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Sustainability, pandemia and women in academia: breaking the "good girl" culture to enhance sustainability in engineering education

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Abstract

We would all agree that the role of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising quality of life for future generations. We would agree that sustainable development relies on ending discrimination towards women and providing equal opportunities for education and employment. Gender equality has been conclusively shown to stimulate economic growth, which is crucial for low-income countries. We would also agree that there has been a lot of research in relation to sustainable development in engineering education, indicating that the subject of sustainability may help increase participation of women in engineering. But in reality, how can we teach our students sustainable development and promote the role of females in engineering, when the engineering education is so unsustainable for female academics?

Academic women have long made the compromises in terms of the double burden of domestic and paid work, as well as to their personal life choices and well-being, yet academia and higher education institutions have simply not made the working environment a more just and sustainable space for women. During the pandemic, these inequities were exacerbated by the loss of educational provision, now delivered online and facilitated by, in the majority of cases, mothers. The precarity of childcare, now makes the question of the unsustainability of female academic's lives unavoidable. Women have been literally and figuratively left holding the baby during this crisis. We are at a critical juncture where we have the opportunity as academics, to reimagine the post-pandemic community, and create a more socially just and sustainable balance in our lives.

This issue exceeds academia; it is actually the culture that dictates women to be "good girls"; to comply with the patriarchal system. While there is nothing wrong about being a good person, the "good girl" label has a completely different meaning and impact on the life and career of women. "Good girl" is the one who cares about the others, seeks their approval, has no needs or ambitions, is quiet, kind, willing to please everyone, to get everything right the first time, is not allowed to make mistakes, has to sacrifice herself, and to be perfect and above all else, not to challenge the system or to call out all the specifically gendered ways in which the impact of the system marginalises and hurts women. The "good girl" culture has been a big burden for women in academia in general, having a detrimental impact to the career development of female academics in particular in the male dominated sector of engineering education. During the pandemic, it has been taken for granted that women would deliver on all fronts. It is well document that women's work is often invisible, both in the domestic and public spheres[1]. Although common to all disciplines, the impacts of bias and stereotypes are particularly pronounced in engineering[2]. Female academics please their students, line managers, colleagues and family, leaving behind themselves, their

research and other necessary elements for their progression. They are never considered equally good, impactful, and successful, as their male colleagues. As a matter of fact, women in engineering education experience more grade appeals and receive lower course evaluations than their white male counterparts[3], being discriminated by students, administrators and academics, while their efforts and ideas are being constantly discounted. There is nothing sustainable about this.

This paper proposes effective actions to tackle the "good girl" expectations for female academics, enhancing sustainability, implementing a fit-for-purpose change of the culture system across school, with targeted and consistent actions, actively promoting the needs of female academics.

1 Introduction

It is not new that women are the mostly affected by pandemics[4]. As a matter of fact and despite the societal progress, development and awareness, the social and economic impacts of COVID-19 have fallen once more harder on women than on men, with mothers being pushed out of leadership roles, reducing their working hours or quitting, as a result of the pressure of holding multiple roles, minding and home-schooling their kids, while being challenged and compared with their male colleagues[5]. While the pandemic is not over yet, the statistics are already extremely worrying; in Ireland, already 10% of women have quit their jobs in order to mind their kids, while 65% of families report the mother is taking full responsibility for home-schooling[6].

The detrimental effect of Covid-19 to the career development and progression of females is even more disproportionate in academia[7], and more specifically in the male dominated academic environment of engineering. Female academics in engineering were already the exception rather than the rule prior to the recent pandemic, and, it is expected that this small "tribe" will go into extinction, unless serious actions are being taken to support not only women in engineering academia, but also the "ecosystem" of female engineers in general, leading to the loss of sustainable development in engineering in terms of gender inclusivity. So, as engineers and educators, we cannot talk about or teach the concept of sustainability, unless we redesign the engineering education, focusing on gender equality and inclusivity for both the female academics and students of engineering education.

2 Sustainability, Gender Equality and COVID-19

For most of us, the first thoughts around sustainability and sustainable development are related to globalisation, climate change, energy and renewables, circular economy, food production and consumption, technology and digitalisation, engineering challenges, solutions and economic growth. However, very few of us realize that sustainability is linked to gender balance and will remain a theoretical, and almost a philosophical, challenge if we continue marginalising and discriminating more than half of the world's population.

Sustainability and gender equality are the two sides of the same coin. Sustainable development relies on ending discrimination towards women, and providing equal opportunities for education and employment; gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world. The United Nations have selected Gender Equality, as one of the United Nations

Sustainable Development Goals (UN SDG)[8], highlighting the link between sustainability and gender equality.

Unfortunately, the effects of the COVID-19 pandemic have reversed the limited progress that has been made on gender equality and women's rights. The coronavirus outbreak exacerbated existing inequalities for women and girls across every aspect – from health and the economy, to security, social protection, paid work and equal opportunities[8]. We have spent more than a year viewing and listening to men in podiums, proving that the decision making has been shifted again mainly to men, who represent less than half of the global population. The result is the lack of awareness and inclusiveness when it comes to essential decisions, which affect not only the female population, but also the younger generations. A very recent example of the disconnection of men from the real societal needs and solutions was the closure of the shoe shops for several months, resulting to several health and developmental issues of the Irish kids and teenagers. Shoes are an essential item in terms of the growth and development of children, but none of the male decision makers would understand or consider a fact as simple as this! This would have not been the case if women were equally represented in the decision making in relation to the pandemic.

Moreover, multiple studies have shown that COVID-19 have significantly affected the career development of women in academia. The use of lockdowns to attempt to mitigate the transmission of COVID-19 in communities increased the household and child-rearing demands of both men and women[9]. Even without children, women still shoulder a greater share of domestic duties[10]. A global study of academics found that this resulted in decreased time available to devote to research across the board; however, this was disproportionately experienced by women[11]. More specifically, women have written significantly fewer papers than their male colleagues during the pandemic, with reports showing that at least one-third of working women in two-parent households exclusively provided child care after schools and day cares shuttered, resulting to a potential leak of the academic pipeline for many of them, due to the lack of support in career progression. The effect of COVID-19 to career development and progression is even worse for the females in engineering academia, because they are already working in a non-female friendly environment, dictated by male rules, prioritising male needs and defining success on male terms.

STEM fields are largely considered critical to national economies[12] and studies have consistently shown that diverse teams are more productive and innovative[13]. However, data compiled by the UNESCO Institute for Statistics in 2019 estimates that women represent 29.3% of the global research and development (R&D) workforce[14]. The greater the number of women in leadership roles in a company, the better the company's economic performance and outcomes[15]. Studies have found that teams with women have greater collective intelligence, which facilitates problem solving[16], an essential skill in engineering. Therefore, to build a more sustainable world will need more female decision makers, such as engineers, academics, politicians, managers, entrepreneurs, professionals and leaders.

3 The "good girl" culture in engineering education

Unfortunately, there is still a strong culture around teaching girls to be "good", unerringly nice, polite, modest, and selfless, embracing a version of selfhood that curtails sharply their personalities and potential. And it is this "good girl" culture that erects a psychological glass ceiling, which begins its destructive sprawl in girlhood and extends across the female life and career span, jeopardizing the growth of skills and habits essential to becoming a strong woman and a competent professional[17].

The expectation, almost demand, to be "good girls" is even more toxic for the females working in male dominated sectors. A "good girl" who decides to pursue with a career in academia, and more specifically in the male dominated sector of engineering, has to be perfect. She has to be socially and academically successful, smart, pretty and kind. She has to work twice as much as her male colleagues but she does not have the right to complain, because she will come across as lazy. She has to please her colleagues, and students, to have no opinion and to follow the rules. She also has to earn less compared to her male counterparts, limiting the expression of her financial needs.

A female academic of engineering has to smile with inappropriate comments or jokes, to stay calm and be forgiving when her colleagues are doing "mistakes", such as calling her "this thing"! She has to feel guilty when going on maternity leave; she actually has to work while on maternity leave, but her male colleagues are entitled to take credit for all her work during this time! She is on "maternity holidays" after all! She also has to accept that she cannot be the first or the last author of her articles, nor to submit a funding proposal under her name; she is the sailor, not the captain.

She cannot be ambitious; she does not have the right to think about career progression because her male colleagues are better than her. But if she does get promoted, this is because she is a woman, not because she deserves it.

Above all else, she must not question or rock the gender system. She must not draw attention to the difficulties, detriment, abuse and hurt this system perpetuates against women, or how it makes the fragile eco-system unsustainable for female engineer educators. Actually, she has to pretend not to be a woman, to conceal her highly gendered life experiences, in a gender blind system which assumes that the typical academic is white, male, middle class and without caring responsibilities.

A female academic in engineering education has to walk a treacherous line, balancing mixed messages about how far she should go and how strong she should be. She has to be enthusiastic while being quiet; smart with no opinions on things; intelligent but a follower; popular but quiet. She has to hold a second role, not to be the protagonist; she has to be something, but not too much.

4 Making engineering education sustainable

As mentioned earlier, building a more sustainable world will need more women engineers. Therefore, the presence of women in engineering education is essential, in order to be role models and inspire more girls – as well as boys – to study science and technology-based subjects and foster a new generation of technical professionals. In other words, it is essential to make the engineering education sustainable for female academics, prior to envisaging a sustainable world, designed by/with female engineers. The question is how to achieve this.

As engineers, we know that each problem has indeed multiple dimensions and therefore multiple solutions.

Actions to be taken:

- Women being able to call out systemic misogyny without fear of detriment to their career. The pandemic has raised levels of gender inequality to unsustainable levels; we can no longer afford, or morally condone a gender blind 'eco-system'.

- The typical model of engineering educator and academic needs to be remodelled on a more diverse and inclusive demographic; it needs to take account of the different life experiences of women, black and ethnic minorities, LGBTQ+, disabled persons, and the social & economic disadvantaged.
- Equal pay and benefits for comparable roles and equal opportunities for progression and promotion.
- Equal consideration of needs and resourcing support. Specifically gender based needs, such as women's experience as mothers and other caring roles; institutional or state funded child care, improved and more flexible parental, caring and compassionate leave.
- Sustainable cultural changes in the academic workspace; zero tolerance of misogyny, sexual harassment, abuse, bullying or other forms of gender based violence in faculties.
- Male allies amongst engineering educators, this is not just a women's issue, and it is a societal problem.

5 Conclusions

The engineering education is indeed far from being sustainable for the female academics. Women in engineering education are not only under-represented; they are discriminated by academics, administrators and students, despite working harder. They are also earning less and are being inadequately represented in higher academic positions, being remote from the decision making tables, while they are expected to be "good girls" and sacrifice their career development, as a result of their family status and personal choices. There is nothing sustainable in this condition.

Female engineer educators and academics have reached a point where remaining silent and complying are no longer options. We cannot hold the baby any longer. The onus is on us all to call out misogyny, sexism and gender blind practice, structures, and support female academics who speak out about their experiences.

As engineers and educators, it is about time to practice what we preach and lead by example. We have no right to talk about or teach the concept of sustainability, if we do not change the culture and redesign the engineering education, focusing on gender equality and inclusiveness for the female academics of engineering and subsequently the future generations of engineers; this is the purpose of sustainability.

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