Understanding the Reasons Behind Failure of Higher Education in India to Enhance Employable Skill

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Success of higher education depends upon its effectiveness to inculcate employable skill among the students. Since independence, there has been an upsurge in the demand for higher education in India, resulting in a virtual explosion in the number of universities and colleges in the country. However, it seems that government of India has focused mainly on expanding the quantity not on enhancing the quality of higher education. Having earned degrees, many graduates and post-graduates in India remain unemployed or under-employed because of insufficient demand for their skills. While the problem of educated unemployed Indian youth remains acute, paradoxically, there is a shortage of skilled manpower in the labour market. While around 40 per cent of teaching positions are lying vacant in different educational institutions, we observe extremely low success rate of aspirants in different eligibility tests for the posts of teachers in schools, colleges and universities, organized by different government agencies like CBSE, UGC, CSIR etc. Despite a record growth in intake of engineering candidates at All India Council of Technical Education (AICTE)-approved institutes, more than 60% of passed out engineering graduates stay unemployed every year. It is therefore clearly evident that unemployability is no less important problem than unemployment in India. Under these circumstances, it is absolutely necessary to find out the indicators of inability of higher education system in India to inculcate the employable skill among the students and control all such dampening factors. This paper is an attempt to measure the inter-state variations in quality of higher education in India during 2014-15 and to find out the major explanatory factors behind such variations. Our study utilizes the All India Survey on Higher Education (AISHE) data for 2010-11 to 2014-15, data of grades of the Higher Education Institutions accredited by NAAC prior to July 2016, data of engineering programmes accredited by NBA during 2014-16 and data on Police Organizations published by Bureau of Police Research and Development of India for 2015. To measure the state-level quality of higher education, we have constructed state-level Higher Education Quality Index (HEQI) for each state. To find out the significant explanatory factors behind inter-state variations in HEQIs, we used the OLS regression method. Our study shows that gross enrolment ratio, teaching-non-teaching staff ratio and number of colleges have significant positive impacts on the quality of higher education in any state. We also observe that percentage share of temporary teachers in total faculty, pupil-teacher ratio, share of enrolment in state universities out of enrolment in all universities have significant negative impacts on the quality of higher education in any Indian state. Interestingly, we find that, compound annual growth rate of percentage share of budgeted expenditure on education in GSDP and number of student agitations in any state do not have any significant effect on quality of higher education of the state.

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1. Introduction

It is a widely accepted logic that education provides skill and skill enhances employability. Higher education is the final stage of education which equips any individual with the ultimate skill to get a decent job. Success of higher education depends upon its effectiveness to inculcate employable skill among the students. Since independence, there has been an upsurge in the demand for higher education in India, resulting in a virtual explosion in the number of universities and colleges in the country. At present, India has the third largest higher education system in the world in terms of size and diversity, next to China and United States, and the largest in the world in terms of number of educational institutions. According to the All India Survey on Higher Education (AISHE) data, there were 760 universities and 25177281 colleges in India during 2014-15. Ironically, it seems that government of India has focused mainly on expanding the quantity not on enhancing the quality of higher education. Having earned degrees, many graduates and post-graduates in India remain unemployed or under-employed because of insufficient demand for their skills in the job market. According to the 68th Round Survey of NSSO, almost 68 per cent of graduates and 53 per cent post-graduates from general education background and almost 45 per cent of graduate or post-graduate degree holders and 51 per cent of graduate or post-graduate diploma holders with technical education were unemployed during 2011-12. While the problem of educated unemployed Indian youth remains acute, paradoxically, there is a shortage of skilled manpower in the labour market. While around 40 per cent of teaching positions are lying vacant in different educational institutions (Source: Ministry of Human Resource Development), we observe extremely low success rate of aspirants in different eligibility tests for the posts of teachers in schools, colleges and universities, organized by different government agencies like CBSE, UGC, CSIR etc. If we examine the percentage of total posts lying vacant in different leading higher education institutions in India during 2014-15, we observe that IITs topped the list with 39% vacancies and Central Universities followed with 38% vacancies, while NITs and IIMs had 29% and 25% vacancies, respectively (Source: Unstarred Question Number 296, Ministry of Human Resource Development, Answered on 25-02-2015 in the Lok Sabha). On the other hand, according to the results of different eligibility tests, during the period from 2011 to 2016, more than 87 per cent of the aspirants of school teaching and during the period from 2010 to 2014, more than 90 per cent of the aspirants of college/university teaching were unsuccessful despite securing good marks in school, college and university level examinations (Source: Central Board of Secondary Education). Despite a record growth in intake of engineering candidates at All India Council of Technical Education (AICTE)-approved

institutes, more than 60% of passed out engineering graduates stay unemployed every year. There was total intake of 3961670 students in 10334 AICTE approved institutions in India in 2014-15. During the same year, 57.56 per cent of passed out students could not get any placement (Source: AICTE). The National Association of Software and Services Companies (NASSCOM) survey of 2016 claimed that 80.89 per cent of technical graduates of India during 2015 were not ready for jobs due to lack of desirable generic abilities. It is therefore clearly evident that unemployability is no less important problem than unemployment in India. Under these circumstances, it is quintessential to find out the indicators of inability of higher education system in India to inculcate the employable skill among the students and control all such dampening factors.

It is observed that Indian universities do not find a place in the top 200 positions in the global ranking of universities. There are wide variations in the quality of higher education institutions. There are a few high-quality institutions like Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs) etc. On the other hand, there is large number of mediocre institutions with poor infrastructural facilities and shortage of qualified full-time teachers. Due to scarcity and competing claims on available funds, the ability of financially poorer state governments to invest in higher education is circumscribed. As a result, these states are reluctant to fill permanent teaching posts in state universities and affiliated colleges regularly. However, the alternative of recruiting temporary (ad-hoc and part-time) faculty impacts adversely on the quality of teaching. Temporary teachers are those who could not get permanent jobs in higher education institutions but are engaged in teaching in the same institutions on the basis of some temporary agreements which is renewed after a regular interval. They get extremely low remunerations, and cannot stake claim to medical facilities, insurance, study leave, maternity leave and some other benefits enjoyed by permanent faculty members. Consequently, it is quite obvious that they would be reluctant to put their best efforts in teaching. Insufficient government investment in the higher education sector has resulted in the increase in private sector's role in the growth of this sector. However, most of the private institutions act with the motive to extract high capitation fees and award useless degrees.

Enjoying academic freedom is the primary right of the universities and colleges. Ironically, in India, autonomy of universities/colleges are often restricted by political interference. Almost all governments, whether it is centre or the state, have the same characteristic of interfering in the appointments of Vice Chancellors, faculty and non-teaching

staff or influencing the students' unions, so that the benefited groups can be used as instruments in political battles during elections. Quality of education becomes the last item in the priority list.

Students' agitation in the campuses of higher education institutions of India is another hindrance in the smooth functioning of the higher education institutions. Since India is a liberal democratic nation, presence of students' unions is inevitable here. Students of India have always been socially, politically and economically conscious. [2] However, activities of students' unions sometimes become extremely radical. Universities and colleges are frequently disturbed by agitations by students backed by political or caste/religion-based associations. In many cases, the question arises, who actually is doing the fighting, whether it is the students themselves or it is the political parties who use the students as their puppets to fight proxy wars. On the other hand, the silent majority of students of India, who just want to focus on their education and career, hardly have any liberty to remain apolitical. They have to pay donations to these groups regularly. These ordinary students are disturbed by all the agitations around them and cannot focus on their studies and careers due to these distractions.

State universities get marginal amount of grant from state governments (4.04 per cent of GSDP on an average was allotted for education and training for any state during 2014-15) and much less share of grant from UGC (since, lion's share of UGC grant goes to the central universities). Under these circumstances, state universities are so heavily dependent on the affiliation fees they receive from affiliated colleges that they operate primarily as administrative and examination conducting centres rather than as institutions that promote teaching, research and faculty development. Within state university system there are large number of affiliated private and government colleges. Most of these colleges do not have any autonomy in their academic and administrative decisions. For these reasons state universities and affiliated colleges of these universities are experiencing a downfall of quality of education they impart.

In order to assess and enhance the quality and standards of higher education institutions in India, accreditation agencies like National Assessment and Accreditation Council (NAAC) and

[2] We witnessed many famous student movements like Nav Nirman Andolan (Reconstruction Movement) in Gujarat during 1974, Anti Mandal Commission Protest in Delhi during 1990, a second round of major protest against the reservation system during 2006, Anti–Sri Lanka Protests against the war crimes committed by army against Tamils in Sri Lanka during 2013, Hok Kolorob movement by Jadavpur University students in Kolkata during 2014, protests over suicide of Dalit scholar Rohit Vemula in Hyderabad University during 2016. There are many other student agitations which often take place in colleges and universities of India, some for good cause and some for not so good cause but for vested interests of some political or religious groups. (Source: Various Newspapers)

National Board of Accreditation (NBA) were established in India during 1994. While NAAC gives accreditation to the entire higher education institutions, NBA gives accreditation to the programmes. Higher Education Institutions, if they have a record of at least two batches of students graduated or been in existence for six years, whichever is earlier, are eligible to apply for the process of Assessment and Accreditation of NAAC subject to fulfilment of some conditions laid by NAAC. After assessment by NAAC, the Cumulative Grade Point Average (CGPA) of an institution is computed for those institutions which clear the grade qualifiers. According to the range of value of institutional CGPA, the grades are A, B, C and D. If the institution gets D, it does not get any accreditation. Out of all universities and colleges accredited by NAAC till July 2016, only 32 per cent of the universities and 9 per cent of the colleges are rated A grade or above (Source: NAAC). NBA gives accreditation to the programmes in professional and technical disciplines, i.e., Engineering and Technology, Management, Architecture, Pharmacy and Hospitality. There are four types of accreditation for Tier-I[3] institutions namely, full accreditation of the program for five years, full accreditation of the program for three years, provisional accreditation of the program for two years, and no Accreditation of the program. For Tier-II[4] institutions, there are three types of accreditation, namely, full accreditation of the program for five years, provisional accreditation of the program for two years, and no accreditation of the program. Out of all engineering programmes accredited by NBA, only 21 per cent got accreditation for 5 years during the period from 2014 to 2016 (Source: NBA).

It is, therefore, evident that Higher Education system of India could hardly be able to instill employable skill among the students. According to Younis Ahmad Sheikh (2017), despite the increase in gross enrolment ratio in higher education, supply of higher education institutions is insufficient compared to demand. The available institutions suffer from inadequate infrastructural facilities and strong and disturbing political interventions. Gap between the supply and demand, lack of quality research work, shortage of faculty and high student-faculty ratio, inadequate infrastructure and facilities are some of the most important dampening factors for the quality improvement of higher education in India (Sharma, S., & Sharma, P. 2015). Per capita spending on higher education has been very low, which leads to paucity of funds necessary for

[3] Tier-I institutions are academically autonomous institutions, university departments and constituent colleges of the universities offering the engineering/technology programmes.

[4] Tier-II institutions are non-autonomous institutions, i.e., those colleges and technical institutions affiliated to a university offering the engineering/technology programmes.

expansion and quality enhancement of higher education in India. Poor linkages between academic institutions and industry/Government R&D laboratories are also responsible for poor standard of research in Indian higher education institutions. (Shaguri 2013). According to Sengupta and Parekh (2009), in order to sustain on a long-term basis, Indian higher education has to be accessible and it has to match the global standards in terms of structure and process. While it has done well in terms of accessibility, much more work is needed in order to maintain global standards. According to them, most important constraining factors are multiplicity of regulations (education being a concurrent subject), focus on inputs & control rather than process or outputs and development, inadequacy of competent faculty, and lack of adequate research orientation. Sahu, Srivastava and Srivastava (2008) briefly examined the various factors which affect the effectiveness of technical education in India and came to the conclusion that good infrastructure, effective teaching, good extra-curricular activities and extensive research and development activities can improve the effectiveness of technical education in India. According to Sharma (2014), although growth of engineering education in India has been phenomenal, but quality of most of the engineering institutes is questionable given the fact that employability skills are missing among the pass outs. Under these circumstances, a thorough analysis of the most important explanatory factors which influence the quality of higher education in India is quintessential. Ironically, very few comprehensive works have been done on the reasons behind inter-state disparity of the quality of higher education in India which has gone to the extent of empirical investigation.

Under this backdrop, this paper is an attempt to find out the reasons behind the failure of higher education system of India to inculcate employable skill among the students. We try to measure the inter-state variations in quality of higher education in India during 2014-15 and to find out the major explanatory factors behind such variations. We have utilized the All India Survey on Higher Education (AISHE) data for 2010-11 to 2014-15, data of grades of the Higher Education Institutions accredited by NAAC prior to July 2016 and data of engineering and management programmes accredited by NBA during 2014-16 and data on Police Organizations published by Bureau of Police Research and Development of India for 2015. To measure the state-level quality of higher education, we have constructed a Higher Education Quality Index (HEQI). To find out the significant explanatory factors behind inter-state variations in HEQIs, we use the OLS regression method.

Rest of the paper is designed as follows. Section 2 shows the situation of higher education in India during the period of our study. Section 3 describes the data and methodological issues in

the construction of Higher Education Quality indices in different states of India. Methodological issues in estimating higher education quality equation are discussed in section 4. Empirical estimates of OLS regression are analyzed in section 5. Section 6 concludes.

2. Situation of Higher Education in India

Higher education in India starts after the 10+2 stage of education. System of higher education in India follows a complex framework, which includes various types of educational institutions like universities, general colleges, institutes of national importance, engineering colleges, medical colleges, management institutions, polytechnics etc. There are different types of universities like central universities, state universities, deemed universities and private universities (Sanat Kaul 2006). In the federal structure of democracy of India, education is included in the concurrent list, i.e. education is the joint responsibility of both the centre and the states. The centre coordinates and fixes the standards of higher general and higher technical education, whereas, state takes the responsibility of school education (PWC Report on Higher Education in India 2012). Higher education, both general and technical, is regulated by various regulatory bodies and research councils. The regulatory bodies are University Grant Commission (UGC), All India Council for Technical Education (AICTE), etc. The research councils are Indian Council of Historical Research (ICHR), Indian Council of Social Sciences Research (ICSSR), Indian Council of Philosophical Research (ICPR), National Council of Rural Institute (NCRI), Project of History of Indian Science Philosophy and Culture (PHISPC), etc.

In this section, we would try to know the situation of higher education in India during the period from 2010-11 to 2014-15. During the period from 2010-11 to 2014-15, number of general universities in India grew[5] at a rate of 7.17 per cent per annum and other universities grew at a rate of 5.11 per cent per annum. If we consider all kinds of universities of India together, the growth rate was 6.28 per cent per annum. Private colleges of India experienced the growth rate of 21.78 per cent annum, whereas compound growth rate of government colleges was 15.57 per cent. If we consider all kinds of colleges of India together, the growth rate was 20.21 per cent per annum (Source: Author's calculations from AISHE data). State-wise picture in all the above areas are given in Table 1 of Appendix. In terms of compound annual growth rate (CAGR) of general universities during 2010-11 to 2014-15, Madhya Pradesh was in the top

[5] $CAGR = \left(\frac{EndingValue}{BeginningValue} \right)^{\left(\frac{1}{No.ofYears} \right)} - 1$, where CAGR is compound annual growth rate.

position, followed by Punjab and Himachal Pradesh. While the number of general universities declined in Delhi and Mizoram and it remained the same in Chandigarh, Goa, Manipur, Nagaland, Puducherry, and Tripura. In terms of CAGR of other universities, Puducherry was in the top position followed by Rajasthan, Assam and Chandigarh. Number of other universities declined in Maharashtra and remained the same in Bihar, Himachal Pradesh, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. In Tamil Nadu, number of government colleges grew at the fastest rate per year, followed by Jharkhand and Madhya Pradesh. Jharkhand achieved the highest CAGR of private colleges, followed by Uttar Pradesh and Madhya Pradesh. Number of private colleges declined in Mizoram and remained the same in Puducherry.

In order to investigate whether the undergraduate colleges of India were evenly distributed across the people during the period of our study, we would like to know the number of colleges per one lakh[6] population. Number of colleges per one lakh population in India was 23 in 2010-11, which increased to 27 in 2014-15, with 4.07 per cent CAGR. State-level measures in this regard are shown in Table 2 of Appendix. Number of colleges per one lakh population was highest in Puducherry followed by Andhra Pradesh including Telangana and Karnataka and lowest in Bihar and Jharkhand.

Gross enrolment ratio in higher education means the ratio of the number of students living in India with the age group of 18 to 23 years to those who have the same age group and have enrolled for the higher education in India. Gross enrolment ratio in higher education in India increased from 19.41 per cent in 2011-12 to 24.26 per cent in 2014-15, with 5.73 per cent CAGR. The state-level figures of gross enrolment ratio and the corresponding CAGRs are shown in Table 3 of Appendix. Gross enrolment ratio was highest in Chandigarh followed by Manipur and Tamil Nadu during 2010-11. Chandigarh continued to be in the top position in terms of gross enrolment ratio over the years, Puducherry and Tamil Nadu secured the second and third position, respectively and Manipur came down to the fifth position. CAGR of gross enrolment ratio was highest in Jharkhand, followed by Uttar Pradesh and Jammu & Kashmir. Gross enrolment ratio declined in Nagaland, Gujarat and Goa.

CAGR of enrolment in under-graduate, post-graduate, M.Phil. and Ph.D. level of higher education in India during the period 2010-11 to 2014-15 were 5.45 per cent, 4.19 per cent, 7.15 per cent and 10.79 per cent, respectively. Corresponding state level figures are shown in Table 4

[6] 1 Lakh = 1/10 million

of Appendix. In terms of UG enrolment, Jharkhand had the highest annual growth rate followed by Chandigarh and Uttar Pradesh. UG enrolment declined in Nagaland, Manipur, Goa, Gujarat, Assam, Chhattisgarh and Mizoram. Growth rate of PG enrolment was highest in Puducherry followed by Jammu and Kashmir and Assam. PG enrolment declined in eight states, namely, Andhra Pradesh & Telangana Combined, Delhi, Goa, Gujarat, Haryana, Nagaland, Tripura and West Bengal. Jharkhand experienced highest annual growth rate of M.Phil. enrolment, followed by Sikkim and Tamil Nadu. Enrolment in M.Phil. declined in 12 out of 31 states/union territories, namely, Andhra Pradesh & Telangana Combined, Chandigarh, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Nagaland and West Bengal. Jharkhand topped in annual growth rate of Ph.D. enrolment also, followed by Sikkim and Goa. Enrolment in Ph.D. declined in Andhra Pradesh & Telangana Combined, Arunachal Pradesh, Manipur and Puducherry.

Pupil-teacher ratio is an important indicator of efficiency of any level of education. A high pupil-teacher ratio suggests that each teacher has to be responsible for a large number of pupils. In other words, the higher the pupil-teacher ratio, the lower the relative access of pupils to teachers. Therefore, high pupil-teacher ratio is a restrictive factor for the qualitative improvement of higher education. Pupil-teacher ratio in higher education of India declined from 35.93 in 2010-11 to 23.22 in 2014-15, compound annual rate of decline being 10.34 per cent. Pupil-teacher ratios of different states during the same period of time are illustrated in Table 5 of Appendix. Arunachal Pradesh (alongwith Telangana) and Tripura were two states which experienced increase in pupil-teacher ratio. However, in all the other states/union territories, compound annual growth rate of pupil-teacher ratio was negative. Maximum decline in pupil-teacher ratio took place in Madhya Pradesh followed by Manipur and Uttar Pradesh.

In India, different full-time posts of teachers in colleges and universities are Assistant Professor, Associate Professor, Professor and Demonstrator/Tutor. However, almost all higher education institution suffer from shortage of full-time faculties and the authority fills the gap through ad-hoc appointments of Temporary Teachers. During the period from 2010-11 to 2014-15, number of Assistant Professors, Associate Professors, Professors, Demonstrators/Tutors and Temporary Teachers grew at the rate of 19.8 per cent, 15.94 per cent, 10.95 per cent, and 18.64 per cent per annum, respectively. State-level figures during the same time period are shown in Table 6 of Appendix. Assistant Professors, Associate Professors, Professors and Temporary Teachers were employed at the highest annual rate in Madhya Pradesh. Uttar Pradesh and Jharkhand were in second and third position in terms of annual growth rate of Assistant

Professors. Haryana and Uttar Pradesh secured second and third position in terms of annual growth rate of Associate Professors. In terms of annual growth rate of Professors, Chandigarh and Uttar Pradesh were in second and third position. Punjab, Manipur and West Bengal secured second, third and fourth position in terms of annual growth rate of Temporary Teachers. In Rajasthan, Demonstrators/Tutors were employed at the highest rate per year, followed by Jharkhand and Uttar Pradesh. North Eastern states like Arunachal Pradesh, Nagaland experienced decline in number of Assistant Professors, Associate Professors and Professors. Number of Professors declined in Andhra Pradesh & Telangana Combined and Karnataka also. Number of Demonstrators/Tutors declined in Delhi. Number of Temporary Teachers declined in Goa, Gujarat, Nagaland and Tripura.

Non-teaching staff play extremely important roles in Higher Education institutions. They control all the administrative and financial works, without which the institution cannot exist. According to the responsibilities, status and rank, there are four groups of non-teaching staff in all the Higher Education institutions of India, namely, Group-A, Group-B, Group-C and Group-D. During the period from 2010-11 to 2014-15, number of Group-A, Group-B, Group-C and Group-D staff in India grew at CAGR of 17.66 per cent, 21.5 per cent, 15.06 per cent, and 12.03 per cent, respectively. Figures for different states during the same time period are shown in Table 7 of Appendix. Group-A staff increased at the highest rate in Jharkhand followed by Madhya Pradesh and Manipur. Number of Group-A staff declined in West Bengal. Group-B staff grew at the highest rate in Jammu & Kashmir followed by Madhya Pradesh and Jharkhand. Number of Group-B staff declined in Sikkim and Meghalaya. CAGR of Group-C staff was highest in Madhya Pradesh followed by Jharkhand and Uttar Pradesh. Number of Group-C staff declined in Meghalaya. Group D staff increased at the highest rate in Jharkhand followed by Madhya Pradesh and Punjab. Number of Group-D staff declined in Arunachal Pradesh, Delhi, Himachal Pradesh, Karnataka, Meghalaya and Mizoram.

In order to analyze the situation of technical institutions in India during the period of our study, i.e. during 2014-15, we use All India Council for Technical Education (AICTE) data, available in the website of AICTE. The data of technical education is available from the period 2012-13. We have analyzed the changes in different indicators of technical education in India during the period from 2012-13 to 2014-15 using the AICTE data. During the period from 2012-13 to 2014-15, number of AICTE Approved Institutions in India grew at the rate of 0.31 per cent per annum, enrolment decreased at the rate of 0.36 per cent per annum, number of faculties increased at the rate of 31.86 per cent annually and number of passed out students grew at the

rate of 7.13 per cent per annum. All the state-level indicators during the same time period are shown in Table 8 of Appendix. CAGR of AICTE approved institutions was highest in the north eastern states, like Mizoram, Arunachal Pradesh and Nagaland, in which there were no such institutions a few years back and in 2014-15 number of such institutions were growing rapidly. Number of AICTE approved institutions declined in all the states where there were already large number of such institutions, namely, Andhra Pradesh & Telangana Combined, Haryana, Karnataka, Manipur, Rajasthan, Tamil Nadu and Uttarakhand. CAGR of enrolment was, once again, highest in the north eastern states, namely, Mizoram, Nagaland and Tripura in which enrolment was increasing rapidly in newly established technical and management institutions. Ironically, enrolment in technical institutions declined in 13 out of 31 states/union territories, namely, Arunachal Pradesh, Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Puducherry, Rajasthan, Sikkim and Tamil Nadu. Number of faculties increased at the fastest rate in Chandigarh followed by Mizoram and Tamil Nadu, whereas number of faculties declined in Manipur. Number of passed out students grew at the fastest rate in Meghalaya followed by Goa and Assam, whereas number of passed out students declined in Arunachal Pradesh and Manipur.

Success rate of passed out students, i.e. percentage share of passed out students who got placements, increased from 40.63 per cent to 42.44 per cent, with CAGR of 2.2 per cent. State-level figures are shown in Table 9 of Appendix. In terms of success rate, Puducherry, Delhi, Chandigarh and Tamil Nadu were the top states throughout the whole time period. In 2012-13, success rate was highest in Chandigarh followed by Puducherry, Delhi and Tamil Nadu, whereas, in 2013-14, success rate was highest in Delhi followed by Puducherry, Chandigarh and Tamil Nadu. In 2014-15, success rate was highest in Delhi followed by Puducherry, Tamil Nadu and Chandigarh. CAGR of success rate was highest in Nagaland followed by Manipur and Meghalaya. Ironically, success rate declined in 11 out of 32 states/union territories, namely, Andhra Pradesh, Assam, Chandigarh, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Punjab, Sikkim, Tripura and West Bengal.

After analyzing the situation of higher education in India and in 32 states/union territories of the country, we now try to construct the Higher Education Quality Indices for the states during 2014-15.

3. Data and methodological issues in construction of Higher Education Quality Index

In this study, we use the grades given to the education institutions by two higher education accreditation institutions of India, NAAC and NBA. Since the grades of the educational institutions and programmes are given by NAAC and NBA after judging all the qualitative aspects of higher education, we can safely use these ranks to construct our Higher Education Quality Index. In order to construct the Higher Education Quality Index, we divide it into two parts, namely, Higher General Education Quality Index and Higher Technical Education Quality Index. We give 50% weightage to both of these indices. In order to construct the Higher General Education Quality Index, we use the data of grades of the Higher Education Institutions accredited by NAAC prior to July 2016. Higher General Education Quality Index (HGEQI) is constructed separately for each state on India using the following formula:

$$HGEQI_i = U_{Ai} \times \frac{30}{100} + U_{Bi} \times \frac{15}{100} + U_{Ci} \times \frac{5}{100} + C_{Ai} \times \frac{30}{100} + C_{Bi} \times \frac{15}{100} + C_{Ci} \times \frac{5}{100} \quad \text{..... (1)}$$

Where,

$HGEQI_i$ = Higher General Education Quality Index of the ith state

U_{Ai} = Percentage share of universities ranked with A in the ith state

U_{Bi} = Percentage share of universities ranked with B in the ith state

U_{Ci} = Percentage share of universities ranked with C in the ith state

C_{Ai} = Percentage share of colleges ranked with A in the ith state

C_{Bi} = Percentage share of colleges ranked with B in the ith state

C_{Ci} = Percentage share of colleges ranked with C in the ith state

In order to construct the Higher Technical Education Quality Index, we use the data of engineering and management programmes accredited by NBA during 2014-16. Higher Technical Education Quality Index (HGEQI) is constructed separately for each state on India using the following formula:

$$HTEQI_i = P_{AC2i} \times \frac{10}{100} + P_{AC3i} \times \frac{40}{100} + P_{AC5i} \times \frac{50}{100} \quad \text{..... (2)}$$

Where,

$HTEQI_i$ = Higher Technical Education Quality Index of the ith state

P_{AC2i}=Percentage of Engineering and Management Programmes of the ith state getting accreditation for 2 years

P_{AC3i}=Percentage of Engineering and Management Programmes of the ith state getting accreditation for 3 years

P_{AC5i}=Percentage of Engineering and Management Programmes of the ith state getting accreditation for 5 years

Combining Higher General Education Quality Index and Higher Technical Education Quality Index and giving 50 per cent weightage to each of these indices, we obtain Higher Education Quality Index for each state of India.

$$HEQI_i = HGEQI_i \times \frac{50}{100} + HTEQI_i \times \frac{50}{100} \quad \text{..... (3)}$$

Higher General Education Quality Indices, Higher Technical Education Quality Indices and Higher Education Indices for different states of India during 2014-16 are shown in Table 10 of Appendix. In terms of Higher General Education Quality Indices, Delhi was in the top position followed by Goa and Meghalaya, whereas, Jharkhand was in the last position. In terms of Higher Technical Education Quality Indices, Himachal Pradesh was in the top position followed by Sikkim and Puducherry. Meghalaya, Mizoram and Nagaland had no accreditation by NBA during the period of our study and therefore the values of Higher Technical Education Quality Indices for these states were zero. Besides these three states, Arunachal Pradesh had lowest positive value of Higher Technical Education Quality Index. In terms of combined Higher Education Quality Indices, Puducherry was in the top position followed by Delhi, Goa and Punjab, whereas, Nagaland was in the last position.

4. Estimating Higher Education Quality Equation: methodological issues

The most convenient way to find out the significant explanatory factors behind variations in higher education quality indices across the states of India is to estimate higher education quality equation with higher education quality index as the dependent variable and gross enrolment ratio, percentage share of temporary teachers out of total teachers, teaching-non-teaching staff ratio, pupil-teacher ratio, percentage share of enrolment in state universities out of total enrolment, compound annual growth rate of percentage share of budgeted expenditure on education in GSDP during 2009-10 to 2014-15 (we have taken five-year time span since higher education takes at least five years to be completed), log value of number of colleges, log value of number of student agitations as explanatory factors. All the explanatory factors except the

number of student agitations are taken from the AISHE dataset and the number of student agitations is taken from data on Police Organizations published by Bureau of Police Research and Development of India for 2015.

The higher education quality equation is specified as:

$$HEQI_i = \alpha_{0i} + \alpha_{1i} GER_i + \alpha_{2i} TEMP_i + \alpha_{3i} TS\_NTS\_R_i + \alpha_{4i} PTR_i + \alpha_{5i} ENROL\_STATE\_UNIV_i + \alpha_{6i} CAGR\_SHARE\_GSDP_i + \alpha_{7i} \ln\_COLLEGE_i + \alpha_{8i} \ln\_STUDENT\_AGIT_i + \varepsilon_i \quad \ldots (4)$$

Where, $HEQI_i$ = Higher Education Quality Index of ith state

GER_i = Gross Enrolment Ratio in Higher Education Institutes of ith state

$TEMP_i$ = Percentage share of temporary teachers out of total teachers in ith state

$TS\_NTS\_R_i$ = Teaching Non-teaching staff ratio in ith state

PTR_i = Pupil-teacher ratio in ith state

$ENROL\_STATE\_UNIV_i$ = Percentage share of enrolment in state universities out of enrolment in all universities in ith state

$CAGR\_SHARE\_GSDP_i$ = Compound annual growth rate of percentage share of budgeted expenditure on education in GSDP in ith state during 2009-10 to 2014-15

$\ln\_COLLEGE_i$ = Log value of number of general colleges in ith state

$\ln\_STUDENT\_AGIT_i$ = Log value of number of student agitations in ith state

ε_i = Independently and identically distributed idiosyncratic error term with mean zero and constant variance σ^2_ε measuring the effects of unobservable random factors.

Higher General Education Quality Indices, Higher Technical Education Quality Indices and Higher Education Quality Indices of all the states of India during 2014-15 are shown in Table 10 of Appendix. In terms of Higher General Education Quality Indices, Delhi was in the top position followed by Goa and Meghalaya and Jharkhand was in the last position. In terms of Higher Technical Education Quality Indices, Himachal Pradesh was in the top position followed by Sikkim and Puducherry. Meghalaya, Mizoram and Nagaland had no accreditation during the period of our study and therefore the values of indices for these states were zero. Besides Meghalaya, Mizoram and Nagaland, Arunachal Pradesh had lowest positive value of Higher Technical Education Quality Index. In terms of combined Higher Education Quality Indices,

Puducherry was in the top position followed by Delhi, Goa and Punjab and Nagaland was in the last position.

5. Inter-State Variations in Quality of Higher Education - empirical results

The higher education quality equation has been estimated using the OLS method. The sample used in this study includes the data of 32 states/union territories of India (Andhra Pradesh and Telangana taken separately) during 2014-15. The estimated results are shown in Table 11 of Appendix.

In the higher education quality equation (4), positive and significant coefficient for gross enrolment ratio implies that gross enrolment ratio of a state had a positive and significant relation with the quality of higher education in that state. This is perfectly understandable because with the gross enrolment ratio of a state, more people would be enrolled in the higher education institutions of the state. Increasing the gross enrolment ratio at the undergraduate and post graduate level is extremely necessary in all states of India. While gross enrolment ratio in India at the higher secondary level was 54.21 per cent (Source: https://data.gov.in/catalog/school-education-statistics) in 2014-15, in the higher education level it was only 24.26 per cent (Source: AISHE data). This implies that during 2014-15, more than the half of total 10+2 passed out students could not enroll themselves in higher education institutions of India.

Empirical result in Table 11 indicates that the percentage share of temporary teachers out of total teachers in a state had a negative and significant relation with the quality of higher education of that state. We have already mentioned in the section 1 that recruiting temporary teachers impacts adversely on the quality of teaching. Quality of teachings of temporary teachers would obviously be inferior than that of permanent teachers. It is therefore clearly evident that recruiting more temporary teachers would have damaging effect on the quality of higher education of any state.

Table 11 reveals that teaching-non-teaching staff ratio of a state had a positive and significant relation with the quality of higher education of that state. This result implies that appointment of permanent teachers would be extremely important for any educational institution. During any emergency, teachers can perform the tasks of non-teaching staff in the office. Therefore, when resources are limited, the higher education institutions should give more priority to appointment of teachers than to appointment of non-teaching staff.

Our empirical result also reveals that pupil-teacher ratio of a state had a negative and significant relation with the quality of higher education of that state. Pupil-teacher ratio is the number of students who attend an educational institution divided by the number of teachers in the institution. The higher the pupil/teacher ratio, the lower the relative access of students to teachers. A low pupil-teacher ratio signifies smaller classes, which enables the teacher to pay more attention to individual students, which may in the long run result in a better performance of the pupils. Therefore, according to our empirical result, the higher education institutions should try to maintain low pupil-teacher ratio so that individual students can get more care and attention from the teachers and perform better.

Our result further suggests that as the percentage share of enrolment in state universities out of all universities in any state had a negative and significant relation with the quality of higher education of the state. This result tells us the miserable story of the state universities in India. In 17 out of 32 states/union territories of India, more than 70 per cent of the total enrolled students were enrolled in state universities during 2014-15. Most of these state universities were burdened with the academic and administrative responsibilities of affiliated colleges; they suffered from political interventions, student agitations and they got marginal amount of grants from the state governments and UGC. All these factors restricted them to improve their qualities of teaching and research. As a result, quality of higher education imparted by state universities and colleges affiliated to them experienced downfall of quality.

We have taken compound annual growth rate of percentage share of budgeted expenditure on education in GSDP of a state during the period of 2009-10 to 2014-15 as an explanatory factor of quality of higher education in that state. We have taken five-year duration since it takes at least five years to become a post graduate, students passing out in 2014-15, would surely be affected by the development of the institutions during the period from 2009-10 to 2014-15. However, according to our result, CAGR of percentage share of budgeted expenditure on education in GSDP of any state during the period of 2009-10 to 2014-15 had a positive but insignificant impact on quality of higher education in that state during 2014-15. Such a result can be explained by the fact that, during the period of our study, most of the states spent very small percentage of GSDP on education, and higher education sector got even a smaller share. During the period from 2009-10 to 2014-15, 17 out of 32 states/union territories reduced shares of GSDP to be spent on education, and, therefore, higher education sector got

even lesser shares. Such a small amount of expenditure could not significantly affect the quality of higher education in any state although it had a positive impact on it.

Our results indicate that number of colleges in any state had a positive and significant relation with the quality of higher education in that state. During 1947, at the time of independence, India had 500 colleges. The number of colleges increased to 32974 in 2010-11 and to 38498 in 2014-15. With the increase in the number of colleges, undergraduate and postgraduate education could come to our doorsteps. It was much easier for the students to enroll themselves in colleges and pursue higher education even in the remotest areas of any state. Colleges established in the backward areas, were able to bring the ray of hope for the underprivileged backward people. Therefore, it is quite evident that larger the number of colleges in any state, higher would be the value of higher education quality index.

To test whether student agitations through the whole year hindered the quality of higher education in India during the period of our study, we have incorporated log value of number of student agitations reported in police stations of different states during 2014-15. Our result shows that the value of the coefficient is negative but insignificant. This implies that although student agitations in any state had dampening effect on quality of higher education in that state, the effect was not significant. Having said that, it should be kept in mind that we obtained the record of those agitations only which were reported in police stations. In reality, very few such incidents in any educational institution are reported in the police stations, since students' union members being the students, college/university authorities would always try to solve these matters by themselves. Therefore, it is very much possible that actual figures of student agitations would have been much higher and the negative coefficient would have been quite significant in reality.

6. Conclusions

This study analyses the inter-state differences in quality of higher education in 32 states/union territories of India by using the data from AISHE, AICTE, NAAC, NBA, and the data on Police Organizations published by Bureau of Police Research and Development of India during 2014-15. Higher Education Quality Indices have been constructed using the grades given to the universities and colleges by NAAC and accreditations given to the programmes run by different technical education institutions by NBA. We have analysed the situation of higher education in India as a whole and across different states during 2014-15 using the AISHE and AICTE data. To find out the significant explanatory factors behind variations in higher education

quality indices across different states, we have estimated the higher education quality equation using the OLS method. We have identified major explanatory factors affecting quality of higher education that may cause significant differences of quality of higher education across different states.

While analyzing the AISHE data for 2014-15, we find that number of universities imparting general education grew at a higher rate than that of other universities in India. In case of general education, except few states, most of the states witnessed zero growth in the number of universities. Further, it is observed that number of private colleges grew at a higher rate than that of government colleges. However, for majority of the states, we find zero growth of any kind of colleges. Therefore, growth in number of universities and colleges seemed to be concentrated in a few developed states. Number of colleges per one lakh population also increased in India during the period from 2010-11 to 2014-15. Eastern states like Jharkhand and Bihar had minimum compound annual growth rate of number of colleges per lakh population during the period of our study, which is a matter of concern. We further notice that gross enrolment ratio increased in India as well as in most of the states during the period of our study.

Interestingly, we observe that compound annual growth rates of enrolments in M.Phil. and Ph.D. were higher than compound annual growth rates of enrolments in UG and PG in India during the period of our study. However, total enrolment in M.Phil. was found to decline in 12 states/union territories and total enrolment in Ph.D. was found to decline in 5 states/union territories. This implies that in a few states only, the students were increasingly being interested to do research works after becoming post-graduates. Pupil-teacher ratio in higher education in India declined during the period of our study. Most of the states also witnessed decline in pupil-teacher ratio in the higher education institutions during the same period. Madhya Pradesh was found to hire maximum number of Assistant Professors, Associate Professors, Professors and Temporary Teachers in different higher education institutions. On the other hand, north eastern states like Arunachal Pradesh, Nagaland experienced a decline in number of Assistant Professors, Associate Professors and Professors. This implies that the backwardness of the north-eastern states played a negative part and teachers appointed there tried to get job in developed states and leave those backward states. Growth rate was highest for Group-B staff compared to other groups in India. On the other hand, number of Group-D staff declined in 6 states. This implies that in order to curtail expenditure of state governments, temporary staff were being hired in the institutions for much less salaries and posts of permanent Group-D staff were lying vacant.

From our analysis, we discover that the number of AICTE approved technical institutions declined in all the states where there were already large number of such institutions. Further, enrolment in technical education institutions declined in 13 out of 31 states/union territories. This means that a number of institutions were being closed since NBA tightened its rules of accreditations and did not accredit their programmes. On the other hand, growth rate of technical education institutions was highest in the north eastern states in which there were no such institutions a few years back. Growth rate of enrolment was also highest in the north-eastern states. This means that, in terms of technical education, north-eastern backward states were improving during the period of our study. Success rate of passed out students from technical education institutions in India increased during the period from 2011-12 to 2014-15. However, only a few developed states like Puducherry, Delhi, Chandigarh and Tamil Nadu contributed in this success story. It is quite alarming that, success rate declined in 11 out of 32 states/union territories during the same period of time.

We have constructed Higher General Education Quality Indices, Higher Technical Education Quality Indices and Higher Education Quality Indices for all the states/union territories of India during 2014-15. Delhi topped in terms of quality of higher general education, Himachal Pradesh topped in terms of quality of higher technical education and Puducherry was in the first position in terms of quality of combined higher education. Most of the north-eastern states like Nagaland, Mizoram, Arunachal Pradesh etc. performed poorly in terms of qualities of higher general, higher technical education and combined higher education.

The empirical result of this study suggests that increase in gross enrolment ratio had positive and significant relation with higher education quality index. Therefore, increase in the gross enrolment ratio in the states significantly improved the quality of higher education in the states during the period of our study. Our empirical result further reveals that share of temporary teachers out of total faculty in a state had a positive and significant relation with the quality of higher education of that state. Since employment of temporary teachers increased in the higher education institutions in most of the states during the period of our study, it can safely be concluded that the quality of higher education was harmfully affected in these states.

Our empirical result also states that teaching-non-teaching staff ratio of a state had a positive and significant relation with the quality of higher education of that state. This implies that appointment of permanent teachers was more important than that of permanent non-teaching staff in any institution. In most of the affiliated colleges of financially poorer states, many posts of non-teaching staff were lying vacant. In those colleges, teachers often took extra

responsibilities of office works. However, alternative is not true, i.e. office staff would never be able to take the responsibilities of teachers. Our empirical result also reveals that pupil-teacher ratio of a state had a negative and significant relation with the quality of higher education of that state. Therefore, a decline in pupil-teacher ratio is always welcome. It is a matter of delight that pupil-teacher ratio in higher education in India and in most of the states declined during the period of our study.

Our result has further suggested that the percentage share of enrolment in state universities out of all universities in any state had a negative and significant relation with the quality of higher education of the state. We have already mentioned the saga of state universities in India. In these universities, due to scarcity of fund, large number of teaching posts were lying vacant which were being compensated by the qualitatively lower temporary teachers. Autonomy of these universities and affiliated colleges were restricted by political interference. Students were disturbed by all the agitations around them and could not focus on their studies and careers due to these distractions. Furthermore, these universities got marginal amount of grant from state governments and much smaller part of UGC grants compared to central universities. State universities were heavily dependent on the affiliation fees received from affiliated colleges, regulation of which had been burdensome for the universities. All these factors were responsible for the downfall of quality of education imparted by the state universities during the period of our study. It is, therefore, quite understandable that extremely low annual growth rate of share of GSDP spent on education of any state would have a positive but insignificant impact on the quality of higher education in that state.

Our result has also indicated that number of colleges had a positive and significant relation with the quality of higher education. In this respect, India has achieved quite a lot with phenomenal increase in number of colleges since the independence. Increase in the number of student agitations was found to have a negative but insignificant impact on the quality of higher education. We already mentioned that since we have the data of those agitations only which had been reported in the police stations, the actual number of agitations might be higher and the impact could have been quite significant.

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Appendix

Table 1: Compound Annual Growth Rate of Number of Universities and Colleges in India from 2010-11 to 2014-15

STATES/UTs	CAGR of General Universities	CAGR of Other Universities	CAGR of Government Colleges	CAGR of Private Colleges
Andhra Pradesh & Telangana Combined*	1.87%	0.00%	1.69%	4.00%
Arunachal Pradesh	13.62%	N.A.	18.92%	23.59%
Assam	18.92%	18.92%	30.51%	19.90%
Bihar	3.93%	0.00%	1.44%	21.57%
Chandigarh	0.00%	18.92%	15.47%	22.47%
Chhattisgarh	14.42%	5.74%	13.16%	14.30%
Delhi	-2.90%	10.67%	6.57%	2.41%
Goa	0.00%	0.00%	13.21%	14.80%
Gujarat	7.15%	9.33%	-12.80%	13.03%
Haryana	20.25%	2.41%	27.85%	33.85%
Himachal Pradesh	13.10%	0.00%	4.86%	2.90%
Jammu and Kashmir	4.66%	13.62%	17.84%	35.54%
Jharkhand	12.47%	5.74%	51.23%	72.77%
Karnataka	5.48%	2.20%	3.39%	3.54%
Kerala	3.93%	2.41%	11.47%	20.74%
Madhya Pradesh	28.78%	0.00%	48.38%	51.34%
Maharashtra	4.89%	-3.15%	18.04%	35.56%
Manipur	0.00%	0.00%	41.42%	49.53%
Meghalaya	13.62%	0.00%	26.63%	13.29%
Mizoram	-9.64%	0.00%	1.87%	-15.91%
Nagaland	0.00%	0.00%	0.00%	7.67%
Odisha	6.78%	0.00%	26.19%	29.54%
Puducherry	0.00%	31.61%	6.48%	0.00%
Punjab	21.79%	2.20%	40.47%	40.50%
Rajasthan	18.92%	23.59%	27.81%	33.74%
Sikkim	18.92%	0.00%	15.83%	5.74%
Tamil Nadu	1.68%	0.95%	52.56%	21.69%
Tripura	0.00%	0.00%	7.46%	8.78%
Uttar Pradesh	9.63%	14.42%	36.62%	60.69%
Uttarakhand	17.23%	15.83%	9.06%	24.90%
West Bengal	11.37%	5.14%	30.33%	28.99%

Source: Author's calculations from AISHE data

* We have kept Andhra Pradesh and Telangana combined in order to maintain comparability, since Telangana was formed in 2014 and data of Telangana was not available for all the years.

Table 2: Number of Colleges Per Lakh (1/10 Million) Population in India and its Compound Growth Rate during the period from 2010-11 to 2014-15

STATES/UTs	2010-11	2011-12	2012-13	2013-14	2014-15	CAGR
Andhra Pradesh & Telangana Combined	48	48	98	100	107	22.21%
Arunachal Pradesh	11	16	16	16	17	11.05%
Assam	13	13	15	15	15	3.18%
Bihar	5	6	6	7	7	7.12%
Chandigarh	18	19	18	17	16	-2.93%
Chhattisgarh	20	20	20	22	23	3.98%
Delhi	8	9	9	9	9	0.44%
Goa	25	32	33	34	33	7.15%
Gujarat	27	25	26	27	28	1.09%
Haryana	33	33	34	34	35	1.19%
Himachal Pradesh	38	37	38	39	43	2.97%
Jammu and Kashmir	14	21	23	24	24	14.73%
Jharkhand	5	7	7	8	8	15.11%
Karnataka	44	41	44	46	49	2.47%
Kerala	29	33	34	37	41	8.53%
Madhya Pradesh	23	25	26	25	26	2.92%
Maharashtra	35	34	33	34	35	-0.05%
Manipur	23	26	27	28	29	6.68%
Meghalaya	16	17	18	18	18	2.68%
Mizoram	21	22	22	22	22	1.30%
Nagaland	20	22	23	24	26	7.07%
Odisha	23	23	23	23	23	0.42%
Puducherry	54	64	62	60	57	1.57%
Punjab	29	28	29	30	31	1.01%
Rajasthan	29	32	32	33	34	3.43%
Sikkim	14	14	15	16	18	5.98%
Tamil Nadu	27	30	31	33	33	5.37%
Tripura	8	9	10	11	11	9.28%
Uttar Pradesh	17	20	21	23	25	10.28%
Uttarakhand	28	32	31	33	35	5.57%
West Bengal	8	8	9	9	10	4.65%

Source: As for Table 1.

Table 3: Gross Enrolment Ratio in Higher Education (18-23 Years) in India and its Compound Growth Rate during the period from 2010-11 to 2014-15

STATES/UTs	GER in 2010-11	GER in 2011-12	GER in 2012-13	GER in 2013-14	GER in 2014-15	CAGR
Andhra Pradesh and Telangana Combined	28.37	29.90	30.22	33.19	33.68	4.38%
Arunachal Pradesh	26.88	21.30	19.04	26.14	28.28	1.27%
Assam	13.38	14.70	13.84	15.80	14.84	2.62%
Bihar	10.54	12.50	13.07	12.98	13.90	7.18%
Chandigarh	41.43	42.20	54.60	55.82	56.08	7.86%
Chhattisgarh	13.63	10.50	12.44	13.98	14.62	1.77%
Delhi	32.45	38.90	39.64	43.10	43.53	7.61%
Goa	33.22	23.50	24.92	26.36	27.69	-4.45%
Gujarat	21.28	16.50	18.33	19.45	20.02	-1.52%
Haryana	24.15	28.00	27.77	27.47	27.55	3.36%
Himachal Pradesh	25.97	24.80	25.80	29.27	31.17	4.66%
Jammu and Kashmir	16.85	22.80	25.61	25.58	24.80	10.15%
Jharkhand	8.14	9.90	12.10	13.13	15.42	17.31%
Karnataka	25.49	23.80	25.36	26.19	26.38	0.86%
Kerala	21.90	21.80	22.14	24.89	28.71	7.00%
Madhya Pradesh	13.61	18.50	19.20	19.59	19.62	9.58%
Maharashtra	27.61	26.30	22.92	26.25	27.93	0.30%
Manipur	35.93	30.20	29.93	37.74	35.93	0.00%
Meghalaya	17.50	17.40	19.19	19.30	20.54	4.08%
Mizoram	21.57	19.00	22.24	23.21	23.26	1.91%
Nagaland	21.52	15.80	14.71	15.42	15.64	-7.67%
Odisha	16.14	16.60	16.32	16.39	17.70	2.33%
Puducherry	31.23	38.30	44.14	47.69	45.95	10.14%
Punjab	19.39	23.00	23.92	25.35	27.13	8.76%
Rajasthan	18.23	18.20	18.27	19.71	20.01	2.37%
Sikkim	24.22	28.20	24.26	27.85	30.35	5.80%
Tamil Nadu	32.87	40.00	42.03	43.03	45.22	8.30%
Tripura	13.60	12.40	14.09	15.37	16.78	5.40%
Uttar Pradesh	16.25	17.40	19.53	21.62	24.96	11.32%
Uttarakhand	27.77	31.10	33.27	33.77	33.91	5.12%
West Bengal	12.39	13.60	15.14	16.32	17.40	8.86%

Source: As for Table 1.

Table 4: Compound Annual Growth Rate of Enrolment in Different Levels of Higher Education in India during 2010-11 to 2014-15

STATES/UTs	CAGR of UG Enrolment	CAGR of PG Enrolment	CAGR of M.Phil. Enrolment	CAGR of Ph.D. Enrolment
Andhra Pradesh & Telangana Combined	3.88%	-0.24%	-20.90%	-0.88%
Arunachal Pradesh	3.41%	3.54%	19.26%	-20.26%
Assam	-0.16%	18.97%	24.09%	18.01%
Bihar	4.11%	6.75%	N.A.	5.76%
Chandigarh	13.95%	4.29%	-3.04%	7.82%
Chhattisgarh	-0.16%	9.96%	-4.41%	18.45%
Delhi	10.37%	-0.86%	-15.32%	13.90%
Goa	-2.90%	-24.30%	-69.23%	63.43%
Gujarat	-0.43%	-2.25%	-0.13%	8.02%
Haryana	4.31%	-1.94%	-10.28%	4.84%
Himachal Pradesh	2.79%	7.51%	-2.03%	13.96%
Jammu and Kashmir	0.85%	31.98%	-24.95%	22.30%
Jharkhand	14.28%	11.19%	42.33%	104.36%
Karnataka	2.00%	2.04%	-12.87%	9.78%
Kerala	6.04%	4.40%	7.06%	8.40%
Madhya Pradesh	7.63%	9.32%	12.52%	4.13%
Maharashtra	0.74%	1.48%	7.00%	12.49%
Manipur	-5.08%	3.21%	18.92%	-0.12%
Meghalaya	1.59%	13.85%	7.22%	1.81%
Mizoram	-0.15%	2.56%	2.08%	3.75%
Nagaland	-8.93%	-10.10%	-100.00%	5.84%
Odisha	1.08%	0.09%	-6.65%	31.96%
Puducherry	5.43%	48.78%	13.00%	-37.74%
Punjab	7.94%	12.22%	21.23%	20.27%
Rajasthan	1.71%	6.49%	12.83%	6.67%
Sikkim	6.01%	1.37%	39.42%	92.51%
Tamil Nadu	10.33%	6.45%	37.00%	24.17%
Tripura	6.94%	-13.24%	N.A.	28.85%
Uttar Pradesh	10.78%	9.86%	1.81%	14.60%
Uttarakhand	4.78%	2.11%	3.39%	3.04%
West Bengal	9.99%	-1.63%	-7.77%	14.19%

Source: As for Table 1.

Table 5: Pupil-Teacher Ratio in Higher Education (18-23 Years) in India and its Compound Growth Rate during the period from 2010-11 to 2014-15

STATES/UTs	PTR in 2010-11	PTR in 2011-12	PTR in 2012-13	PTR in 2013-14	PTR in 2014-15	CAGR
Andhra Pradesh & Telangana taken together	19.61	18.29	17.38	18.12	16.61	-4.07%
Arunachal Pradesh	23.84	39.51	31.33	41.98	49.32	19.93%
Assam	54.39	24.29	26.08	29.21	25.33	-17.39%
Bihar	52.27	46.06	52.82	56.54	50.02	-1.09%
Chandigarh	35.74	25.32	22.57	29.76	28.88	-5.20%
Chhattisgarh	32.82	20.97	24.39	24.39	23.51	-8.00%
Delhi	49.09	48.37	47.25	49.92	48.83	-0.13%
Goa	31.83	17.35	18.45	18.26	17.18	-14.28%
Gujarat	30.61	26.80	27.11	27.14	27.54	-2.61%
Haryana	43.84	21.85	19.39	18.20	17.75	-20.23%
Himachal Pradesh	27.43	23.58	20.42	21.89	21.35	-6.08%
Jammu and Kashmir	49.86	37.98	34.74	33.39	31.69	-10.71%
Jharkhand	109.39	43.76	51.78	57.73	57.81	-14.74%
Karnataka	14.83	14.49	14.57	13.98	13.80	-1.78%
Kerala	23.94	15.47	15.16	15.46	16.62	-8.73%
Madhya Pradesh	107.03	27.32	24.96	26.69	24.13	-31.09%
Maharashtra	41.17	23.11	21.33	23.13	22.79	-13.74%
Manipur	71.93	18.73	19.94	22.17	20.93	-26.55%
Meghalaya	37.22	19.87	19.61	18.95	19.91	-14.47%
Mizoram	23.23	18.04	19.67	19.17	18.43	-5.61%
Nagaland	28.41	23.56	20.30	20.71	19.21	-9.32%
Odisha	39.40	21.48	19.24	19.34	19.76	-15.85%
Puducherry	10.89	8.84	11.70	10.72	9.83	-2.54%
Punjab	28.51	19.16	17.96	16.52	17.02	-12.11%
Rajasthan	64.37	25.94	20.67	22.30	23.26	-22.46%
Sikkim	24.40	19.56	14.43	17.09	17.04	-8.58%
Tamil Nadu	28.36	18.38	17.51	16.99	16.45	-12.73%
Tripura	30.79	26.98	28.44	29.77	31.18	0.31%
Uttar Pradesh	127.36	31.73	37.14	39.31	38.56	-25.82%
Uttarakhand	38.26	31.24	29.32	29.87	23.45	-11.52%
West Bengal	60.02	36.37	38.36	38.95	37.69	-10.98%

Source: As for Table 1.

Table 6: Compound Annual Growth Rate of Number of Different Types of Teachers in Higher Education Institutions of India during 2010-11 to 2014-15

STATES/UTs	CAGR of Assistant Professors	CAGR of Associate Professors	CAGR of Professors	CAGR of Demonstrators/ Tutors	CAGR of Temporary Teachers
Andhra Pradesh & Telangana Combined	10.24%	5.11%	-0.69%	10.06%	0.69%
Arunachal Pradesh	-17.88%	-13.64%	-21.82%	0.00%	12.47%
Assam	25.95%	19.33%	15.81%	14.86%	33.23%
Bihar	4.09%	0.01%	2.73%	8.19%	19.90%
Chandigarh	14.21%	5.80%	37.46%	17.02%	25.46%
Chhattisgarh	11.43%	3.24%	13.82%	50.66%	7.09%
Delhi	7.16%	4.91%	10.62%	-8.16%	26.47%
Goa	14.09%	7.03%	10.60%	2.70%	-0.11%
Gujarat	3.54%	5.25%	0.23%	4.45%	-8.55%
Haryana	31.70%	37.98%	16.71%	23.40%	20.65%
Himachal Pradesh	10.29%	16.36%	2.91%	30.93%	3.73%
Jammu and Kashmir	17.73%	10.11%	19.67%	39.44%	23.92%
Jharkhand	40.49%	28.72%	26.83%	74.87%	8.32%
Karnataka	4.46%	5.45%	-1.21%	3.46%	0.03%
Kerala	21.58%	7.97%	7.03%	2.66%	9.49%
Madhya Pradesh	64.31%	75.71%	41.05%	58.88%	44.50%
Maharashtra	20.16%	16.05%	11.18%	9.64%	8.03%
Manipur	34.91%	24.22%	26.84%	17.69%	34.92%
Meghalaya	18.80%	32.15%	8.85%	4.15%	13.57%
Mizoram	5.03%	2.69%	14.35%	16.12%	13.39%
Nagaland	1.04%	-2.16%	6.85%	51.01%	-16.06%
Odisha	19.94%	20.75%	17.65%	29.26%	23.12%
Puducherry	9.73%	8.55%	10.89%	30.48%	13.42%
Punjab	20.95%	23.63%	17.57%	49.54%	44.20%
Rajasthan	35.17%	28.38%	21.92%	120.54%	6.87%
Sikkim	11.19%	15.06%	9.82%	34.92%	30.33%
Tamil Nadu	23.00%	34.54%	20.46%	47.74%	26.18%
Tripura	4.00%	14.15%	-6.66%	17.58%	-16.62%
Uttar Pradesh	59.99%	35.54%	34.95%	61.85%	28.68%
Uttarakhand	26.95%	17.39%	4.69%	7.38%	5.91%
West Bengal	21.89%	18.30%	13.74%	20.45%	34.90%

Source: As for Table 1.

Table 7: Compound Annual Growth Rate of Number of Different Types of Non-Teaching Staff in Higher Education Institutions of India during 2010-11 to 2014-15

STATES/UTs	CAGR of Group-A	CAGR of Group-B	CAGR of Group-C	CAGR of Group-D
A.P. & Telangana Combined	6.67%	2.79%	0.34%	4.54%
Arunachal Pradesh	26.07%	41.42%	19.13%	-5.39%
Assam	16.67%	31.35%	13.14%	11.60%
Bihar	7.86%	5.49%	2.81%	0.91%
Chandigarh	8.25%	20.66%	20.09%	14.12%
Chhattisgarh	15.04%	23.85%	9.68%	6.24%
Delhi	12.23%	29.23%	20.86%	-7.88%
Goa	14.95%	14.16%	8.87%	1.24%
Gujarat	2.54%	14.47%	3.87%	2.06%
Haryana	21.60%	20.79%	18.70%	11.51%
Himachal Pradesh	6.01%	28.07%	8.69%	-1.68%
Jammu and Kashmir	32.45%	88.59%	6.10%	17.31%
Jharkhand	72.43%	67.97%	43.49%	38.24%
Karnataka	9.63%	11.27%	0.66%	-1.02%
Kerala	13.48%	21.09%	7.60%	8.17%
Madhya Pradesh	71.49%	69.56%	54.57%	37.55%
Maharashtra	19.10%	22.06%	14.63%	12.90%
Manipur	43.24%	36.84%	29.84%	5.09%
Meghalaya	16.90%	-3.71%	-7.15%	-5.72%
Mizoram	7.30%	12.54%	22.97%	-3.21%
Nagaland	6.81%	6.26%	9.95%	2.65%
Odisha	7.75%	16.90%	19.40%	14.60%
Puducherry	29.15%	40.32%	22.02%	11.40%
Punjab	23.95%	22.08%	20.32%	23.23%
Rajasthan	41.81%	22.45%	19.39%	14.59%
Sikkim	42.87%	-15.98%	3.42%	0.56%
Tamil Nadu	23.54%	33.99%	25.37%	28.03%
Tripura	2.30%	15.11%	10.29%	3.53%
Uttar Pradesh	29.80%	41.30%	35.46%	22.77%
Uttarakhand	10.76%	13.94%	18.62%	9.68%
West Bengal	-6.15%	19.59%	12.39%	19.84%

Source: As for Table 1.

Table 8: Compound Annual Growth Rate of Number of Different Indicators in Technical and Management Institutions of India during 2010-11 to 2014-15

STATES/UTs	CAGR of AICTE Approved Institutions	CAGR of Enrolment	CAGR of Number of Faculties	CAGR of Number of Student Passed
Andhra Pradesh & Telangana Combined	-2.09%	2.79%	31.65%	5.99%
Arunachal Pradesh	52.75%	-17.11%	7.61%	-15.83%
Assam	15.92%	8.80%	19.54%	28.08%
Bihar	11.14%	5.31%	29.60%	3.57%
Chandigarh	0.00%	4.58%	78.49%	23.24%
Chhattisgarh	5.56%	2.52%	19.57%	4.67%
Delhi	3.20%	5.53%	20.86%	8.02%
Goa	3.08%	25.44%	33.51%	39.50%
Gujarat	0.59%	-2.99%	40.56%	8.92%
Haryana	-2.33%	-1.69%	27.08%	1.65%
Himachal Pradesh	3.32%	-1.65%	38.50%	17.84%
Jammu and Kashmir	21.19%	7.53%	22.25%	2.08%
Jharkhand	14.50%	17.31%	31.84%	8.94%
Karnataka	-0.20%	1.23%	26.44%	6.16%
Kerala	2.80%	4.47%	35.03%	7.98%
Madhya Pradesh	0.66%	-3.39%	26.76%	6.04%
Maharashtra	1.15%	-3.55%	35.89%	9.64%
Manipur	-18.35%	-16.77%	-9.16%	-6.74%
Meghalaya	0.00%	-6.36%	17.85%	39.60%
Mizoram	73.21%	177.08%	47.90%	-5.71%
Nagaland	50.00%	52.63%	31.25%	6.45%
Odisha	1.56%	-0.93%	13.44%	2.62%
Puducherry	6.90%	-7.33%	29.95%	12.48%
Punjab	0.66%	2.44%	26.73%	7.21%
Rajasthan	-0.86%	-11.32%	35.37%	6.76%
Sikkim	0.00%	-8.60%	16.23%	9.85%
Tamil Nadu	-0.11%	-6.48%	41.64%	6.95%
Tripura	41.42%	26.92%	22.16%	5.54%
Uttar Pradesh	0.28%	9.38%	26.43%	7.33%
Uttarakhand	-0.31%	0.79%	38.84%	6.48%
West Bengal	2.74%	2.75%	25.10%	12.27%

Source: Author's calculations from AICTE data

Table 9: Success Rate of Students in AICTE approved Technical and Management Institutions of India and its Compound Growth Rate during the period from 2012-13 to 2014-15

STATES/UTs	2012-13	2013-14	2014-15	CAGR
Andhra Pradesh	30.24	31.05	34.53	6.86%
Arunachal Pradesh	9.23	10.18	6.77	-14.33%
Assam	39.73	38.31	31.69	-10.69%
Bihar	27.21	30.93	35.10	13.57%
Chandigarh	65.60	54.41	55.26	-8.22%
Chhattisgarh	23.38	28.88	27.55	8.56%
Delhi	57.60	65.07	66.29	7.28%
Goa	42.63	32.11	31.14	-14.53%
Gujarat	26.71	26.93	28.00	2.38%
Haryana	46.46	44.88	46.89	0.47%
Himachal Pradesh	42.28	38.62	33.08	-11.54%
Jammu and Kashmir	35.62	31.88	28.83	-10.04%
Jharkhand	43.55	39.76	39.27	-5.04%
Karnataka	37.75	38.07	40.22	3.21%
Kerala	42.69	43.52	45.94	3.75%
Madhya Pradesh	38.27	38.35	39.81	1.99%
Maharashtra	31.36	30.83	32.07	1.13%
Manipur	35.35	44.00	48.13	16.68%
Meghalaya	23.26	22.66	30.79	15.06%
Mizoram	0.00	37.86	40.15	6.06%
Nagaland	0.00	10.75	47.47	341.52%
Odisha	46.32	46.58	49.02	2.86%
Puducherry	59.03	59.39	63.06	3.35%
Punjab	34.67	32.11	34.09	-0.83%
Rajasthan	38.94	38.21	40.77	2.33%
Sikkim	52.71	46.18	46.06	-6.52%
Tamil Nadu	56.74	56.29	59.37	2.29%
Telangana*	36.45	36.18	36.77	0.45%
Tripura	3.98	1.81	3.57	-5.25%
Uttar Pradesh	45.31	48.19	48.16	3.10%
Uttarakhand	38.61	37.58	41.72	3.95%
West Bengal	51.42	51.36	50.48	-0.92%

Source: As for Table 8.

*We have kept Telangana separate since data for Telangana was available for all the years.

Table 10: Higher General Education Quality Indices, Higher Technical Education Quality Indices and Higher Education Quality Indices of Different States of India During 2014-16

STATES/UTs	HGEQI	HTEQI	HEQI
Andhra Pradesh	45.95	31.35	38.65
Arunachal Pradesh	33.33	10.00	21.67
Assam	38.85	25.53	32.19
Bihar	32.66	16.67	24.67
Chandigarh	26.00	19.79	22.89
Chhattisgarh	37.63	31.11	34.37
Delhi	52.80	32.87	42.84
Goa	51.82	31.67	41.74
Gujarat	43.61	31.70	37.66
Haryana	42.80	33.79	38.29
Himachal Pradesh	34.75	40.21	37.48
Jammu and Kashmir	41.07	30.00	35.54
Jharkhand	25.54	34.82	30.18
Karnataka	43.31	35.37	39.34
Kerala	46.22	37.04	41.63
Madhya Pradesh	41.96	36.32	39.14
Maharashtra	46.19	34.89	40.54
Manipur	46.19	34.89	40.54
Meghalaya	50.42	0.00	25.21
Mizoram	42.81	0.00	21.41
Nagaland	32.81	0.00	16.41
Odisha	40.80	35.52	38.16
Puducherry	48.42	39.49	43.95
Punjab	50.34	33.09	41.71
Rajasthan	38.85	18.60	28.72
Sikkim	30.00	40.00	35.00
Tamil Nadu	42.19	33.99	38.09
Telangana	44.29	24.76	34.53
Tripura	44.29	24.76	34.53
Uttar Pradesh	35.99	35.54	35.77
Uttarakhand	39.31	34.19	36.75
West Bengal	42.62	29.51	36.07

Source: Author's calculations from NAAC and NBA data

Table 11 OLS estimates of Higher Education Quality Equation

Dependent Variable.: *HEQI*			
Independent Variables	**Coefficients**	**t-statistic**	**P> t**
intercept	21.66257	2.94	0.007
GER	0. .2798365	2.66	0.014
TEMP	-0.3917196	-2.44	0.023
TS _ NTS _ R	4.526739	2.01	0.057
PTR	-0.2958386	-3.43	0.002
ENROL _ STATE _ UNIV	-0.173572	-4.13	0.000
CAGR _ SHARE _ GSDP	0.1917092	1.01	0.323
ln_ *COLLEGE*	3.737405	4.47	0.000
ln_ *STUDENT _ AGIT*	-0.0011014	-0.44	0.662
F	4.93(0.0012)		
R-Squared	0.6319		
Adj R-Squared	0.5038		

Source: Author's calculations from NAAC, NBA, AISHE, AICTE and Police Organizations data

Note: We have checked for the presence of multicollinearity and heteroscedasticity in the regression results and the results are found to be free from these problems.