

Bridging Gender Gap in Indian Higher Education System

Pragya*

**Senior Research Fellow, Faculty of Education, Banaras Hindu University, Varanasi –
221005, India*

**E-mail: pragya12bhu@bhu.ac.in*

ABSTRACT

Higher education equips a person to make better life choices. It assures economic mobility and the future success of a person. However, gender discrimination restricts the development of individuals as well as the entire nation. Gender inequality prevents the contribution of nearly half of our human resources in social, cultural, political, and research fields, which further decreases the productivity of society. Although India has made several efforts to reduce the gender gap, it still ranks 135 out of 146 countries in the global gender gap Index, 2022. Women are still concentrated in a few female-friendly and low-paying jobs. One of the foremost steps for the development of a society is the elimination of the gender gap in the education system. From independence till now, India has made remarkable progress in reducing the gender gap in terms of enrollment in elementary education, but simply reducing the gender gap in enrollment is not enough; it does not assure gender equality; a lot more needs to be done. NEP-2020 states that the gender gap remains in India even after successive government efforts. The present paper intends to explore the ways of bridging the gender gap in the Indian higher education system, what has been done, and what more needs to be done.

Keywords: Higher Education, Gender Inequality, Gender Gap, Gender Discrimination, Women's Education

1. INTRODUCTION

Higher Education has the power to equip people to deal with difficult times. It makes people aware of their rights and duties. Higher education assures better life choices to a person and higher status of the person in society. Higher education helps individuals in developing and fostering all the qualities required for the development of a nation. But when men, women, girls, or boys don't have equal access to resources and equal opportunities it results in hatred, fear, enmity, and poverty. Discriminating people on grounds of gender results in gender inequality, which further has an adverse impact on the development of individuals as well as society. So, to create a peaceful and prosperous society, the United Nations (UN) has adopted Sustainable Development Goals (SDGs). Gender equality is one of the SDGs. India is also committed to reducing the gender gap, but it is still a far cry, which is evident by India's rank in the global gender gap index, 2022, which is 135 out of 146 countries. Since education is one of the crucial factors for the development of a nation, the gender gap in education is of utmost concern.

2. HISTORICAL BACKGROUND OF WOMEN'S EDUCATION IN INDIA

Women were deprived of education for many centuries. Women in India got access to education around the 19th century. Several schools for girls were opened during the British period, but

only higher-class females got the opportunity to become educated. Calcutta university introduced education for women in 1877, followed by Bombay university in 1883. By 1901, literacy in India stood at 5.35 per cent, with female literacy comprising a mere 0.60 per cent. In 1951, overall literacy rose to 16.67 per cent, with female literacy reaching 7.93 per cent. By 1991, total literacy had climbed to 42.84 per cent, while female literacy remained below the average at 32.17 per cent (Bassi, 2022). Over time, significant improvements in female literacy were achieved through initiatives such as the National Committee on Women’s Education (1958–59), the Education Commission (1964–66), the National Policy on Education (1968), the Committee on the Status of Women in India (1974), the National Policy on Education (1986) with its Program of Action (1992), and the National Policy for the Empowerment of Women (2001). Despite the rise in female literacy to 54.16 per cent as reported in the 2001 census, gender inequality and discrimination persisted, leaving women significantly behind their male counterparts.

3. SOURCES OF DATA

The study is mainly based on secondary data sources. Data were obtained from related literature, the Census of India, and the All-India Survey on Higher Education (AISHE) 2020-21 (Ministry of Education, 2022).

3.1 The Gender Gap in Higher Educational Attainment (According to the Census of India 1991 & 2011)

Table 1, given below, shows the number of males and females having an educational level of graduation and above in some of the states of India. Table 1 also shows the difference in higher education received by males and females in India according to the 1991 and 2011 censuses of India.

Table 1: No of Males and Females having educational level Graduation and above

Some states of India	According to the 1991 Census		According to the 2011 census	
	Male	Female	Male	Female
Arunachal Pradesh	11719	3268	36430	17176
Bihar	1383493	269794	2326092	735584
Kerala	443500	352015	1131336	1399985
Madhya Pradesh	996806	384751	2051127	1171675
Odisha	437684	118763	1174184	609613
Rajasthan	640574	193709	2086247	977035
Uttar Pradesh	2238270	750719	6378138	3541700
India	1,47,93,662	58,37,310	4,21,20,460	2,61,68,511

*Source: ‘Census of India 1991 & 2011’

The above table shows that according to 1991 census, there was a drastic gender gap in higher educational attainment in India. Number of females who received higher education was not even half of the number of males who received higher education. While the 2011 census shows that the number of females who received higher education improved, the number of females

getting higher education in comparison to males was very low, which indicates a huge gender gap.

3.2 Present Status of the Gender Gap in Higher Education

The following are some of the key findings from the AISHE report for the year 2020-21. The report was based on the voluntary uploading of data by institutions of higher education listed on the aishe.gov.in portal in specially designed formats for data collection. The AISHE 2020-21 was conducted with a reference date of December 31, 2020. The report recorded 1,113 universities, 43,796 colleges, and 11,296 stand-alone institutions. Responses were submitted and verified for 1,099 universities, 41,600 colleges, and 10,307 stand-alone institutions.

Table 2: Gender Gap in Enrollment in Higher Education

	Enrollment in higher education	Percentage (%)
Male	2,12,37,910	51.33
Female	2,01,42,803	48.67

*Source: 'AISHE 2020-21'

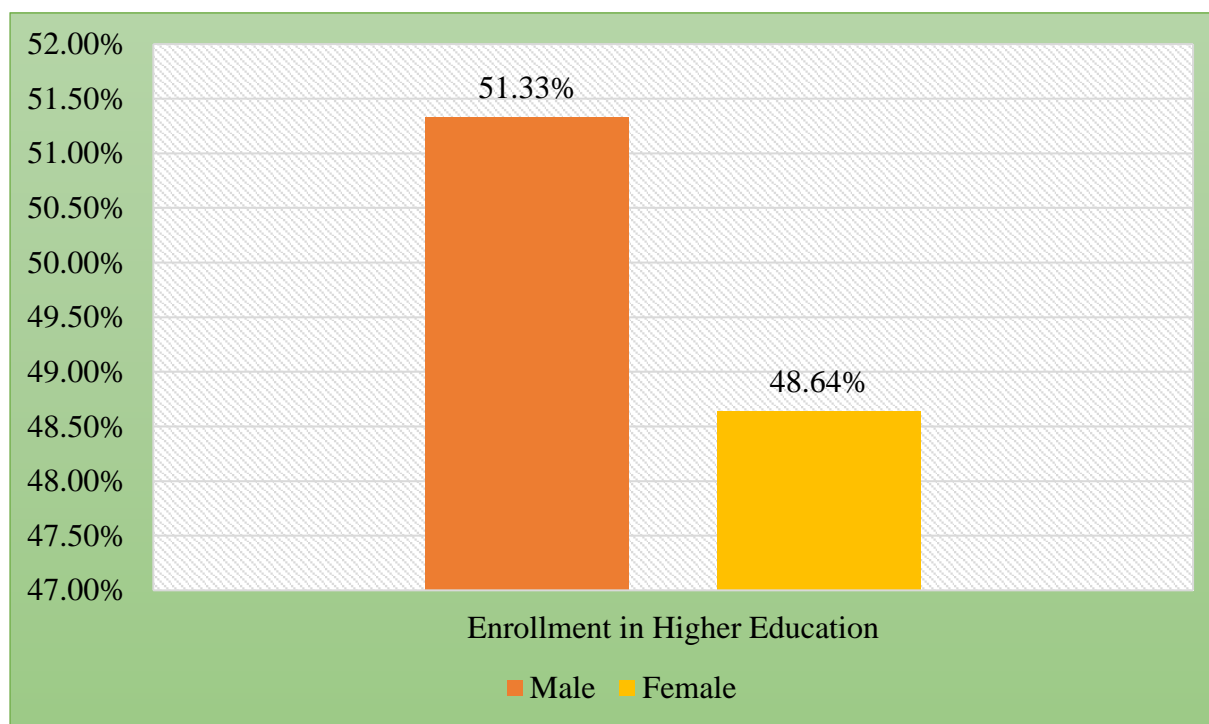


Figure 1: Status of Gender Gap in Higher Education

Table 2 shows that female enrollment in higher education is 48.67 percent while male enrollment in higher education is 51.33 percent (Figure 1). Here, higher education means education, which is obtained after completing 12 years of schooling or equivalent and is of the duration of at least nine months (full-time) or after completing ten years of schooling and is of the duration of at least 3 years, irrespective of the fact that whether the education is general, vocational, professional, or technical.

Table 3: Gender-wise Distribution at Different Levels in terms of Enrollment

	Undergraduate	Postgraduate	Ph.D.
Male	1,67,47,674	20,53,794	1,16,764
Female	1,59,09,835	26,62,855	95,088

*Source: 'AISHE 2020-21'

Table 3 shows that at the undergraduate (UG) and Ph.D. levels, female enrollment is considerably lower in comparison to males, while at the postgraduate (PG) level, female enrollment is higher in comparison to males.

Table 4: Gender-wise Enrollment in Higher Education in Some States

States	Male	Female
Madhya Pradesh	1374036	1224525
Rajasthan	1278304	1154486
Uttar Pradesh	3397012	3254055
Tamil Nādu	1662153	1674286

*Source: 'AISHE 2020-21'

Table 4 shows that female enrollment in higher education is still low in the mentioned states in terms of enrollment, except for Tamil Nadu.

Table 5: Percentage of Female Enrollment in Different Courses

Course	Total Enrollment (in lakhs)	Percentage of Female Enrollment
B.A.	104	52
B.Sc.	49.12	52.3
B.Com.	43.22	48.5
B.Tech.	23.20	28.7
B.E.	13.42	28.5

*Source: 'AISHE 2020-21'

Table 5, the percentage of females in Bachelor of Arts (B.A.) is 52 percent, Bachelor of Science (B.Sc.) is 52.3 percent, which includes life sciences and physical sciences, with females mostly enrolled in life sciences. The percentage of females in the rest of the courses is not even 50 percent.

Table 6: Gender Gap in Enrollment in STEM subjects

	No. of students enrolled	Percentage of enrollment
Male	53,74,237	56.8
Female	40,94,785	43.2
Total	94,69,022	100

*Source: 'AISHE 2020-21'

Table 6 shows that the enrollment in STEM subjects (at UG, PG, M.Phil., & Ph.D. level) is 94,69,022 out of which 43.2 per cent are females.

Table 7: Enrollment of Students in Engineering and Technology

	Percentage of students enrolled	Total enrollment
Male	71	39,20,213
Female	29	

*Source: 'AISHE 2020-21'

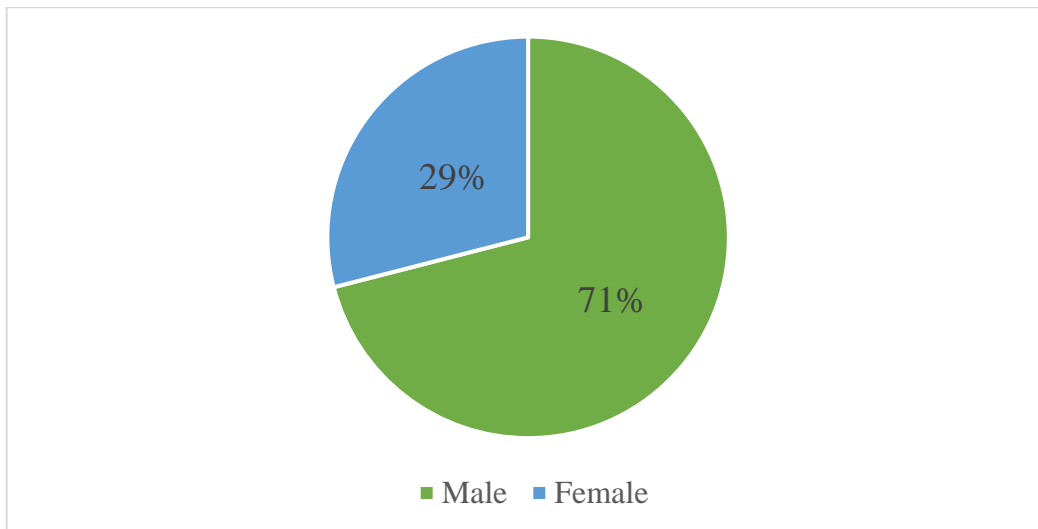


Figure 2: Enrollment of students in Engineering and Technology

Table 7 shows that overall, in Engineering and Technology (UG, PG, M.Phil., Ph.D.) female enrollment is 29.3 per cent which is approximately 29 per cent while male enrollment is approximately 71 per cent. (see, Figure 2).

4. DISCUSSION

The level and quality of education empower individuals and also result in the development of society. However, the world economic forum's global gender gap report, 2022, brings to light the hidden reality of increased female enrollment in Indian higher education. India ranks 135 out of 146 countries in the gender gap index. This global gender gap report is based on the

following dimensions: economic participation and opportunity, educational attainment, health and survival, and political empowerment. It further states that women's participation in the labour force is still very low. All these findings indicate that simply increasing enrollment in education won't be enough to reduce the gender gap in education. According to the above data, it can be observed that female enrollment in education has increased since 1991; however, the gender gap still persists in higher education. Women are concentrated in a few female-friendly disciplines. Enrollment of women in subjects such as mathematics, engineering, and technology remains very low. Women who opt for B.Sc. prefer to study life sciences rather than physical sciences. NEP 2020 states that as one proceeds from Grade 1 to Grade 12, the overall enrollment of students decreases, and this decline in enrollment becomes even more severe for SEDs "for female students within each of these SDGs and often even steeper in higher education." Keservani (2021) did a study about gender disparity in enrollment in higher technical education in the Varanasi district. The study was done in 3 private colleges and one government college of engineering and technology. It was found that 40 girls per 100 boys were enrolled in undergraduate courses of engineering and technology.

The gender gap in Indian higher education, while narrowing, remains significant. According to the AISHE 2021-2022 report, female enrollment in higher education in engineering and technology remains at 29.3 percent, unchanged from the 29.3 percent reported in the AISHE 2020-2021 report. This improvement does not reflect any progress, so it can be said that women are still underrepresented in STEM fields, with only 12,11,754 female students enrolled in Engineering and Technology programs in 2021-2022 compared to a total of 29,19,549 male students (Ministry of Education, 2021). These figures highlight the persistent gender disparity, especially in technical disciplines, requiring continued policy efforts.

5. REASONS OF GENDER GAP IN HIGHER EDUCATION

1. **Gender inequality and gender stereotypes:** gender stereotypes lead to gender inequality. Gender stereotypes tend to define the innate capabilities and attitudes of each sex, and social roles that are supposed to be appropriate for men, women, girls, and boys. When women are accorded a lower status in society, their education seems worthless. People who think that women's work is to manage the house, cook food, and take care of children, to them investing money to educate women is useless.
2. **Gender discrimination in schools and classrooms:** what students experience in schools and classrooms has a deep impact on their minds, which is reflected later in their lives as they grow up. Gender inequality may further influence the career an individual opts for and the stream they choose. Giving more attention to boys in schools or discouraging girls from taking Mathematics in higher classes may hamper the progress of girls.
3. **Gender discrimination in learning material:** gender discrimination in learning material occurs when there is-
 - 3.1 Exclusion- occurs when a gender is not included in the entire text or learning material. For example, if a text mentions about the contribution of human resources in the economic upliftment of a country in doing so if only the contribution of men is included and the contribution of women is totally absent then it means the text is excluding women or if a science textbook mentions only about the contribution of male scientist and contribution of female scientists are totally absent from the text
 - 3.2 Linguistic discrimination- when the language used in a text or learning material is gender insensitive, the learning material uses sexist language.
 - 3.2 Isolation of gender in texts- if in a text, only a few lines about women or one or two paragraphs are added, and it has no connection with the entire text, or only a few

pages are included in a book to show the inclusion of any particular gender. (NCERT, 2013b; NCERT,2006)

4. **Poverty:** Children from poorer families leave school and colleges due to their inability to pay fees or to help their parents earn money, which lands these individuals in low-paying jobs. Parents with a low-income level tend to prefer boys to receive a higher level of education than girls. For example, girls are often discouraged from pursuing higher education so that they can focus on household work, while male members may go out to earn money.
5. **Period poverty:** Period poverty is the problem menstruating people encounter when they are unable to afford proper menstrual products. Many menstruating girls drop out of school because of period poverty. (UNICEF, 2023).
6. **Inappropriate sanitation facility:** Many schools in developing nations have insufficient toilets and inadequate privacy measures, as well as poor water, sanitation, and hygiene facilities, so many students especially girls drop out of school and their chances of getting a higher education are nibbed in the but according to UNICEF, in India nearly half of the schools lack basic hand washing facility.
7. **Early marriage of girls and lower status of women in society:** Many people still hold the notion that husbands should have a higher level of education than their wives. Many parents discourage their daughters from getting a higher level of education because if a girl is highly educated, it will be more difficult to find a boy having higher education than a girl.
8. **Safety concerns:** The increase in the number of crimes against women created a sense of fear among people. Parents are hesitant to send their daughters to schools and colleges that are far from their residence.
9. **Lack of awareness:** People are unaware of the several government policies and schemes designed to increase women's participation in higher education.

6. SEVERAL GOVERNMENT EFFORTS TO REDUCE THE GENDER GAP IN EDUCATION

The Indian government has implemented various initiatives aimed at reducing the gender gap in education, targeting both school and higher education levels.

6.1 Reducing the Gender Gap at the School Level

The first step in reducing the gender gap in higher education is addressing the gender disparity at the school level. The Government of India has undertaken several measures to promote greater gender equality in education. Among these is Samagra Shiksha, a comprehensive program that spans from preschool to 12th grade. The program combines the objectives of three major initiatives: Sarva Shiksha Abhiyan (SSA), Rashtriya Madhyamik Shiksha Abhiyan (RMSA), and Teacher Education (TE). A key objective of Samagra Shiksha is to bridge the gender gap in school education by providing equal opportunities for girls across India (<https://dsel.education.gov.in/scheme/samagra-shiksha>)

Another important initiative is the Right to Education (RTE) Act, 2009, which mandates that every child has the right to a free and compulsory elementary education of satisfactory quality in a formal school setting. This law aims to reduce gender disparities by ensuring that both boys and girls receive education in line with certain standards (<https://dsel.education.gov.in/rte>)

Moreover, Kasturba Gandhi Balika Vidyalayas (KGBVs), a scheme launched by the government, provides educational opportunities for girls aged 10-18 from marginalized communities, including Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward

Classes (OBC), minority groups, and families living Below the Poverty Line (BPL). This initiative seeks to increase the enrollment and retention of girls in education, particularly in rural and educationally backward areas (<https://samagra.education.gov.in/kgbv.html>)

6.2 Reducing the Gender Gap in Higher Education

At the higher education level, the Indian government has introduced several programs to encourage greater female participation in various academic fields. One such initiative is the postgraduate Indira Gandhi scholarship for single girl children. This scholarship is specifically for single girl children pursuing their first year of a Master's degree at a recognized university or postgraduate college. The scheme aims to support the higher education of girls in families where the daughter is the only child, or the sole girl child in a family with one son and one daughter. The scholarship excludes students enrolled in distance education courses (https://www.ugc.gov.in/oldpdf/xiplanpdf/revisedIG_SGC_guideline24aug09.pdf).

Additionally, the Swami Vivekananda single girl child scholarship for research in social sciences is designed to support single girl children enrolled in full-time Ph.D. programs in social sciences at recognized institutions. Similar to the previous scholarship, this scheme excludes students pursuing distance learning courses (https://www.ugc.gov.in/pdfnews/1555717_guidelines-SWAMI-Vivekananda.pdf).

The government also offers post-doctoral fellowships for women candidates to encourage their involvement in advanced research in various academic fields, including humanities, social sciences, and science and technology. This fellowship is awarded to women who have completed their Ph.D. and are not currently employed, thereby providing them with an opportunity to pursue post-doctoral research (<https://www.ugc.ac.in/pdfw>) (Kesarwani, 2021).

Another notable initiative is the UDAAN Project, launched by the Central Board of Secondary Education (CBSE). The project aims to bridge the gap in girls' enrollment in prestigious engineering institutions by providing free study support for girls from economically disadvantaged backgrounds, including those from SC/ST and minority communities. UDAAN helps girls from government schools and CBSE-affiliated institutions to better prepare for engineering entrance examinations (Kesarvani, 2021).

Finally, the PRAGATI initiative, sponsored by the All-India Council for Technical Education (AICTE), offers scholarships to girls pursuing degrees or diplomas in technical education. The scholarship provides financial assistance of up to ₹50,000 per year, with a maximum of two girls per family eligible for support. It is available for a period of up to four years at the degree level and three years at the diploma level (Kesarvani, 2021).

These efforts are part of the broader government strategy to address gender inequality in education, aiming to empower women through improved access to education at both primary and tertiary levels.

7. STRATEGIES FOR REDUCING THE GENDER GAP IN HIGHER EDUCATION

7.1 Raising Awareness About Gender Issues: Educating people about gender discrimination and its detrimental effects on individuals and society is critical to fostering equality. Studies have highlighted the importance of sensitization to challenge entrenched stereotypes and biases (Sadker & Sadker, 1985; Kabeer, 2005).

7.2 Gender-Inclusive Schools: Creating gender-inclusive environments in schools and classrooms plays a foundational role in bridging the gender gap in higher education.

Inclusive practices, such as mixed-gender seating arrangements and equal opportunities in classroom participation, can contribute to long-term behavioural changes (NCERT, 2013b).

- 7.3 **Teacher Training and Awareness:** Teachers serve as pivotal role models for students. Research indicates that gender stereotypes held by educators can unconsciously influence students' subject choices and performance, ultimately shaping their educational trajectories (Rakshit & Sahoo, 2023; Bian et al., 2017). Training programs should focus on raising teachers' awareness of such biases to promote equitable learning environments.
- 7.4 **Gender-Sensitive Curriculum:** Developing curricula that challenge traditional gender roles is essential at both the school and college levels. Textbooks should avoid perpetuating stereotypes and instead promote gender equity. Research supports the role of inclusive curricula in fostering critical thinking and reducing bias (Subrahmanian, 2005).
- 7.5 **Gender Audits:** Conducting gender audits in higher education institutions can identify gaps in enrollment, retention, and access to resources. Studies suggest that audits help highlight disparities and provide policymakers and educators with actionable insights (Hazarika & Madhukullya, 2024).
- 7.6 **Encouraging Research on Gender Issues:** There is a notable lack of research on gender dynamics in fields such as engineering and technology. Promoting studies on these topics can provide data-driven strategies to address disparities.
- 7.7 **Addressing Violence Against Women:** Sexual and gender-based violence significantly discourages female participation in higher education. The National Education Policy 2020 recommends measures such as providing bicycles and forming walking groups to enhance safety and encourage attendance, particularly in rural areas (NEP, 2020).
- 7.8 **Improving Sanitation Facilities:** Adequate sanitation, including clean and private toilet facilities, is essential for female students' comfort and dignity in higher education settings. Poor sanitation has been shown to disproportionately affect female students' attendance and retention.
- 7.9 **Reducing Period Poverty:** Efforts to address period poverty, such as providing affordable menstrual hygiene products and raising awareness, are crucial. Partnerships with NGOs and self-help groups can play a significant role in this regard.

8. CONCLUSION

Bridging the gender gap in Indian higher education has been a long and challenging journey shaped by historical, social, and policy influences. In the 19th century, women's education faced significant barriers, but by the late 19th and early 20th centuries, progress began to take root with institutions like the University of Calcutta and Bombay University allowing women to enroll in higher education. The post-independence period saw further expansion through policies such as the NEP 1986 and the Program of Action (1992), which promoted gender equality in education. The NEP 2020 reinforced these efforts by prioritizing gender inclusivity (Government of India, 1986, 2020).

The AISHE, 2020-21 revealed that female enrollment in higher education reached 48.67 per cent, showing improvement. However, a significant gender disparity, especially in STEM fields. Female participation in Engineering and technology was only approximately 29 per cent, contrasting with 52 per cent female enrollment in B.A. program (Ministry of Education, 2021). Gender biases and societal norms continue to discourage women from pursuing technical and scientific careers.

Various factors, including cultural stereotypes, safety concerns, and financial limitations, hinder women's participation in higher education. To address these, the government has launched schemes such as the Pragati Scholarship and created gender cells in universities to combat discrimination. While progress has been made, continued efforts, including gender-sensitive curricula, promoting female role models, and improving infrastructure, are needed to close the gender gap fully. As per the AISHE 2021-22 report, challenges in STEM fields persist, with only 29.3 per cent female enrollment in Engineering and Technology, showing no improvement from the previous report (Ministry of Education, 2022). India has made notable strides in bridging the gender gap, but further policy reforms and societal changes are necessary to ensure gender parity in higher education. This will unlock the potential of India's female population and contribute to its sustainable development.

REFERENCES

- Bassi, T. (2022). *Women's development initiatives in education*. IGNOU. Retrieved from <https://egyankosh.ac.in/handle/123456789/84645>
- Bian, L., Leslie, S.-J., & Cimpian, A. (2017). Gender stereotypes about intellectual ability emerge early and influence children's interests. *Science*, 355(6323), 389–391. <https://doi.org/10.1126/science.aah6524>
- Census of India. (1991). *Census of India 1991*. Office of the Registrar General & Census Commissioner, India. <https://censusindia.gov.in/>
- Census of India. (2011). *Census of India 2011*. Office of the Registrar General & Census Commissioner, India. <https://censusindia.gov.in/>
- Hazarika, A., & Madhukulya, S. (2024). Advancing gender equality through gender budgeting and auditing: A framework for gender-neutral budgetary allocations in India. *Journal of Innovations in Business and Industry*, 2(3), 123–130. <https://jibi.aspur.rs/archive/v2/n3/1.pdf>
- Kabeer, N. (2005). Gender Equality and Women's Empowerment: A Critical Analysis of the Third Millennium Development Goal. *Gender and Development*, 13(1), 13–24. <http://www.jstor.org/stable/20053132>
- Kesarvani, D. (2021). *Gender disparity in enrollment in higher technical education: A study of Varanasi district* [Doctoral thesis, Banaras Hindu University]. Shodhganga. <http://hdl.handle.net/10603/437181>
- Ministry of Education. (2021). *All India Survey on Higher Education 2020-2021*. Government of India. <https://aishe.gov.in/>
- Ministry of Education. (2022). *All India Survey on Higher Education 2021-2022*. Government of India. <https://aishe.gov.in/>
- National Council of Educational Research and Training (NCERT). (2013a). *Training material for teacher educators on gender equality and empowerment: Perspectives on gender and society* (Vol. I).
- National Council of Educational Research and Training (NCERT). (2013b). *Training material for teacher educators on gender equality and empowerment: Gender and schooling processes* (Vol. II).

National Council of Educational Research and Training (NCERT). (2013a). *Training material for teacher educators on gender equality and empowerment: Perspectives on gender and society* (Vol. I).

National Council of Educational Research and Training (NCERT). (2013b). *Training material for teacher educators on gender equality and empowerment: Gender and schooling processes* (Vol. II).

Rakshit, S., & Sahoo, S. (2023). Biased teachers and gender gap in learning outcomes: Evidence from India. *Journal of Development Economics*, 161, 103041. <https://doi.org/10.1016/j.jdeveco.2022.103041>

Sadker, D., & Sadker, M. (1985). Is the OK classroom OK?. *The Phi Delta Kappan*, 66(5), 358-361. <http://www.jstor.org/stable/20387346>

Subrahmanian, R. (2005). Gender equality in education: Definitions and measurements. *International Journal of Educational Development*, 25(4), 395–407. <https://doi.org/10.1016/j.ijedudev.2005.04.003>

UNESCO. (2015). *A guide for gender equality in teacher education policy and practices*. <https://unesdoc.unesco.org/ark:/48223/pf0000231646>

UNESCO. (2019). *From access to empowerment: UNESCO strategy for gender equality in and through education 2019-2025*. <https://unesdoc.unesco.org/ark:/48223/pf0000369000>

UNICEF. (n.d.). *Clean India- clean schools*. Retrieved December 18, 2022, from <https://www.unicef.org/india/what-we-do/clean-india-clean-schools>

UNICEF. (2020). *UNFPA-UNICEF global programme to end child marriage country profile: India*. <https://www.unicef.org/documents/child-marriage-country-profiles>

UNICEF. (2023). *Period poverty: Impact of taboos and barriers on information and resources for menstrual health and hygiene*. <https://www.unicef.org/mena/media/24606/file/Periodpercent20Poverty.pdf>

University Grants Commission (UGC). (n.d.). *Post Graduate Indira Gandhi Scholarship for Single Girl Child*. Government of India. Retrieved December 18, 2022, from https://www.ugc.gov.in/oldpdf/xiplanpdf/revisedIG_SGC_guideline24aug09.pdf

University Grants Commission (UGC). (n.d.). *Swami Vivekananda Single Girl Child Scholarship for Research in Social Sciences*. Government of India. Retrieved December 18, 2022, from https://www.ugc.gov.in/pdfnews/1555717_guidelines-SWAMI-Vivekananda.pdf

World Economic Forum. (2022). *Global gender gap report 2022 insight report*. https://www3.weforum.org/docs/WEF_GGGR_2022.pdf