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# K.B.N. COLLEGE (AUTONOMOUS)

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Kothapeta, Vijayawada - 520001.

A College with Potential for Excellence (UGC-CPE) All India 92<sup>nd</sup> Rank in NIRF by MIRD



## *Invitation*

*You are cordially invited to the Inaugural Session of  
ICSSR Sponsored Two-Day National Seminar on*

### **“SOCIAL INNOVATION & ENTREPRENEURSHIP IN INDIA”**

On Friday 25<sup>th</sup> February, 2022 @ 10:00 A.M.

*Chief Guest*

**Prof. K. Rama Mohana Rao**  
Vice-Chairman, APSCH

*Presided by*

**Dr. V. Narayana Rao**  
Principal

Organized by  
**Department of  
Commerce & Management**



**ICSSR Sponsored Two-Day National Seminar**

**On**

**SOCIAL INNOVATION & ENTREPRENEURSHIP IN INDIA**  
(In collaboration with Krishna University, Machilipatnam)

**25<sup>th</sup> & 26<sup>th</sup> February, 2022**



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## Role of Women in science and technology in India – An Overview

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## Abstract

Historically, the presence of women in the fields of science, technology, engineering and mathematics remains mainly trivial. Despite the infrastructural and financial support availed from the government and non-governmental bodies, under-representation of women in the field of education has not changed over the years. Also, no information about the current status of women in these fields is available in the public domain. In this paper, we address this lack of information by collecting data from renowned institutions throughout India. The under-representation of women in the science and technology community is depicted, primarily highlighting the male-dominated technology-driven Indian institutions. The probable causes for such inequality need to be analysed and addressed for remedial purposes.

**Keywords:** Gender inequality, higher education, science and technology, women's participation

## Introduction

With the emergence of 'rational thinking', ideas like 'freedom from religion', 'abolition of slavery', 'constitutional government' and 'equal rights to women' become central to the political debates during the "Age of Enlightenment". The era also known as the "Century of Philosophy" starts loosely in 1620s with the scientific revolution in Europe and paved the way for different political revolutions of the 18<sup>th</sup> and 19<sup>th</sup> centuries (1). India granted voting rights to women immediately after its freedom in 1947. The right to vote was quickly followed by the rights to equal employment and education, to provide better opportunities and social acceptance to women workforce. However, a

brief glance of higher education and employment history shows very marginal participation of women, not just in India but also in the world. As a prompt example, the percentage of women Nobel laureates (2.94%) in the fields of Science and Technology along with the Field's medal (1.66%) in mathematics gives us a brief idea. Such evident inequity can be explained by many social prejudices and stereotypes towards women counterpart, questioning their intellectual and leadership ability. The age old concept of 'women being the intellectually weaker section' is often professed by many socioeconomical factors along with psychological stereotypes, such as.

a) **Gender stereotypes:** A stereotype of men being better at math and science is inculcated from childhood itself (2, 3). These preconceived notions might discourage female students to pursue their career in science or technology.

b) **Gender stereotyping of subjects:** There is also the longstanding belief that science and technology are masculine subjects, since they deals with the technical aspects of nature (4, 5). A recent study tried to explain the role of society and psychological impression over the masculinity of "physics" and thus highlighted the role of symbolic hegemony which perpetuated this idea (6).

c) **Social stereotypes:** Historically, the female intelligence was always believed to be inferior to male, fuelled by Eugenics and Genetics (7). The hypothetical relationship between skull size and intellect supports the concept of intellectual inferiority of women (2). This school of thought persisted through time, and still does, despite several successful attempts to debunk it (2, 8).

The first objective of the study was to identify the various factors that influence the career choices of women in India. The study was conducted in a semi-structured manner.

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In the present study, we observed the educational status of various professions and the role of women in various sectors. The study was conducted in a semi-structured manner. The data was collected through interviews and questionnaires. The study was conducted in a semi-structured manner.

Table 1

Profession	Percentage
1. Teacher	25%
2. Doctor	15%
3. Engineer	10%
4. Scientist	5%
5. Business	10%
6. Government	10%
7. Other	25%

NIU Uttarakhand	6.67
NIU Manipal	29.41
CSIR	18.48
ICSER	15.47

**Discussion**

From the table it can be assumed that the dearth of qualified women candidates remained the same from 1951 to 2018. However, the profile of faculty in the top 20 universities of the country differed significantly, may be the fact that these universities handle teaching and research mostly related to basic sciences rather than technical subjects. Among the universities, Indian Institute of Sciences, Bangalore was mostly male-dominated while Amritha Vishwa Vidyapeetham and Savitribai Phule Pune University, Pune stood out with most balanced distribution of gender within India.

When studied, it became clear that irrespective of the year of establishment, eminence and geographical distribution, all the research and teaching institutes in India exhibited a similar pattern in employing female faculty/researcher (merely 10-20% of the total strength) with very few exceptions. Lastly, the distribution of female scientists/faculties amongst the top ten ranked Institutes throughout World showed an average participation of 20.34% ( $\pm 3.45$ ) females which is marginally better than the Indian scenario (18.86%).

Such a huge gap between the male and female faculty distribution in the STEM cannot be reasoned only by not having enough female student to start with. The minimal number of female candidates pursuing a career in STEM can be explained by a model, called the "leaky pipeline effect, (15,16) where the leaking happens at primary school, secondary school, undergraduate, postgraduate, doctorate, post-doctorate and faculty level positions. The two of the greatest leaks in this system are transitions from secondary school to college and from post-doc to faculty positions due to familial and societal

constraints (17). This phenomenon is further supported from the data where different research/Re-entry Fellowships/faculty positions, awarded in India over last 5 years, showed comparatively better female representation (21.88%) than the Institutes/Universities. However, the continuous loss of female workforce can be assumed to be a cumulative effect of the many factors (2) such as the followings.

a) **Social responsibility:** The absence of women both in primary and higher ranks of scientific community could be reasoned primarily by the family responsibility (18).

b) **Glass ceiling at work place:** Furthermore, due to these ingrained stereotypes supported by society and other scientists, women in science became a victim of self inflicted inferiority complex 18 and reduced presentation in senior authorship (19).

c) **Lack of recognition and Matilda effect:** The "Matilda effect" which refers to the prejudice against crediting women scientists for their work, and attributing the said work to their male colleagues might also have negative impacts (20). Multiple examples of this effect include renowned female scientists not duly credited for their ground breaking experiments such as Agnes Pockels, Nettie Stevens (21, 22), Frieda Robscit-Robbins (23), Rosalind Franklin (24), C.S. Wu, Jocelyn Bell, and Lise Meitner (20).

d) **Less participation in networking:** It is observed that during scientific conferences, male researchers ask 1.8 times the number of questions asked by the same number of female researchers, which might impact the scientific networking negatively (25).

**Probable solutions:** General improvement in social and financial front especially in developing countries like India is paramount for more inclusion of women in main stream education which can be expected to trickle

Some further in Science, Technology, Engineering and Mathematics (STEM) inclusion of women role model specifically those STEM should be more in popular media and accessible literature particularly in school textbooks might have positive impact. Science, comfortable work place, flexible work hours, creches and daycare facilities can be included in the current infrastructure to support the existing women workforce. In case of such hurdles and obstacles, the success in changing worldwide, as 130% increase in enrollment of girl students was observed in male dominated subjects such as physics, technology, engineering, mathematics, statistics and computer science over the period 1990-2013 in the United States (20). In India, long term analysis is needed to understand the repercussions of previous policy changes and its impact on social structure.

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