

Data Article

Trend of Female Enrolment in STEMat Higher Education Level in India

ABSTRACT:

Participation of women in science, technology, and engineering is not only an important aspect in the social and economic development of the nation; it is a critical constituent in the process of improving the quality of life of women themselves. In science, technology, and engineering education only the participation of men is not enough, women's participation is equally important because in India women constitute half of mankind (47.5 %). Women play a very important role in the progress of a family, society, and country and contribute their bit to the national economy. Through science, technology, and engineering education, women contribute to the empowerment of themselves. This study aims to examine the position of women in science, technology, and engineering education programs at higher education in India through the Annual Report of the All-India Survey on Higher Education (AISHE) Department of Higher Education, Ministry of Education, Government of India, from 2013-14 to 2019-2020. This was a qualitative and documentary research. **The study found that enrolment trend of female students among Others Backward Classes (OBC) in STEM comparatively higher than General SC,ST female students in six years.** Enrolment in engineering and technology is not hopeful, the enrolment growth rate is very little and discontinuous, gender gap exists. **The study concludes that the enrolment growth rate of female students in STEM in six years gradually increasing.** The study suggests remedial measures to overcome constraints faced by females in pursuing science, engineering, and technology education.

Keywords: Science, Engineering, Technology, Higher Education, Enrolment, India.

INTRODUCTION:

Now recognized by all modern societies that education and career are not only the right but also a key factor that contributes to the economic and social development of the country. In

the Indian context, women have entered all disciplines of science and technology. Science, technology, and engineering all have been part of our human progress. Education of women elevate human capital, expands, and enables economic opportunities, and engage women as leaders. Women and men together have researched and solved each emerging need. They contributed in all the ways there are to the advancement of humanity. Women are a powerful force and they were as resourceful and passionate about their work and certainly as creative and they equally contributed to the economic and social development of the country. Without women, science, technology, and engineering to miss out on new innovative ideas. The literature review demonstrates that investment in women, and more specifically women 's education, has numerous positive effects on not only women but also their children and families. These outcomes not only improve the quality of life of women and families but also combat poverty and foster economic growth. Science, engineering, and technology can improve or develop concepts, theories, models, techniques instrumentation, software, operational methods, etc. It is a probe that a woman is the main creator of any new creation. So, it is very important to engage girls in the fields of science, engineering, and technology at higher education levels.

The present study explored the position of women in science, technology, and engineering education programs at higher education in India through the Annual Report of the All-India Survey on Higher Education (AISHE) Department of Higher Education, Ministry of Education, Government of India, from 2013-14 to 2019-2020.

REVIEW OF RELATED LITERATURES:

Findings of existing literatures on women in science, engineering and technology indicate that the underrepresentation of women faculty differs across the STEM disciplines at IITs in India. A significant gap between males and females in faculty positions at IITs also exist. (Amirtham and Kumar 2023). Gender parity in overall disciplines at under-graduation, post-graduation, and M.Phil. levels. In STEM disciplines, enrolment of females is higher than males in biological sciences at all levels, but physical sciences show lower enrolment of females. Computer engineering, information technology, and electronics engineering have shown improvement in the enrolment of females within the engineering and technology category. Gender parity is poor in mechanical engineering, civil engineering, and electrical engineering at all levels of higher education (Amirtham and Kumar 2021). The underrepresentation of women in the science and technology community is depicted, primarily

highlighting the male-dominated technology-driven Indian institutions (Swarup and Dey, 2020). Women in an engineering college, this article demonstrates that the increase in their participation is specific to computer-related fields in engineering and directly related to a vibrant market. Although there is no radical shift in the traditional “patrifocal” ideology, the trend of a growing number of women engineers reflects the forces of change demonstrating that the masculine “image” is not static either in time or space (Gupta, 2012).

Based on the previous literature search, it was evident that previous research has been done variously on different higher education level programs but no research done on the current and updated information on women's enrolment in science engineering, and technology at higher education levels in India. This inspires the researchers to research on this topic.

STATEMENT OF THE PROBLEM:

The current study stated as “Trend of Female Enrolment in STEM at Higher Education Level in India.”

RATIONALE OF THE STUDY:

- Women are a powerful force and they were as resourceful and passionate about their work and certainly as creative and they equally contributed to the economic and social development of the country.
- The literature review demonstrates that investment in women, and more specifically women's education, has numerous positive effects on not only women but also their children and families. These outcomes not only improve the quality of life of women and families but also combat poverty and foster economic growth.
- It is a probe that a woman is the main creator of any new creation. So, it is very important to engage girls in the fields of science, engineering, and technology at higher education levels.

From the above-mentioned ground, the study was justified.

OBJECTIVES:

Objectives of the study were-

1. To examine the enrolment status of women in Bachelor of Science (B.Sc.) in India.

2. To study the enrolment status of women in Masters of Science (M.Sc.) in India.
3. To examine the enrolment status of women in Bachelor of Technology (B.Tech.) in India.
4. To study the enrolment status of women in Masters of Technology (M.Tech.) in India.
5. To examine the enrolment status of women in Bachelor of Engineering (B.E.) in India.
6. To study the enrolment status of women in Masters of Engineering (M.E.) in India.

DELIMITATION:

Delimitation of the study are-

- In this study, higher education levels consist of undergraduate and postgraduate levels.
- The study has been carried out on the basis of the enrolment of the academic session 2013-14 to 2019-2020 of the All-India Survey on Higher Education (AISHE) Department of Higher Education, Ministry of Education, Govt. of India.
- This study showed the position of women in science, technology and engineering only.

DEFINITION OF TERMS USED IN THE STUDY:

- **Science:** Science can be divided into different branches based on the subject of study. In this study, the term 'science' refers to Bachelor of Science and Masters of science (B.Sc. & M.Sc.).
- **Technology:** Technology education is the study of technology. It is designed to teach students to be prepared for several technology-related fields and to learn about technology within specific fields of study. In this study, the term 'technology' refers to Bachelor of Technology and Masters of Technology (B.Tech. & M.Tech.).
- **Engineering:** Engineering education is the activity of teaching knowledge and principles to the professional practice of engineering. It includes an initial education (bachelor's and/or master's degree), and any advanced education and specializations that follow. In this study, the term 'engineering' refers to Bachelor of Engineering and Masters of Engineering (B.E. & M.E.).

METHODOLOGY OF THE STUDY:

This study was qualitative and documentary in nature. As a source of data researcher used Annual Report of All India Survey on Higher Education (AISHE) Department of Higher education, Ministry of Education, Govt. of India., 2013-14 to 2019-2020, and information has been collected from various books, Research Article, Magazines, Research Journal, E-journal, Annual Report of UGC, and Report of the Higher Education Department of West Bengal and also from the Higher Education Department of India.

DATA ANALYSIS AND INTERPRETATION: Objective-wise

Analysis of objective 1: To examine the enrolment status of women in Bachelor of Science (B.Sc.) in India.

Table 1: Enrolment status of women in Bachelor of Science (B.Sc.) in India.

Year	All Category				Scheduled Caste				Scheduled Tribe				Other Backward Classes			
	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate
2013-14	3183423	1541143	48.41	..	396484	183123	46.18	..	130109	58914	45.28	..	1210272	609466	50.35	..
2014-15	4036977	1921561	47.59	-0.82	532175	242406	45.55	-0.63	164311	73876	44.96	-0.32	1602297	784727	48.97	-1.38
2015-16	4287838	2057993	47.99	0.4	572981	265735	46.37	0.82	175727	81283	46.25	1.29	1760910	862935	49.00	0.03
2016-17	4677516	2259760	48.31	0.32	633281	292919	46.25	-0.12	194170	91240	46.98	0.73	1957031	967438	49.43	0.43
2017-18	4819196	2375753	49.29	0.98	669793	319280	47.66	1.41	204432	98423	48.14	1.16	2116488	1075927	50.83	1.4
2018-19	4680159	2419059	51.68	2.39	652922	329894	50.52	2.86	218151	108271	49.63	1.49	2095626	1117219	53.31	2.48
2019-20	4706869	2460074	52.26	0.58	661863	339715	51.32	0.8	225245	115169	51.13	1.5	225245	115169	51.13	-2.18

Source: Annual report of All India Survey on Higher Education (AISHE) Department of Higher Education, Ministry of Education, Govt. of India., 2013-2014 to 2019-2020.

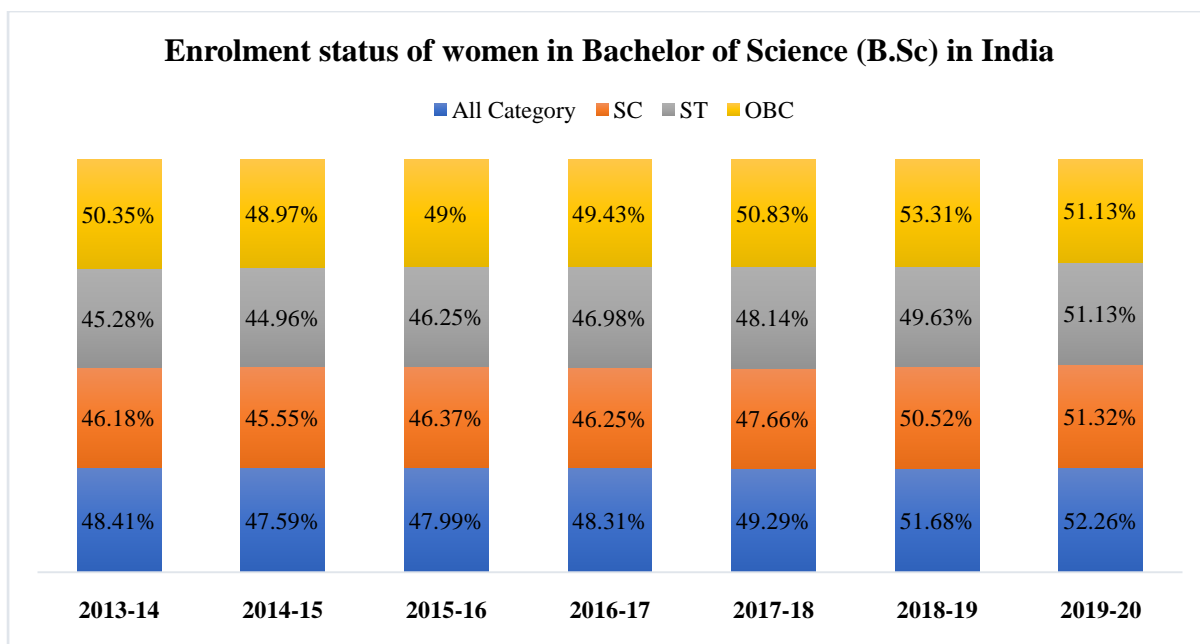


Figure 1:Enrolment status of women in Bachelor of Science (B.Sc) in India.

Interpretation: Table showed social category-wise enrolment status of females in Bachelor of Science (B.Sc) in the last seven years (2013-14 to 2019-20) is hopeful. Highest enrolment of all category females was 52.26% in the academic session of (2019-20) and highest enrolment growth rate was 2.39% in the academic session (2018-19) and lowest enrolment growth rate was -0.82% in the academic session (2014-15). Enrolment status of SC category females is hopeful, highest enrolment of SC category females was 51.32% in the academic session of (2019-20) and highest enrolment growth rate was 2.86 % in the academic session (2018-19) and lowest enrolment growth rate was -0.63% in the academic session (2014-15). Enrolment status of ST category females is hopeful, highest enrolment of ST category females was 51.13 % in the academic session of (2019-20) and highest enrolment growth rate was 1.69% in the academic session (2019-20) and lowest enrolment growth rate was -0.32% in the academic session (2014-15). Enrolment status of OBC category females is hopeful, highest enrolment of OBC category females was 53.31% in the academic session of (2018-19) and highest enrolment growth rate was 2.48% in the academic session (2018-19) and lowest enrolment growth rate was -2.18 % in the academic session (2019-20).

Analysis of objective 2: To study the enrolment status of women in Masters of Science(M.Sc.) in India.

Table 2: Enrolment status of women in Masters of Science (M.Sc.) in India.

Year	All Category				Scheduled Caste				Scheduled Tribe				Other Backward Classes			
	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate
2013-14	125970	60470	48.00	..	10222	4669	45.67	..	2744	1060	38.62	..	42571	24138	56.70	..
2014-15	108962	55807	51.21	3.21	9129	4258	46.64	0.97	3122	1169	37.44	-1.18	33751	19309	57.21	0.51
2015-16	96367	48964	50.80	-0.41	8671	3992	46.03	-0.61	3004	1126	37.48	0.04	31628	17153	54.23	-2.98
2016-17	113938	57435	50.40	-0.4	14904	7072	47.45	1.42	3356	1251	37.27	-0.21	39570	21572	54.51	0.28
2017-18	105507	49765	47.16	-3.24	10919	5437	49.79	2.34	4034	1985	49.20	11.93	51201	23232	45.37	-9.14
2018-19	74103	41529	56.04	8.88	8067	4009	49.69	-0.1	2474	1029	41.59	-7.61	34182	20703	60.56	15.19
2019-20	109459	60409	55.18	-0.86	10699	5185	48.46	-1.23	3601	1506	41.82	0.23	43712	24321	55.63	-4.93

Source: Annual report of All India Survey on Higher Education (AISHE)
Department of Higher Education, Ministry of Education, Govt. of India., 2013-2014 to 2019-2020.

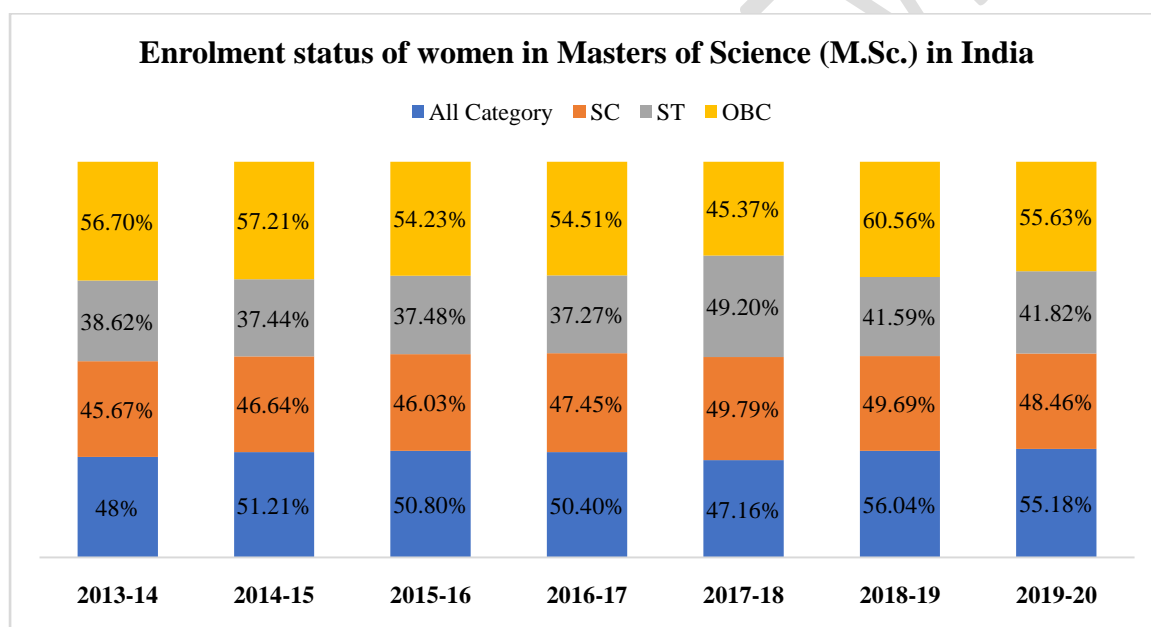


Figure 2: Enrolment status of women in Masters of Science (M.Sc.) in India.

Interpretation: Table showed social category-wise enrolment status of females in Masters of Science (M.Sc.) in the last seven years (2013-14 to 2019-20) is hopeful. Highest enrolment of all category females was 56.04% in the academic session of (2018-19) and highest enrolment growth rate was 8.88% in the academic session (2018-19) and lowest enrolment growth rate was -3.24% in the academic session (2017-18). Enrolment status of SC category females is hopeful, highest enrolment of SC category females was 49.79% in the academic session of (2017-18) and highest enrolment growth rate was 2.34% in the academic session (2017-18) and lowest enrolment growth rate was -1.23% in the academic session (2019-20). Enrolment

status of ST category females is hopeful, highest enrolment of ST category females was 49.20% in the academic session of (2017-18) and highest enrolment growth rate was 11.93% in the academic session (2017-18) and lowest enrolment growth rate was -7.61% in the academic session (2018-19).Enrolment status of OBC category females is hopeful, highest enrolment of OBC category females was 60.56% in the academic session of (2018-19) and highest enrolment growth rate was 15.19% in the academic session (2018-19) and lowest enrolment growth rate was -9.14% in the academic session (2017-18).

Analysis of objective 3: To examine the enrolment status of women in Bachelor of Technology (B.Tech.) in India.

Table 3: Enrolment status of women in Bachelor of Technology (B.Tech.) in India.

Year	All Category				Scheduled Caste				Scheduled Tribe				Other Backward Classes			
	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate
2013-14	2115155	584408	27.62	..	186105	49188	26.43	..	55980	13338	23.82	..	566171	170810	30.16	..
2014-15	2199213	594039	27.01	-0.61	211914	53868	25.41	-1.02	63951	15019	23.48	-0.34	629995	184202	29.23	-0.93
2015-16	2181870	583221	26.73	-0.28	217663	53879	24.75	-0.66	63137	14863	23.54	0.06	643082	184529	28.69	-0.54
2016-17	2172134	590194	27.17	0.44	219274	55927	25.50	0.75	67218	15778	23.47	-0.07	650524	188566	28.98	0.29
2017-18	2119942	585584	27.62	0.45	221031	58630	26.52	1.02	66397	15874	23.90	0.43	657834	193791	29.45	0.47
2018-19	2125043	595159	28.00	0.38	221003	61112	27.65	1.13	68082	17060	25.05	1.15	675744	200216	29.62	0.17
2019-20	2147962	611831	28.48	0.48	219191	62328	28.43	0.78	68635	17560	25.58	0.53	685927	204473	29.80	0.18

*Source: Annual report of All India Survey on Higher Education (AISHE)
Department of Higher Education, Ministry of Education, Govt. of India., 2013-2014 to 2019-2020*

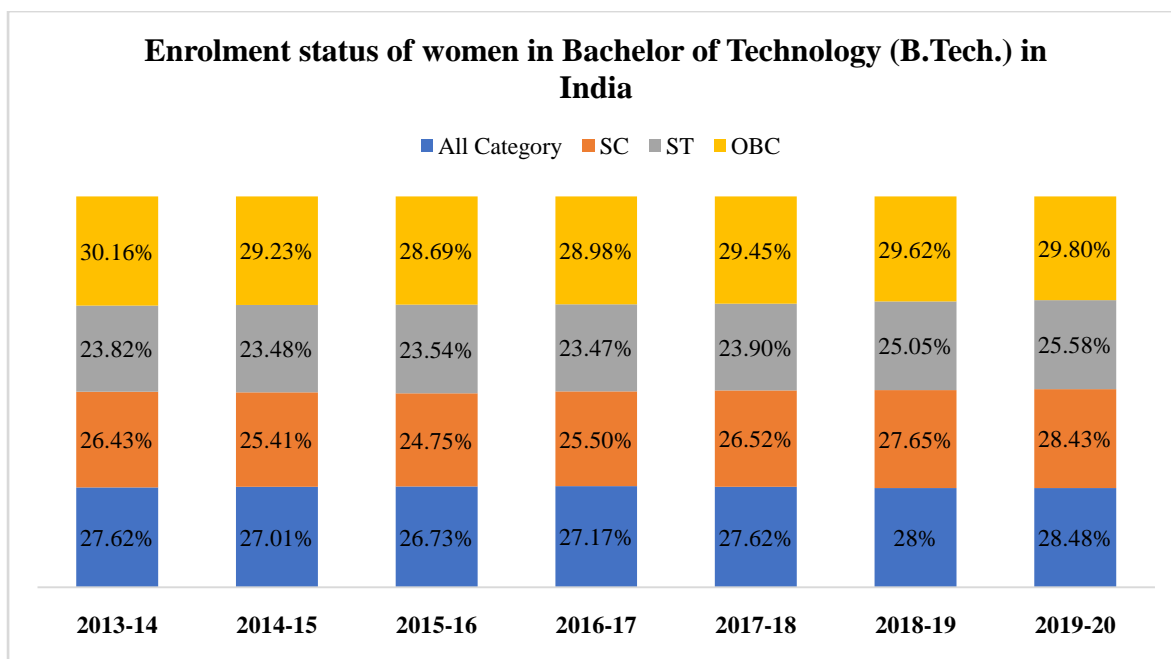


Figure 3:Enrolment status of women in Bachelor of Technology (B.Tech.) in India.

Interpretation: Table showed social category-wise enrolment status of females in Bachelor of Technology (B.Tech.) in the last seven years (2013-14 to 2019-20) is hopeful. Highest enrolment of all category females was 28.48% in the academic session of (2019-20) and highest enrolment growth rate was 0.48% in the academic session (2019-20) and lowest enrolment growth rate was -0.61% in the academic session (2014-15).Enrolment status of SC category females is hopeful, highest enrolment of SC category females was 28.43% in the academic session of (2019-20) and highest enrolment growth rate was 1.13% in the academic session (2018-19) and lowest enrolment growth rate was -1.02% in the academic session (2014-15).Enrolment status of ST category females is hopeful, highest enrolment of ST category females was 25.58% in the academic session of (2019-20) and highest enrolment growth rate was 1.15% in the academic session (2018-19) and lowest enrolment growth rate was -0.34% in the academic session (2014-15).Enrolment status of OBC category females is hopeful, highest enrolment of OBC category females was 30.16% in the academic session of (2013-14) and highest enrolment growth rate was 0.47% in the academic session (2017-18) and lowest enrolment growth rate was -0.93% in the academic session (2014-15).

Analysis of objective 4: To study the enrolment status of women in Masters of Technology (M.Tech.) in India.

Table 4: Enrolment status of women in Masters of Technology (M.Tech.) in India.

Year	All Category				Scheduled Caste				Scheduled Tribe				Other Backward Classes			
	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate
2013-14	178325	64992	36.44	..	16596	5304	31.95	..	4550	1311	28.81	..	46133	16534	35.83	..
2014-15	208905	77537	37.11	0.67	20858	7085	33.96	1.74	6401	1777	27.76	-1.05	58940	21512	36.49	0.66
2015-16	192066	71590	37.27	0.16	20823	7222	34.68	0.72	11594	5846	50.42	22.66	123051	59641	48.46	11.97
2016-17	160895	59259	36.83	-0.44	18099	6258	34.57	-0.11	4954	1582	31.93	-18.49	46540	17335	37.24	-11.22
2017-18	142084	50596	35.60	-1.23	16312	5658	34.68	0.11	4305	1367	31.75	-0.18	41850	15158	36.21	-1.03
2018-19	135500	47420	34.99	-0.61	15762	5482	34.77	0.09	4196	1285	30.62	-1.13	40112	14366	35.81	-0.4
2019-20	137051	45498	33.19	-1.8	15920	5450	34.23	-0.54	4294	1250	29.11	-1.51	40927	14106	34.46	-1.35

Source: Annual report of All India Survey on Higher Education (AISHE) Department of Higher Education, Ministry of Education, Govt. of India., 2013-2014 to 2019-2020.

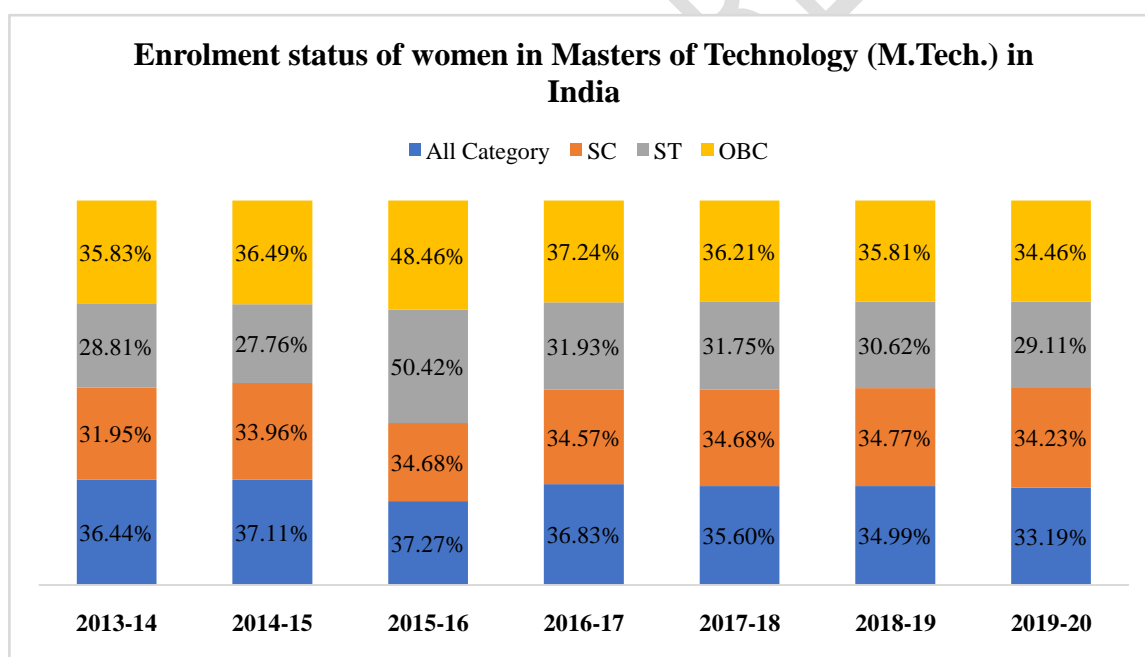


Figure 4: Enrolment status of women in Masters of Technology (M.Tech.) in India.

Interpretation: The table shows that social category-wise enrolment status of females in Masters of Technology (M.Tech.) in the last seven years (2013-14 to 2019-20) is hopeful. Highest enrolment of all category females was 37.27% in the academic session of (2015-16) and highest enrolment growth rate was 0.67% in the academic session (2014-15) and lowest enrolment growth rate was -1.23% in the academic session (2019-20). The enrolment status of SC category females is hopeful, highest enrolment of SC category females was 34.77% in the

academic session of (2018-19) and highest enrolment growth rate was 1.74% in the academic session (2014-15) and lowest enrolment growth rate was 0.54% in the academic session (2019-20). Enrolment status of ST category females is hopeful, highest enrolment of ST category females was 31.93% in the academic session of (2016-17) and highest enrolment growth rate was 22.66% in the academic session (2015-16) and lowest enrolment growth rate was -18.49% in the academic session (2016-17). Enrolment status of OBC category females is hopeful, highest enrolment of OBC category females was 48.46% in the academic session of (2015-16) and highest enrolment growth rate was 11.97% in the academic session (2015-16) and lowest enrolment growth rate was -11.22% in the academic session (2016-17).

Analysis of objective 5: To examine the enrolment status of women in Bachelor of Engineering (B.E. in India.

Table 5: Enrolment status of women in Bachelor of Engineering (B.E.) in India.

Year	All Category				Scheduled Caste				Scheduled Tribe				Other Backward Classes			
	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate
2013-14	1896153	541884	28.57	..	175395	53520	30.51	..	36564	9866	26.98	..	736651	225346	30.59	..
2014-15	1968107	561809	28.54	-0.03	195691	60753	31.04	0.53	40407	10467	25.90	-1.08	786881	240556	30.57	-0.02
2015-16	2003022	570043	28.45	-0.09	212084	67264	31.71	0.67	43519	11295	25.95	0.05	809352	246354	30.43	-0.14
2016-17	1913625	552190	28.85	0.4	219883	71711	32.61	0.9	44845	12109	27.00	1.05	797453	243964	30.59	0.16
2017-18	1820155	523220	28.74	-0.11	223426	75669	33.86	1.25	42828	11981	27.97	0.97	782629	236646	30.23	-0.36
2018-19	1645906	474971	28.85	-0.11	204110	69298	33.95	0.09	40071	11396	28.43	0.46	717463	217241	30.27	0.04
2019-20	1496083	433689	28.98	0.13	180920	62385	34.48	0.53	35568	10405	29.25	0.82	659640	201734	30.58	0.31

*Source: Annual report of All India Survey on Higher Education (AISHE)
Department of Higher Education, Ministry of Education, Govt. of India., 2013-2014 to 2019-2020.*

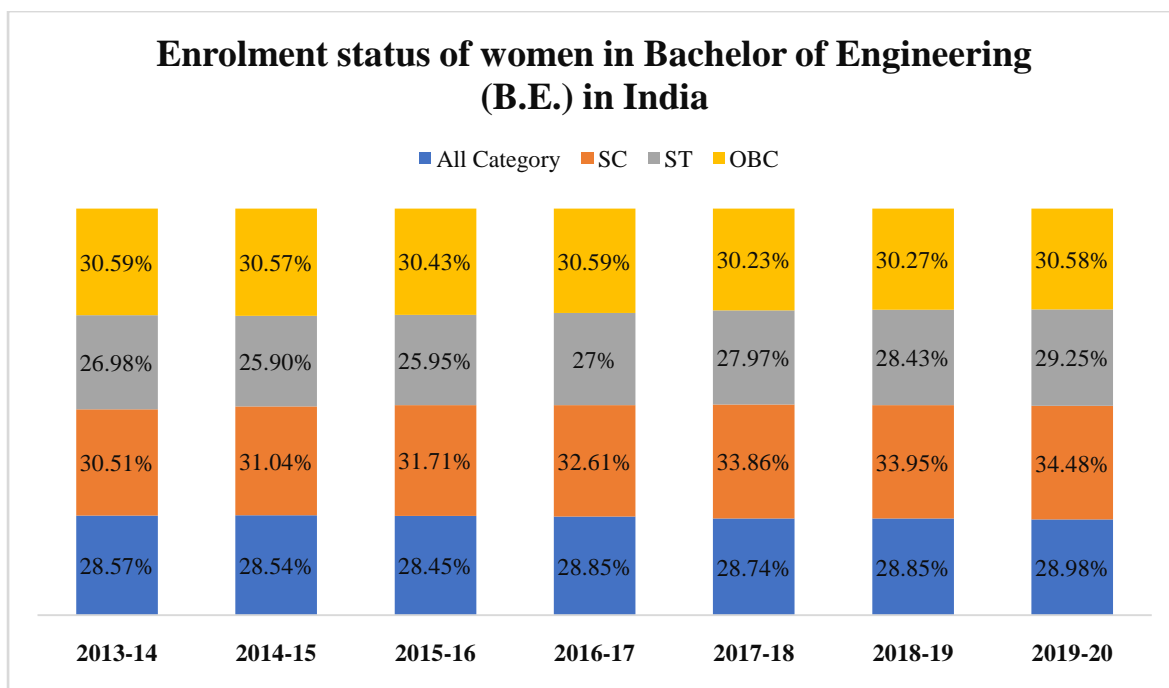


Figure 5:Enrolment status of women in Bachelor of Engineering (B.E.) in India.

Interpretation: Table showed social category-wise enrolment status of females in Bachelor of Engineering (B.E.) in the last seven years (2013-14 to 2019-20) is not hopeful. Highest enrolment of all category females was 28.98% in the academic session of (2019-20) and highest enrolment growth rate was 0.13% in the academic session (2019-20) and lowest enrolment growth rate was -0.11% in the academic session (2017-18).Enrolment status of SC category females is hopeful, highest enrolment of SC category females was 34.48% in the academic session of (2019-20) and highest enrolment growth rate was 1.25% in the academic session (2017-18) and lowest enrolment growth rate was 0.09% in the academic session (2018-19).Enrolment status of ST category females is hopeful, highest enrolment of ST category females was 29.25% in the academic session of (2019-20) and highest enrolment growth rate was 1.05% in the academic session (2016-17) and lowest enrolment growth rate was -1.08% in the academic session (2014-15).Enrolment status of OBC category females is hopeful, highest enrolment of OBC category females was 30.59% in the academic session of (2013-14) and highest enrolment growth rate was 0.31% in the academic session (2019-20) and lowest enrolment growth rate was -0.36% in the academic session (2017-18).

Analysis of objective 6: To study the enrolment status of women in Masters of Engineering (M.E.) in India.

Table 6: Enrolment status of women in Masters of Engineering (M.E.) in India.

Year	All Category				Scheduled Caste				Scheduled Tribe				Other Backward Classes			
	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate	Total (Male & Female)	Total Female	Percent age (%) of Female	Growth rate
2013-14	77130	32674	42.36	..	6697	2616	39.06	..	963	272	28.24	..	32421	15323	47.26	..
2014-15	76721	33589	43.78	1.42	7519	3091	41.10	2.04	1012	341	33.69	5.45	32153	15756	49.00	1.74
2015-16	64405	28479	44.21	0.43	6968	2962	42.50	1.4	1007	333	33.06	-0.63	24857	11968	48.14	-0.86
2016-17	50315	21290	42.31	-1.9	6695	2729	40.76	-1.74	948	327	34.49	1.43	19169	8861	46.22	-1.92
2017-18	45481	18982	41.73	-0.58	7483	3118	41.66	0.9	800	257	32.12	-2.37	17811	8300	46.60	-0.38
2018-19	41166	17379	42.21	0.48	6683	2916	43.63	1.97	779	256	32.86	0.74	16477	7803	47.35	0.75
2019-20	31329	20187	64.43	22.22	2887	1928	66.78	23.15	821	252	30.69	-2.17	13390	6103	45.57	-1.78

Source: Annual report of All India Survey on Higher Education (AISHE)

Department of Higher Education, Ministry of Education, Govt. of India., 2013-2014 to 2019-2020.

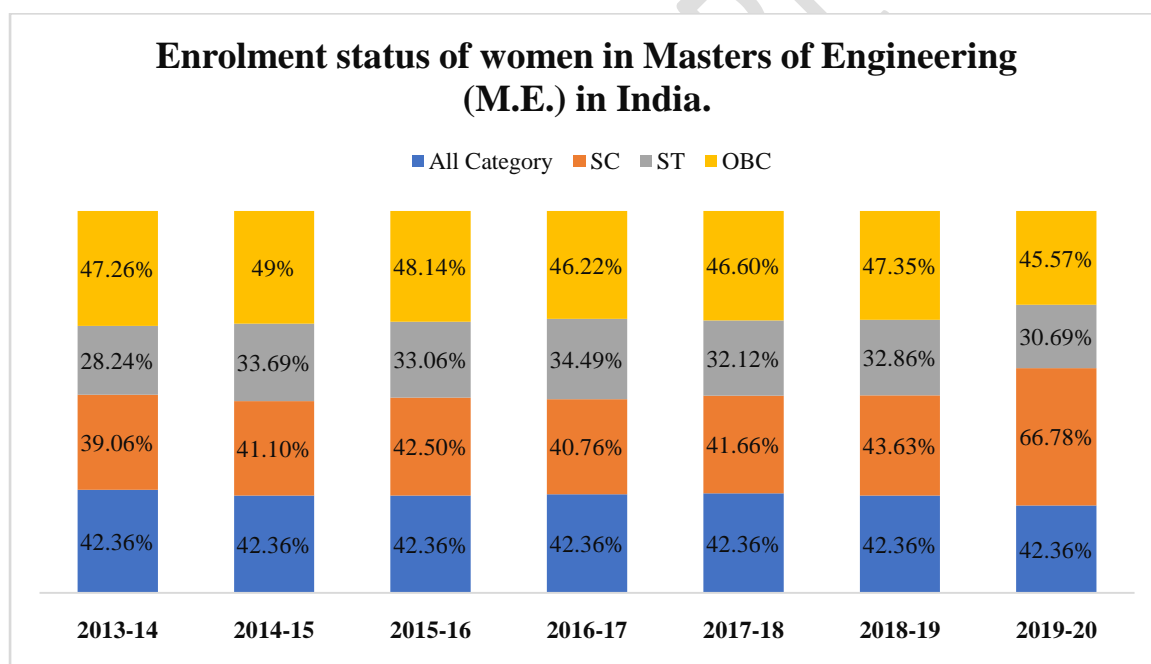


Figure 6: Enrolment status of women in Masters of Engineering (M.E.) in India.

Interpretation: Table showed social category-wise enrolment status of females in Bachelor of Engineering (M.E.) in the last seven years (2013-14 to 2019-20) is hopeful. Highest enrolment of all category females was 64.43% in the academic session of (2019-20) and highest enrolment growth rate was 22.22% in the academic session (2019-20) and lowest enrolment growth rate was -1.9% in the academic session (2016-17). Enrolment status of SC category females is hopeful, highest enrolment of SC category females was 66.78% in the

academic session of (2019-20) and highest enrolment growth rate was 23.15% in the academic session (2019-20) and lowest enrolment growth rate was -1.74% in the academic session (2016-17). Enrolment status of ST category females is hopeful, highest enrolment of ST category females was 33.69% in the academic session of (2014-15) and highest enrolment growth rate was 5.45% in the academic session (2014-15) and lowest enrolment growth rate was -2.37% in the academic session (2017-18). Enrolment status of OBC category females is hopeful, highest enrolment of OBC category females was 48.14% in the academic session of (2015-16) and highest enrolment growth rate was 1.74% in the academic session (2014-15) and lowest enrolment growth rate was -1.92% in the academic session (2016-17).

FINDINGS:

Study revealed the following findings-

1. It was found that enrolment of females in Bachelor of Science (B.Sc.) in the last seven years (2013-14 to 2019-20) is hopeful. Enrolment growth rate is increasing gradually.
2. It was found that enrolment of females in Masters of Science (M.Sc.) in the last seven years (2013-14 to 2019-20) is hopeful except Scheduled Tribe category. Enrolment growth rate is increasing gradually.
3. It was found that enrolment of females in Bachelor of Technology (B.Tech.) in the last seven years (2013-14 to 2019-20) is not hopeful. Enrolment growth rate is very little and discontinuous, gender gap exists.
4. It was found that enrolment of females in Masters of Technology (M.Tech.) in the last seven years (2013-14 to 2019-20) is not hopeful. Enrolment growth rate is very little and discontinuous, gender gap exists.
5. It was found that enrolment of females in Bachelor of Engineering in the last seven years (2013-14 to 2019-20) is not hopeful. Enrolment growth rate is very little and discontinuous, gender gap exists.
6. It was found that enrolment of females in Masters of Engineering in the last seven years (2013-14 to 2019-20) is hopeful. Enrolment Masters of Engineering is higher than Bachelor of Engineering. Also, Enrolment growth rate is increasing gradually.

CONCLUSION AND DISCUSSION:

Researchers concluded that the participation of women in science at the higher education level has been hopeful in the last seven years. It was also observed that the gender gaps

between male and female enrolment rates are narrowing down gradually. The progress of women enrolment has been increasing in the last seven years in India, in the field of science, women have made remarkable improvements. But enrolment of women in the field of engineering, and technology at higher education level is not hopeful in the last seven years. Enrolment growth rate is very low and discontinuous and, a significant gender gap has persisted throughout the last seven years at all levels of, technology, and engineering disciplines all over India. Even though women have made tremendous progress toward increasing their participation in higher education, they are still under-represented in these fields. Girls' achievements and interests in science, technology, and engineering are shaped by the environment around them. Hence, societal beliefs and the growth environment around them influence the future. Negative stereotypes about girls' abilities compared to boys in math can indeed measurably lower girls' test performance. Such stereotypes can lower girls' aspirations for science and engineering careers over time.

There is a need for more incentives in education and the participation of women in engineering and technology. The government needs special attention to women's educational grants and subsidies that ensure the full participation of women in science and technology which brings changes in society.

CONFLICT OF INTEREST:

It has been announced by the authors that there is no conflict of Interest.

ETHICAL STANDARD:

This is documentary research and the research has been done keeping in mind all the ethical aspects of documentary research

References:

Amirtham, N., & Kumar, A. (2023). The underrepresentation of women in STEM disciplines in India: a secondary analysis. *International Journal of Science Education*, 45 (12), 1008-1031.

Sian Hoon et al. (2022). Science, Technology, Engineering, and Mathematics (STEM) Education in University: Pre-service Teachers' Perceptions. *Asian Journal of University Education (AJUE)* 18 (3), 637-648.

- Varma, R., Falk, J., & Dierking, F. (2022). Challenges and Opportunities: Asian Women in Science, Technology, Engineering, and Mathematics. *American Behavioral Scientist*, 0 (0) 1–10. <https://doi.org/10.1177/00027642221078509>.
- Amirtham, N., & Kumar, A. (2021). Gender parity in STEM higher education in India: a trend analysis. *International Journal of Science Education*, 43 (12), 1950-1964.
- Swarup, S., & Dey, T. (2020). Women in science and technology: an Indian scenario. *Current Science*, 119 (5), 744-748.
- MHRD. (2019). *All India Survey on Higher Education 2019-20* Department of Higher Education, Government of India. <https://aishe.gov.in/aishe/gotoAisheReports>.
- Chattopadhyay, A. (2018). *Women Scientists in India: Lives, Struggles & Achievements*. (1st ed). National Book Trust.
- MHRD. (2018). *All India Survey on Higher Education 2018-19* Department of Higher Education, Government of India. <https://aishe.gov.in/aishe/gotoAisheReports>.
- Sarkar, R. (2017). Recent Status of Education, Employment and Empowerment of Women in West Bengal. *International Journal of Scientific and Research Publications*, 7 (1), 263-269.
- Cheruvath, R. (2017). Engineering, technology and science disciplines and gender difference: a case study among Indian students. *International Journal of Science Education*, 45 (12), 99-111.
- Christie, M. (2017). Understanding why women are under-represented in Science, Technology, Engineering and Mathematics (STEM) within Higher Education: a regional case study. *Pro Education*, 27 (spe). <https://doi.org/10.1590/0103-6513.220516>.
- MHRD. (2017). *All India Survey on Higher Education 2017-18* Department of Higher Education, Government of India. <https://aishe.gov.in/aishe/gotoAisheReports>.
- Ghara, T.K. (2016). Status of Indian Women in Higher Education. *Journal of Education and Practice*, 7 (34), 58-64.
- MHRD. (2016). *All India Survey on Higher Education 2016-17* Department of Higher Education, Government of India. <https://aishe.gov.in/aishe/gotoAisheReports>.

- Parker, P. (2015). The Historical Role of Women in Higher Education. *Administrative Issues Journal: Connecting Education, Practice, and Research*, 5 (1), 3-14, <http://dx.doi.org/10.5929/2015.5.1.1>
- MHRD. (2014). *All India Survey on Higher Education 2014-15* Department of Higher, Government of India. <https://aishe.gov.in/aishe/gotoAisheReports>.
- Joshi, K.M., & Ahir, V. K. (2013). Indian Higher education: Some Reflections, *Intelektineekonomika Intellectual Economics*, 7 (15), 42-53.
- MHRD. (2013). *All India Survey on Higher Education 2013-14* Department of Higher Education, Government of India. <https://aishe.gov.in/aishe/gotoAisheReports>.
- Gupta, N. (2012). Women Undergraduates in Engineering Education in India: A Study of Growing Participation. *Gender Technology and Development*, 16 (2), 153-176.
- Kumar, N. (2009). *Women and science in India – A reader*. Oxford University Press.
- Burke, R. J., & Mattis, M. C. (2007). *Women and minorities in science, technology, engineering, and mathematics: Upping the numbers*. Edward Elgar Publishing.
- Dewan, P., Gupta, P., & Chaudhary, P. (2007). Gender Gap and Indian Academy of Pediatrics: Still a Long Way to Go!. *Indian Pediatrics*, 44 (1), 598-600.
- Fox, M. F. (2001). Women, science, and academia: Graduate education and careers. *Gender Society*, 15 (5), 654-666.
- SED. (n.d). *SED's Report on Status of Women Scientists in Delhi*, Society for Environment and Development, New Delhi.