

Status and Select Concerns of Engineering Education in Kerala (India): An Overview

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Abstract - Educational standards of engineering colleges are widely debated for their substantial quality matters and academic challenges. As a whole, engineering education in the state addresses serious pitfalls due to various factors affecting the declining quality of professional education, lower student enrollment, low pass percentages with enormous backlogs, increasing dropout ratio, progressive closing down of colleges for maintaining poor academic standards, increase in unemployment rates among the engineering graduates and absence of suitable placements, etc. All these had contributed to widening the skill gap and reduced the number of producing quality engineers. The major reasons that contributed to the crisis need an enormous overhaul. In this context, the present paper discusses the current status and concerns of engineering education in the backdrop of its growth, student intake, pass percentage analysis, and addresses the lacuna behind the diminishing quality. Greater concerns like accreditation of entire programs in technical institutes, yearly revision of curriculum, appropriate examination reforms, mandatory internships, and industry readiness, along with promoting innovation and creativity among students, were highly needed for improving the quality of technical education and to further enhance the employability of the engineering graduates.

Keywords - Academic Standards, Engineering Education, Employability Status, Pass Analysis, Quality Concerns, Technical Education.

I. INTRODUCTION

Technical education represents one of the rapidly growing and largest educational systems in the country. Nowadays, more than the quantitative aspects, qualitative attributes emerge as a paramount issue. It mostly fails to maintain its standard in par excellence with world-class universities, unlike that of the advanced countries. Moreover, the technical education in Kerala has undergone remarkable changes from its initial stages with the start of technical

education totally managed by the government and its shift in the recent year to the outnumber of self-financing institutes in the private sector. Also, Kerala has witnessed the growth of engineering institutions with a higher annual intake of students during these years.

When we come to the regulatory side, the All India Council for Technical Education (AICTE) stood as the apex advisory body to ensure the facilities, quality assurance, and the management of technical education. Many times, outcome-based assessment and accreditation are vague; the results are assessed based on the prescriptive input standards rather than educational outcomes. The educational quality must be therefore measured by its overall educational outcomes (NBA Annual Report, 2018-19). For ensuring quality, broad parameters like accreditation or grading of academic institutions and programs were widely used. Plans and modified frameworks are being implemented to address the issues and concerns over a period of time.

The 12th plan (of Planning Commission, India) on Technical education (2012-17) advocates it focuses on various categories that comprised of urgent need towards research and innovation, technology-enabled learning, strengthening state technical institutions and skills, and employability as its major concern for excellence as against its previous plan on increasing enrollment, opening up of new courses and starting new institutions, etc. In spite, various projects from MHRD, AICTE, CUBE, RUSA, and TEQIP (Technical Education Quality Improvement Programme) have been undertaken, and schemes focusing on skill development to improve the quality of technical education is carried out simultaneously.

The current scenario of engineering education in Kerala, the status of engineering institutes, student's intake, the pass percentage and employability status of students, and existing challenges affecting the quality of technical education are discussed in brief.

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II. STATUS OF ENGINEERING EDUCATION AND STATISTICS

As education, particularly higher education leads to the development of a nation as it facilitates knowledge generation, professional education has its own grip. The steep growth of engineering education in the state progressed with its functioning of one institution in the year 1939, and the number of institutes grown to 161 in 2014, whereas the number of seats was also raised respectively over a period of time. At its initial stages, the technical education portfolio was initiated by the government institutes, including institutions of national importance, but later institutions under the private sector outstripped the governmental participation in its provisions and facilities sometimes. Expansion at this level has contributed to the excessive growth of Self-financing institutions. Within the decades, the development of engineering education has reached a figure of 179.

The above table illustrates the progressive growth of Engineering colleges in the state. It shows that the total engineering colleges in the state till 1990 was just 8, among than 5 were government and 3 were Private-aided. In the year 2000, there were a total of 32 engineering colleges in the state, and the figure was even lower before 2009. By 2012, with the increase in the number of self-financing colleges, the figure rose to 119. Till 2019, there were about 179 engineering colleges functioning with a sanctioned intake of 51,764 students. The table further shows that there was a tremendous increase in the number of engineering colleges and above 90 percent of engineering colleges fall under self-financing management.

Table 1: Growth In Number of Engineering Institutions in Kerala		
Year	Number of Added Engineering Colleges	Cumulative Number of Engineering Colleges
Before 1960	4	4
1961-1970	2	6
1971-1980	Remained the same	6
1981-1990	2	8
1991-2000	24	32
2001-2010	87	119
2011-2020	60	179

Table-2: District Wise & Management Wise Details of Engineering Colleges in Kerala- 2019									
Sl.No	Name of District	No of Colleges				Sanctioned Intake			
		Govt	Aided	Unaided	Total	Govt	Aided	Unaided	Total
1	Thiruvananthapuram	2	0	25	27	940	0	7060	8000
2	Kollam	0	1	16	17	0	733	3596	4329
3	Pathanamthitta	0	0	7	7	0	0	1860	1860
4	Alappuzha	0	0	10	10	0	0	3075	3075
5	Kottayam	1	0	10	11	340	0	3910	4250
6	Idukki	1	0	6	7	300	0	1134	1434
7	Ernakulam	0	1	32	33	0	540	10346	10886
8	Thrissur	1	0	20	21	530	0	6170	6700
9	Palakkad	1	1	8	10	300	570	1920	2790
10	Malappuram	0	0	13	13	0	0	2620	2620
11	Kozhikode	1	0	9	10	300	0	1780	2080
12	Wayanad	1	0	1	2	300	0	20	320
13	Kannur	1	0	6	7	330	0	1800	2130
14	Kasargod	0	0	4	4	0	0	1290	1290
Total		9	3	167	179	3340	1843	46581	51764

Table 2 classifies the district-wise and management wise details of engineering colleges and their sanctioned intake. The status of engineering colleges in Kerala shows that the total number of engineering colleges in 2019, constitute of 179 with a sanctioned intake of 51,764. Out of which 9 (5.0 percent) are government colleges, 3 (1.7 percent) are private aided colleges, and 167 (93.3 percent) are self-financing colleges (unaided). This depicts that the vast majority of engineering colleges were managed by the private sector. The sanctioned intake of government colleges in 2019 was 3340 (6.5 percent), aided colleges include 1843 (3.6 percent), and unaided colleges consist of 46581 (89.9 percent). As compared to the previous year, there was a gradual decrease in the number of colleges from 183 to 179, and there was also a reduction in the total sanctioned intake of students. The details of student intake in engineering colleges under various managements are depicted in Table 3.

Year	Government	Aided	Self-Financing	Total
2015-16	3343	1700	53194	58237
2016-17	3283	1850	55243	60376
2017-18	3340	1850	52354	57544
2018-19	3340	1850	51910	57100
2018-20	3340	1843	46581	51764

The number of students enrolled in government and aided engineering colleges for graduate courses decreased to 5134 in 2016-17 from that of 6370 in 2015-16. The proportion of girl's enrolment also has decreased, and for postgraduate courses, 1515 students were admitted in 2016-17. Similarly, the proportion of students enrolled in government and aided engineering colleges for graduate courses in 2018-19 increased to 6222 from 5134 as against the strength in 2016-17.

Overall analysis shows a declining trend in the number of students enrolled, especially in self-financing colleges. The sanctioned intake of students was declined to 51764 during the year 2019-20 from 57100 as compared to the previous year, which depicts a gradual decrease of more than five thousand students. This illustrates a negative trend of students seeking admission to engineering education over the years.

Year	Approved Intake	Actual Intake	Vacant Seats	Vacant seats in Private Self-financing colleges
2015-16	58165	37007	21158	19468
2016-17	56139	34467	21672	20088
2017-18	55665	30195	25470	22819

Further analysis of the number of vacant seats in engineering colleges for B.Tech courses for the past three years throws up several insights. It has tremendously increased from 21158 in 2015-16 and reached 25470 over 2017-18. Further, it is observed that the vacant seats in self-financing colleges have increased to 22819 as against 19468 in 2015-16. Table 3 indicates that there has been a considerable declining trend in the admission in engineering education.

III. PASS PERCENTAGE ANALYSIS

Vital statistics regarding the engineering results shows a clear picture of the deteriorating quality of engineering education in Kerala. Government engineering colleges stood forefront in terms of academic excellence due to their high pass percentage and increasing placements of students in reputed multinational firms. More than fifty percent of engineering students have been failing in their BTech examinations.

Many reasons have been put forward by the experts regarding the low pass percentage, which includes the fall in steady standards of professional education in the state followed by crooked policies of the government in sanctioning new engineering colleges without maintaining satisfactory infrastructure or academic standards. This is more evident particularly in the case of the self-financing sector, which results in the progressive closure of these institutions. Instructions were strictly given to close down colleges with less than 40 percent pass percentage.

Pass percentage analysis helps to uncover the academic success of students, and it is, however, very low among the students of self-financing colleges as compared to the government/aided engineering college counterparts. The general trend observed over the years shows that topmost government institutions have higher pass percentages. The comparative analysis of pass percentage in government/aided engineering colleges versus private engineering colleges indicates that the results of government college students are better than aided/unaided colleges. The data also reveals that higher failure rates are among students of unaided colleges. Substantial standards and maintaining poor quality negatively affect the academic performance of students from unaided/private- self-financing institutions.

Table 5: Engineering Result-2019

Management	Boys			Girls			Total		
	Registered Students	Passed Students	Pass Percentage	Registered Students	Passed Students	Pass Percentage	Registered Students	Passed Students	Pass Percentage
Government	2054	1428	69.5	1223	979	80.1	3277	2407	73.5
Private Aided	1296	910	70.2	607	533	87.8	1903	1443	75.8
Government Autonomous	2453	1306	53.2	2357	1823	77.3	4810	3129	65.1
Private Self Financing	13963	6246	44.73	9798	8818	67.54	23761	15064	63.4
Total	19766	9890	50	13985	12153	86.9	33751	22043	65.3

Government-aided colleges showed higher results (75.8 percent pass percentage) than government engineering colleges. Government autonomous and government self-financing colleges also performed better with 73.5 percent and 65.1 percent, respectively. However, as compared to government and aided engineering colleges, the pass percentage of students in private self-financing engineering colleges shows a sharp decline, clearly indicating the deterioration of the quality.



Fig. 1: Overall Analysis of Performance of Colleges-2019

The data in figure-1 shows the overall analysis of performances of colleges based on the eighth-semester examination. It indicates that out of the 35064 students who appeared for the exam, a total of 25690 students had passed the examination with a pass percentage of 73.27 percent. Analysis of the results of the BTech examination conducted by Kerala Technological University in 2019 showed that the pass percentage in one of the colleges was less than 30%, in three colleges it was less than 40%, and in another 8 colleges, it was 50% and lesser.

IV. STUDENTS EMPLOYABILITY STATUS

The placement details of those students passing out of the engineering colleges reveal that majority of the engineering graduates were not employed. A huge percentage of them were engaged in finding out jobs that do not suit their discipline. It is noted that students got fewer placement opportunities. The placement record of the students in government institutions stood relatively higher with that of private-aided and self-financing managements. Out of the total student enrollment of 3340 in various Government engineering colleges, 1354 students get placement in various companies during 2018-19. The placement records in private-aided and self-financing colleges also show a declining trend.

The Kerala State Centre of Institution of Engineers (IEI) states that only 11,210 engineering graduates were able to find a job out of the total student enrollment during the year 2015-16. This nasty picture illustrates that more than 30,000 still lack suitable placements. Thus, over the years, this number shows a rising trend. The study report of the All India Professional Congress- Kerala Chapter, 2019, among 2600 engineering graduates revealed that the graduates faced great challenges to hardly found a job that suits their qualifications. Moreover, only 50 percent are passing the course, and about 25 percent of the engineering graduates were unemployed. The entry-level engineers receive a lower salary. Besides, 66 percent were engaged in non-engineering jobs, especially in recent years. The study also points out that due to lack of adequate internships and the absence of academia-industry linkages, the present employability of graduates is less than 20 percent.

V. MAJOR QUALITY CONCERNS

Rapid strides have been taken to study the quality of technical education and for bettering student achievements. The committee for preparing short and medium-term perspective plans for technical education by Reddy accorded that lower enrollment, low placements, and low employability are major causes for concern in engineering. The situation of Engineering Education in Kerala faces a crisis that requires massive renovation. Nearly 8000 engineering students’ dropouts in the past five years in the state. The major cause for these turnouts occurs as a result of the weak subject base, absence of qualified and experienced faculties, etc. Though there are 179 engineering colleges with an annual intake of 51,764, only 14 percent of the engineering graduates enrolled pass out every year.

Over its long run, engineering colleges in the state hardly find their way to fill all their seats in different branches due to the outgrowth of technical institutions about 122 private engineering colleges in the country have opted for progressive closure in 2017, and beyond 25470 engineering seats remained vacant during 2017-18. Several study reports point out that 80 percent of engineering graduates were not

supposed to have employability, pointing to the lower standards of the engineering institutions (Kerala Perspective Plan, 2018).

There are numerous decisive factors to the lowering standards of educational offerings in a huge proportion of engineering institutions. These institutes currently face many challenges in terms of the badly distributed educational facilities, the affiliating university system, outdated curricula, inadequate infrastructure, absence of qualified faculties, poor teaching-learning processes, lack of innovations, outdated evaluation system, in lack of industry connect and the fall in the employability rate among the graduates (Biswas et al., 2010).

Engineering education is facing a critical crisis that it is imperative for the system to improve its quality in terms of adequate enabling facilities, the mismatch between curriculum and industry needs, and the absence of job-specific skills. There are various aspects that directly or indirectly affect the quality of technical education, such as infrastructural facilities, teaching effectiveness, student outcomes, research and innovations, efficient management and monitoring, and wider industry connect (Singh et al., 2015). The efforts to improve the quality of education are challenging in due concern with inadequate resources, detaining qualification of the educators, languishing quality of students admitted, absence of innovative teaching-learning process, outdated curricula and syllabi lacking in skills, etc. maximize the barriers. The employability status in the top versus other colleges also stood poor, and the pass percentage highly remarked the ability of the students' knowledge lacks with the industry requirement (Kumar & Priya, 2017).

The current state of engineering education, however, shows tremendous changes and improvements. There are enormous factors that jeopardize the growth of technical education. The various aspects that affect the degradation of quality in technical education are not on their own for anyone reason, and it formidably encompasses several problems ranging between institutional, pedagogical, curricular to student-centric. Practical orientation, additional assessment, and evaluation mechanisms have to be strengthened as a solution to these drawbacks. Graduate outcomes, student progression, achievements, and producing employable graduates fruitful for the industry would make an effort to minimize low employability and enhance the quality of engineering education.

Though there is a quality assurance framework for Higher Education Institutions in India, the enrollment trends, graduation status, and employability remarks greater shifts, therefore, ensuring the quality of Technical Education Institutions and employment of graduates' merit seeks further examination.

VI. CONCLUSION

Unlike higher education, technical education needs continuous up-gradation. Stringent efforts are required to set up quality benchmarks for improving institutional mechanisms, which require not only thorough monitoring but also need constant revision. The future trend in engineering education should therefore focus on shift in curricula that needs an inter-disciplinary and progressive address to societal needs. Further move towards the quality of engineering education should 6. scale up to transform the curriculum and pedagogy. Moreover, the backdrop between industry-academia interaction was to strengthen up periodically to upskill the capabilities of the graduating students for their future employment opportunities. Precedence over outcome-based education inculcating innovations on teaching methods, curricular developments, conducive learning experience encouraging overall student progression to raise the standard of quality enhancement. Thus, academic excellence hinges on the recurrent effort of government, institutional, academicians, students, administrators, and all the other stakeholders aiming to bring a massive improvisation in technical education.

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