000 female secondary school students, young women (age 18–23), secondary school teachers, and parents with daughters in post-primary education. The goal of this report was to understand what influences secondary school students' choices of subjects and in particular STEM-related subjects. The reason for this focus is that secondary school students' subject decisions affect their course choices to third level and ultimately their career opportunities.

The research findings [3] indicate that female students and their parents are struggling to make informed decisions when it comes to choosing subjects in secondary school because of a number of key barriers, including the following:

1. Career stereotypes and negative perceptions about the difficulty of STEM subjects run deep:
 - 44% of students identified “the perception that STEM subjects are more suited to males than females.”
 - 92% of teachers believe that physics is perceived to be much more difficult than biology or chemistry.
 - 30% of teachers/24% parents identified the lack of female role models in the sector.
2. Parents are the primary influences but have difficulty advising their daughters on STEM-related career choices:
 - 68% of parents feel “moderately/poorly” informed on career opportunities and industry needs.
3. Information on STEM careers appears fragmented and is not resonating with students or parents.
 - 48% believe their daughters are poorly informed on STEM related careers.
 - 92% expressed the need for a clearly mapped out career path as important for influencing their daughters.

CONCLUSIONS

Recent education cutbacks have had an adverse effect on student participation in physics at second level. There has been a dramatic decrease [4] in (1) the number of career guidance teaching posts in schools and (2) the number of schools offering physics at upper secondary level (21%).

On average the female participation in physics at school and university level is 25%, and this figure correlates directly with female representation in the national STEM workforce—except in the academic sector, where the averages is only 16%. More needs to be done to help students, parents, and teachers understand the importance of taking up STEM subjects (e.g., physics) as a gateway to a variety of exciting careers for females. The key barriers identified for the number of girls taking physics are ultimately contributing to the shortage of women with STEM skills in the workplace, and this gender gap in physics- and STEM-related work will continue to pose a major problem for Ireland's economic growth in the decades ahead. Without enough skilled workers in STEM roles, Irish enterprises will lack the key talent required to compete domestically and globally.

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