Playing for for Gender, Race and Class Balance. Who will be the leaders in Top Academic Positions in Entertainment Computing?

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Abstract. This paper builds on a set of theoretical references and ongoing projects to propose a set of guidelines that can be used to set up projects to improve inclusion of female and other people at risk of exclusion and in top academic positions in STEM and in Entertainment Computing. This set is fourfold, including: 1. knowledge development phase; 2. a strategy development and implementation process; 3. a push for strategic international networking, deploying mentors closely aligned to the aforementioned strategy; and 4. sharing the project's findings with the community.

Keywords: Gender equality, gender balance, gender imbalance, STEM, entertainment computing, mentoring, internationalization

1 Introduction

Universities have a responsibility to produce knowledge that contribute to solve vital challenges, such as climate, gender, poverty. To tackle these challenges, it is important that people with diverse background and gender is included at all level in universities, from students, teachers, researchers, and leaders. Gender research within technological education and research is a well established research field [9, 10]. In the field of computer science there have been relatively few women over the decades. In addition, more women than men drop out of academic STEM (Science, Technology, Engineering and Mathematics) careers and this results in an under representation of women in leading positions, a loss of talent for society and a lack of diversity in the workplace, each of which presents a potential threat to the search for excellence in research [4, 5]. Furthermore, European STEM departments exhibit a strong predominance of men and a strong international profile. Significant portions of women who study and work in STEM at European universities are international. However, women's social capital is hampered by the fact that women are often excluded from influential international networks [7] and that women seem to use the networks in a different way than men - to fulfill social objectives rather than career objectives [10].

Several previous research projects have - often individually - approached issues of gender bias in STEM employment at different academic and industry levels, but rarely within a comprehensive framework. Integrating these lessons could create a renewed push for gender equality in STEM. On the one hand, although improvements have been and continue to be made, there remains a long way to go with regards to increasing the share of top positions occupied by women. The persisting low percentage of women at the student level must be scrutinized in connection to gender imbalance at the professor level. Is a lack of role models at the highest level a contributing factor to women being less likely to be recruited to entry-level research positions and more likely to drop out of academic career pathways? Several studies have looked at the intersectional experiences of being female and foreign in an academic context, each reaching conclusions useful to this study but demanding more emphasis on the individual's own perspective [1, 6]. The need for more in-depth knowledge of the interaction between international mobility and gender equality in academia is thus great. STEM departments' tendency toward excellent international profiles could be used as a resource for better national and international recruitment of female academics, and better networking between recruits to support each other as they continue their academic journeys.

Gender issues in Entertainment Computing have been a hot topic the last few years. Theoretical references and concrete suggestions have been addressed in [2] and [3]. Women are under represented in Entertainment Computing. As an example that is particularly relevant to our community, we refer to IFIP Technical Committee 14 (Entertainment Computing) and its National representatives. For Europe, 20 countries are represented, of which 2 by women (Norway and Sweden). For America, 3 countries are represented of which 1 by a woman (US). For Asia, 5 countries are represented, all by male, for a total of 28 representatives of which 3 women.

With two objectives in mind (sustain participation of girls of diverse backgrounds and raising awareness for intersectionality of gender with other dimensions such as race and class among researchers), we propose a framework, based on four pillars (i.e., knowledge, a strategy development process, international networking and mentoring and knowledge sharing), to improve the gender balance in top academic positions through sustainable structural and cultural changes. These four pillars can be considered as essential elements to incorporate in strategic initiatives that aim to foster a better gender balance.

2 Learning from experiences

The fact that so few women choose to study and work with STEM subjects has been the subject of much research since the 1990s [9, 7, 8, 11]. With the increasing awareness of the gender imbalance, many national and international gender balance projects has started.

The international projects and networks, such as ACM Council on Women in Computing[3], IEEE Women in Engineering[4], Grace Hopper Celebration[5], European Center for Women and Technology[6] and European Women in Mathematics[7], gives us a wide perspective on the necessity, sustainability and broad dissemination opportunities of gender balance projects.

3 Guidelines

Based on these local initiatives, best practices and related work, we propose a framework consisting of four main guidelines that can be integrated into projects or initiatives aimed at improving the gender balance in top academic positions in STEM. We advocate a holistic view of gender representation in STEM all the way from the level of student to that of professor, and one in which internationalization is used consistently as both a lens through which to view participant's experiences and as a resource to help overcome the disadvantages of gender bias and working abroad.

Guideline 1 - Knowledge integration Many projects, local initiatives and measures exist, but their impact may remain limited if not integrated into a more holistic knowledge base. In an initial phase it is therefore of crucial importance to gather and integrate insights from previous and ongoing projects: what can we learn from these (e.g., (un)successful measures)? What are main challenges and how/at which level should they be addressed? Developing such a knowledge base - as an essential foundation for strategy development - thus means gaining a more thorough understanding of relevant broad issues and theories, gathering ideas for action, evaluating experiences with the implementation of different types of measures.

Guideline 2 - Strategy development (targeting cultural and structural management changes) This activity involves initiating and building up a long-term strategic process to develop good measures to improve equality and diversity as represented by academic recruitment and appointment. A potential approach to this strategic development process is that two groups across departments work together in a common strategy-development process. One strategy process research group consists of men and women in academic positions. The second group consists of faculty management. Diversification issues and internationalization are important for both groups, but may be managed in different ways. An essential question here is therefore how to manage processes in academia with a focus on gender balance? Strategy process research group should run throughout the project period, in a participant-centered and iterative way. By implementing a strategy to gather and share knowledge, applied

[3] https://women.acm.org
[4] http://wie.ieee.org
[5] http://gracehopper.org
[6] http://www.ecwt.eu/en/home
[7] www.europeanwomeninmaths.org

reflections and practical measures over time, there is a potential to affect cultural conditions - not just for those who are directly involved, but at the level of institutions as a whole.

Guideline 3 - International networking and mentoring A large proportion of female STEM students and employees at European institutions have a foreign background, and many institutional activities are internationally directed, with international partners and the possibility of international recruitment. A third guideline is therefore to set up a dedicated networking and mentoring program to recruit, retain and lift up female (inter)national employees to the next level. Several international studies have shown that academic mentoring is experienced as beneficial for both mentors and mentees and that it can be an important career development instrument.

More senior faculty members and a pool of adjunct professors could be assigned to assist with mentoring, career guidance and international networking for employees in the various categories. The institution as a whole can play an important role here by encouraging and incentivizing the development of a mentoring culture. It can also contribute with the development of a set of best practices for academic mentoring, with for instance clear descriptions on the roles and responsibilities of mentor and mentee, organization of networking events for mentors and mentees, sharing of experiences and best practices with academic mentoring, etc.

Guideline 4 - Sharing An important target group for the dissemination of the results will be the faculty staff of departments directly involved in the investigation. More broadly, the resulting findings and suggestions may be adapted for audiences at STEM departments that exhibit a similarly skewed diversity balance in occupation of top-level positions. Finally, the findings and recommendations of the project will be conveyed nationally (through blog, social media, articles and other dissemination activities) and internationally (through participation in international conferences and networking activities, especially those with a front-and-centre focus on gender).

4 Conclusions

In order to improve balance of gender and other dimensions such as race and class among researchers in STEM and Entertainment Computing it is important, in addition to activities directed toward young girls and boys, to increase the percentage of women and people with diverse race and class background in academic positions. We have proposed a set of guidelines based on a four pillars cycle: knowledge development, strategy, mentoring, and sharing. We have started to implemented these guidelines in the WeLead project at NTNU and we are in the process of establishing a follow up project which will systematically implement them.

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