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# GENDER, HIGHER EDUCATION AND STEM IN INDIA

RESEARCH REPORT

# Research Report

This research report is part of The Gendered Journeys (GJ) project which aims to investigate gendered issues experienced by STEM students and graduates in India, Rwanda and the UK. The GJ project, funded by the Global Challenges Research Fund, is a partnership between the University of Glasgow, the Indian Institute of Management Calcutta, and the University of Rwanda. This report has been prepared by Emma Seddon, Research Associate, School of Education, University of Glasgow.

## Introduction

India has a vast higher education (HE) system with millions of students (Ministry of Human Resource Department, 2019). Over the decades since independence in 1947, HE has opened up, growing in sheer numbers of both institutions and students, and breadth of subjects and research activities (Janardhana & Rajasekhar, 2012). A firm commitment to the importance of education has seen emphasis placed on equity of access over the years (Mathew, 2016). As a result, today India has reached gender parity across education levels, with women making up 48.6% of enrolled university students in 2018-19 (Ministry of Education, 2019). What this is apparent gender balance hides, however, is a complex system with inbuilt hierarchies (Sahni & Kalyan Shankar, 2012). That is, women still tend to be underrepresented in the most prestigious institutions and certain subject areas, particularly STEM (science, technology, engineering and maths) fields (Ministry of Human Resource Department, 2019). This paper looks at the history of HE in India, focussing on policy developments, before exploring socio-cultural factors related to gender in this multi-layered system. We bring this post to a close by describing how a Global Challenges Research Funded project – Gendered Journeys – is exploring gendered experiences of STEM students in Rwanda, and other contexts.

## HE in India

Following independence from British colonial rule in 1947, HE in India changed substantially (Janardhana & Rajasekhar, 2012). These changes were driven by Jawaharlal Nehru, the first Prime Minister of an independent India, and statistician Prasanta Chandra Mahalanobis (Patnaik, 2015). Their economic policy focussed on rapid industrialisation and state investment to bolster the economy and create jobs, while retaining economic independence from foreign investment (Gadgil, 1952). This foregrounded scientific education and began a process of broadening the higher education sector (Kumar & Singh, 2017). Nehru built on the existing HE structures, creating research intensive institutes that served the national project (Patnaik, 2015; Subramanian, 2015). In the

following decades, policies of industrialisation began to shift towards creating a knowledge-based economy and focussing on the ICT and technology sectors (Mukhopadhyay, 2017). This is reflected in HE reports and policies that stress the importance of technological developments (Kumar & Singh, 2017). From the 1980s, private sector involvement in HE began to increase, which was accelerated after the liberalisation of the economy in the 1990s (Pathak, 2014; Mathew, 2016; Ravi et al., 2019).

Since the early 2000s, there has been a raft of legislation, committees and reports on HE, attempting to reconfigure the system into something coherent and manageable (Mathew, 2016). Over the past few years, various bodies have been suggested or established to govern the HE sector with greater or lesser central state involvement (Pathak, 2014; Roy Chowdhury, 2017; Ravi et al., 2019). As a result, the current system is complex and its governance relatively opaque (Jayaraman, 2009). The most recent policy initiative comes in the form of the National Education Policy (NEP) 2020 (Government of India, 2020). This has been published in a context where the quality of HE has been in doubt, with many graduates not equipped to work in the areas related to their studies (Jagadesh, 2015), and with a fundamental mismatch between higher education programmes and the needs of employers (Narasimha, 2008). The NEP 2020 places emphasis on the quality and expansion of all HE, increasing access and inclusivity, increasing research and postgraduate capacity. The policy stresses greater industry-academic linkages, and a 'light but tight' regulatory approach will apply to the financing of state and private institutions. This demonstrates continued interest and commitment to HE and in particular STEM on the part of the Government to boost the economy. However, despite this clear political will, HE remains relatively poorly funded by the state: the level of funding as a percentage of GDP is below that of most 'developed and developing countries' at 4.43% (Government of India, 2020: 60).

## Gender disparities in HE

Over the decades since independence, all levels of education have been opened up to girls and women in India (Mathews et al., 2013; Roy Chowdhury, 2017; Narwana & Rathee, 2019). From negligible numbers post-independence, 48.6% of students enrolled at higher education institutions (HEIs) were female in 2018-2019 (Ministry of Human Resource Department, 2019). Most recently, girls' and women's education has been bolstered in the 2020 National Education Policy that brings renewed sources of funding for extending equity of access to education (Government of India, 2020). However, the move towards equity has seen the emergence of new hierarches within the broader system of higher education (Sahni & Kalyan Shankar, 2012; Verma, 2014; Roy Chowdhury, 2017). Rather than simple numbers, questions need to be asked about the 'topography' or details of women's access, that is, how does this breakdown by region, subject, institution type and even individual institutions (Sahni and Kalyan Shankar, 2012: 241). The distribution of women in HE also varies across institution

type and discipline, as clearly demonstrated in the 2018-19 All India Survey of Higher Education, AISHE (Government of India, 2019). According to AISHE, in 2018-2019, 48.6% of students enrolled at HEIs were female, giving an initially promising picture of gender equity (p. ii). However, in the bulk of STEM subjects, there are more male than female students, with significant variety across disciplines (p. 40). Perhaps more importantly, substantial differences appear when this is broken down by institution type. The AISHE shows that male students outnumber female students at the more prestigious HEIs, particularly Institutes of National Importance, which include IITs. For example, 78% of students at undergraduate level in Institutes of National Importance are male (p. 25). Although overall numbers of women in HE in India have increased dramatically, female students are more likely to study in less prestigious institutions and are generally underrepresented across STEM subjects.

In addition to such 'topographical' differences, strict gender roles and discourses continue to frame a woman's place as being in the home, a wife, mother or caregiver (Chanana, 2000; Verma, 2014). Such discursive factors impact women's experiences in education, particularly in traditionally 'male' subjects, such as STEM (Campion & Shrum, 2004; Gupta, 2012). Care work and other domestic work is female, while men are 'bread-winners' (Palriwala, 2019). In education, sciences are 'masculine', arts are 'feminine' in India (Campion and Shrum, 2004); technical skills and science are 'manly' and 'boy activities' (Gupta, 2012). Gendered social norms associate scientist as male and an 'Indian woman' as "the upholder of 'Indian culture'" (Gupta, 2016). Women are also discouraged from applying to certain programmes by male superiors and are shoehorned into areas of work and study that provide fewer opportunities (Subramanian, 2007).

Gendering in education is not universal and differs widely within India, with significant differences within and across states (Sahni & Kalyan Shankar, 2012). Schools in poor, rural areas are more likely to enact gender roles by, for example, keeping boys and girls separate, whereas schools in better-off urban settings are more likely to encourage boys and girls to interact and to actively limit gender bias (Narwana & Rathee, 2019). Rural women much less likely to attend university than urban women, which is also true for men in rural and urban settings (Sahni & Kalyan Shankar, 2012). Geography can act as a proxy for complex socio-cultural-economic factors, hinting at the complex intersectional realities that play out in the education system creating intra-systemic hierarchies and biases. Caste and class (among other things) intersect with gender in these systems and settings (Subramanian, 2007). Middle class, educated, urban women are better placed to take advantage of higher education and the potential for financial independence that may bring (Nair, 2020). On the other hand, Dalit female students in India experience highly gendered and casteized discrimination in HE where they face sexual harassment from male peers and staff resulting in intersectional marginalisation (Vandana, 2020).

## Gendered Journeys

The Gendered Journeys (GJ) project was set up to investigate these complex gendered issues experienced by STEM students and graduates in India, Rwanda and the UK. The GJ project, funded by the Global Challenges Research Fund, is being jointly run by the University of Glasgow, the Indian Institute of Management Calcutta, and the University of Rwanda. Despite significant differences between these contexts, all three demonstrate similar, persistent barriers to gender equality in STEM fields (UNESCO, 2017; WEF, 2020). The mixed methods project involves collecting primary data from STEM students in all three contexts, and from STEM graduates in India and Rwanda to explore gendered experiences of studying STEM at undergraduate level and transitioning to STEM employment. We have begun disseminating a large-scale survey with STEM undergraduates focussing on belonging, peer networks, university/course satisfaction and well-being as they relate to academic achievement, attrition and onward career progression. We have also begun recruiting for interviews and focus groups with STEM students and graduates where we will home in on facilitators and barriers to progress throughout participants' educational and career journeys. By combining large-scale quantitative data with fine-grained qualitative data, we will be able to probe the multi-layered nature of inequalities and gendered experiences in STEM. Relatedly, we recognise the need to look at the intersectional challenges that are often glossed over in gender equality initiatives that discuss only at quantitative changes as described above. In doing our own research, we are keen to explore how race and ethnicity, class, wealth and regionality intersect with gender in STEM experiences. We will also look beyond the gender binary often used in many equality initiatives, and will encourage our participants to self-identify as they see fit. Furthermore, we will combine the insights of our international team to ensure cultural sensitivity throughout the research. This will enable us to finetune our data collection tools and to focus on the difference of each context, creating a rich analysis that reflects our participants' diversity and intersectionality of experience. Ultimately, this will allow the GJ project to make a more powerful contribution to timely and important discussions and decision-making related to girls and women's involvement in STEM education and employment.

To find out more about the project visit:  
<https://genderedjourneys.com/>

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