Workshop V: Cultural Perception and Bias/Science Practice and Ethics

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Workshop V: Cultural Perception and Bias / Science Practice and Ethics

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Abstract. Despite the objectivity of science, the local work environment affects the daily activities of scientists. Differences in cultural perception can affect female scientists in the workplace directly. The pressure currently exerted on researchers, on the other hand, is altering how science is practiced and seems to affect women and men differently. In this paper we summarize the discussions that took place on this topic in Workshop V of the 5th IUPAP International Conference on Women in Physics. We present some of the results of the 2010 Global Survey of Physicists analyzed by region and data from France and Taiwan. We also include the recommendations that were formulated at the end of the workshop.

CULTURAL PERCEPTION AND BIAS

Culture permeates all human activities. Despite science's objectivity, the local work environment affects the daily activities of scientists. Differences in cultural perception can affect female scientists in the workplace directly. In Workshop V of the 5th IUPAP International Conference of Women in Physics, Casey Tesfaye from the American Institute of Physics presented the results of the 2010 Global Survey of Physicists, analyzed by region [1]. The regional analysis was restricted to the 12 countries with at least 30 female respondents to the survey. A multilevel analysis considering age, employment sector, gender, and children was applied. The data turned out to be not representative of any nation or region, but rather reflected the respondents' experience. Yet, some global trends were inferred with respect to gender. In nine of the analyzed countries, women had fewer opportunities than men, and in a different 9-country subset, they had fewer resources than men. Regarding career progress, women with children progressed more slowly than men in 8 of the 12 countries analyzed. Interestingly, the percentage of men who perceived that their careers had advanced more slowly was smaller for men with children than for men without children. These findings were consistent among many of the countries analyzed, but not all. Thus, there is something to learn from a deeper study of the differences among countries, but such a multilevel analysis would require data to be collected from a significantly larger number of individuals.

Some countries do have more detailed sources. Detailed data from Europe and Taiwan were presented at the workshop. In Europe, the place of women in society and the workplace varies widely across countries [2]: The number of women in physics research is better in the former Soviet countries as well as in the southern European countries with a "younger" tradition in science. Overall, the male-female ratio has improved in the last decades in most counties, but the pace is very slow. Not many women choose physics for their career.

Women in Physics
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In France, the boy–girl ratio in science classes below age 18 is almost equal. Moreover, girls, on average, perform slightly better than boys. However, they are less likely to opt for mathematics/physics at the university level. The majority of girls who studied mathematics, physics, and biology in high school in France choose careers related to the health sector. Many even opt for literature at university, even though they do well in science. This result seems to indicate the persistence of stereotypes. Furthermore, studies have shown that stereotyping can induce low performance in women. Indeed, the way tests are presented (for instance, with explanations before starting) appears to be connected to the performance of girls (and boys) on the tests [3, 4]. Teacher training should therefore incorporate the use of appropriate evaluations that can make girls feel at ease during testing. The organization of hiring and promotions also affects the careers of women and men differently in France. For instance, in physics research, the male advantage, M (parity: M=1; masculine advantage: M>1) is smaller in the French National Center for Scientific Research (CNRS) (M=1.5–2), where the hiring and promotions are organized in batches (five to eight positions to be filled in similar disciplines), than at the universities (M=2.6–3.0), where positions are filled individually. Following a national survey, the CNRS has since launched a plan to improve the place of women in physics, acting at the levels of the institution, of laboratory management, and of employees themselves [3].

Statistical data collected in Taiwan from 2002 to 2012 shows that the percentage of women graduated from physics departments has not changed much within the last 10 years, despite considerable effort from the Women in Physics committee of the Taiwan Physical Society. The figures stand at around 17% for bachelor's degrees, 20% for master's degrees, and 10% for the PhD. Some plausible reasons for the low figures of women in physics at higher education levels were discussed. Two major reasons cited were "educational system does not favor women," and "cultural bias."

SCIENCE PRACTICE AND ETHICS

The pressure currently exerted on researchers is altering how science is practiced and seems to affect women and men differently. The "publish or perish" culture in academia can clearly conflict with the objectivity of research. In fact, publication pressures have been shown to increase scientific bias [5, 6]. A recent study by Fang et al. finds that female scientists are less likely to commit fraud than their male counterparts [7]. However, it has also been argued that the smaller percentage of fraud cases committed by women is the result of having fewer research opportunities than their male colleagues [8].

RECOMMENDATIONS

The workshop participants formulated several recommendations and observations:

1. The American Institute of Physics should continue conducting its Global Survey of Physicists. Questions pertaining to cultural perception and bias should be crafted into the survey.
2. It is important to reiterate the need to promote and increase the number of women physicists taking leadership positions.
3. For the awarding of prizes in physics, evaluation committees should consider both the performance and the environment (more specifically, the difficulty of women in juggling their role in society, family, and workplace).
4. Educational tests and evaluations at all levels can be gender biased in subtle ways. Examination boards should be aware of the implications, and gender-bias awareness should be incorporated into the training of teachers.
5. More hands-on activities should be offered in school to encourage women to enter into physics.
6. Role models are important in the education and development of children, and parents are often the role models for their children. Parents, as well as industry, should be included in the promotion of science and technology.
7. The mass media should be aware of its role in shaping cultural perception.
8. A workshop on publication culture for young researchers and students would be very useful.
9. IUPAP should adopt a code of conduct for the practice of physics that includes gender awareness, similar to the American Astronomical Society's Baltimore Charter and Pasadena Recommendations.

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