



**Bharatiya Vidya Bhavan's**  
**Sardar Patel College of Engineering**  
(Govt. Aided Autonomous Institute Affiliated to University of Mumbai)



Date: December 3, 2018.

### **One day Sensitization Workshop on Equity Action Plan (EAP)**

Training & Placement Office had organized a one day sensitization workshop on Equity Action Plan under the guidance of NPIU on 27<sup>th</sup> Nov 2018 at SPCE. In this workshop, representatives from following 44 institutes participated and presented their EAP.

Sr. No.	State	Institute	Sub-Component
1	Andaman & Nicobar Islands	Dr. B.R. Ambedkar Institute of Technology, Pahargaon, Port Blair	1.1
2	Maharashtra	BVB's Sardar Patel College of Engineering, Mumbai, Maharashtra	1.3
3	Maharashtra	College of Engineering, Pune, Maharashtra	1.3
4	Maharashtra	Department of Technology, Shivaji university, Kohlapur, Maharashtra	1.3
5	Maharashtra	Dr. Babasaheb Ambedkar Technological University, Lonere, Maharashtra	1.3 (ATU)
6	Maharashtra	Government College of Engineering, Jalgaon, Maharashtra	1.3
7	Maharashtra	Government Engineering College, Aurangabad, Maharashtra	1.3
8	Maharashtra	Govt College of Engineering, Karad, Maharashtra	1.3
9	Maharashtra	Institute of Chemical Technology, Mumbai, Maharashtra	1.3
10	Maharashtra	SGSS Nanded, Maharashtra	1.3
11	Maharashtra	University Department of Chemical Technology, North Maharashtra University, Jalgaon, Maharashtra	1.3
12	Maharashtra	VJTI, Matunga, Maharashtra	1.3
13	Maharashtra	Walchand College of Engineering, Sangli, Maharashtra	1.3
14	Maharashtra (CFTI)	VNIT, Nagpur	1.3
15	Chattisgarh	Chattisgarh Swami Vivekananda Technical University, Chattisgarh	1.2
16	Chattisgarh	Government Engineering College, Bilaspur	1.1
17	Chattisgarh	Govt Engineering College, Jagdalpur	1.1
18	Chattisgarh	Govt Engineering College, Raipur	1.1
19	Chattisgarh	Vishwavidyalaya Engineering College, Lakhanpur	1.1
20	Chattisgarh (CFTI)	NIT Raipur	1.3
21	Gujarat	Birla Vishwakarma Mahavidyalaya, Vallabh Vidyanagar, Gujarat	1.3

<b>Sr. No.</b>	<b>State</b>	<b>Institute</b>	<b>Sub-Component</b>
22	Gujarat (CFTI)	SVNIT, Surat	1.3
23	Madhya Pradesh	Indira Gandhi Engineering College, Sagar	1.1
24	Madhya Pradesh	Jabalpur Engineering College, Jabalpur	1.1
25	Madhya Pradesh	Madhav Institute of Technology & Science, Gwalior	1.1
26	Madhya Pradesh	Rajiv Gandhi Proudyogiki Vishwavidyalaya, Madhya Pradesh	1.2
27	Madhya Pradesh	Rewa Engineering College, Rewa	1.1
28	Madhya Pradesh	Samrat Ashok Technological Institute, Engg. College, Vidisha	1.1
29	Madhya Pradesh	Shri G S Institute of Technology & Science, Indore	1.1
30	Madhya Pradesh	Ujjain Engineering College, Ujjain	1.1
31	Madhya Pradesh (CFTI)	MANIT Bhopal	1.3
32	Rajasthan	College of Engg & Technology, Udaipur	1.1
33	Rajasthan	Govt Engg College, Ajmer	1.1
34	Rajasthan	Govt Engg College, Bharatpur	1.1
35	Rajasthan	Govt Engg College, Jhalawar	1.1
36	Rajasthan	Govt Mahilla Engg College, Ajmer	1.1
37	Rajasthan	Govt. College of Engg & Tech, Bikaner	1.1
38	Rajasthan	Govt. Engineering College, Banskara	1.1
39	Rajasthan	Govt. Engineering College, Bikaner	1.1
40	Rajasthan	MBM Engg College, Jodhpur	1.1
41	Rajasthan	MLV Textile & Engineering College, Bhilwara	1.1
42	Rajasthan	Rajasthan Technical University, Rajasthan	1.2
43	Rajasthan	University College of Engineering, RTU Kota	1.1
44	Rajasthan (CFTI)	MNIT Jaipur	1.3

Following was the schedule of this workshop:

<b>Sr. No.</b>	<b>Program</b>	<b>Time</b>
1	Registration and Tea	9:30 AM- 10:00 AM
2	Introduction by SPIU	10:00 AM- 10:15 AM
3	Workshop on Equity Action Plan	10:15 AM- 11:30 AM
4	Presentations by institute on their EAP (10 minutes each institute)	11:30 PM-1:00 PM
5	Lunch	1:00 PM-2:00 PM
6	Presentations by institute on their EAP (10 minutes each institute)	2:00 PM-5:30 PM
7	Tea & Snacks (to be served during the presentation)	4:15 PM-4:30 PM

The workshop was inaugurated by Ms. Bharti Arya, NPIU Consultant and Dr. S. P. Yavalkar, Jt. Director, DTE, Maharashtra. Ms. Bharti briefed all the participants about importance of

EAP and strategy to implement it effectively at each TEQIP-III institute. The SPIU representatives of each state also participated in this workshop.

During this workshop, the EAP coordinators of all the institutes presented EAP of their institute and also discussed their ideas of effective implementation of EAP. They also mentioned the challenges they are facing in implementation of the same at their institute and the same were addressed by NPIU Consultant and respective state SPIU representative. The World Bank guidance brief about **“Improving Students’ Academic Performance through the EAP”** is enclosed with this report for further details.

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**Training & Placement Officer**

## TECHNICAL EDUCATION QUALITY IMPROVEMENT PROGRAMME (TEQIP)-III

### Guidance Brief

#### Improving Students' Academic Performance through the Equity Action Plan<sup>1</sup>/ Indigenous People's Policy Framework

##### BACKGROUND AND OBJECTIVE

In TEQIP-III all institutions applying under sub-components 1.1, 1.2, and 1.3 are required to prepare and include an **Equity Action Plan (EAP)**. The objective of the Equity Action Plan is “to ensure that *all* students and faculty in the project institutions have equal opportunity to avail of the benefits of the project with substantial improvement in the performance of students who need greater assistance.”

Most importantly, the EAP is meant to help guide institutes in thinking of various ways they can improve student performance and satisfaction, resulting in better employability, placement, and ultimately, creating loyal alumni who will represent the institute in industry and elsewhere. Student performance is not only the responsibility of the student – it is also the responsibility of the institute to ensure that student support services are widely accessible.

Once formulated, the institutions should proactively implement their EAP. The Project Implementation Plan (*PIP*, June 2017) provides the project's overall EAP in section 8, pages 77-84; and the Format for Institutional Development Proposal (Annex IV- pages 115-130) which provides information for the EAP.

##### ***Equity Action Plans in Institutional Development Proposals for TEQIP-III***

The following information regarding equity should be provided in the Institution Development Proposals: the particulars of the Nodal Officer responsible for the implementation of EAP; numbers of SC, ST, OBC and women students, and transition rate of students from 1<sup>st</sup> to 2<sup>nd</sup> year (disaggregated by social categories). To provide greater academic support for students who require it, the institutions under the programme, may continue reservation of seats for students as per the policy framework. Institutes should use various methods (through exam scores, interviews, and other valid assessments) to identify students who require additional support, and provide support services through innovative methods, such as peer mentoring/tutoring; coaching classes; online repository of courses/learning materials; and skill development classes for increasing the transition rates and pass rates with the objective of improving their employability. Institutions may plan to spend at least 4% of the Institutional Project cost for providing academic support for such students.

<sup>1</sup> The EAP/IPPF draws extensively on the experience of TEQIP I and II.

In TEQIP-III, data on the transition rate between 1<sup>st</sup> and 2<sup>nd</sup> year will be obtained from the participating institutions. Some such data already obtained from previous phases indicate that this transition rate is usually higher among girls than boys; and often *but not always* lower among SC/ST students compared with the General category, but *usually* not lower among OBC students. However, the gaps vary considerably among institutions, indicating that the issues of dropout, failure or poor academic performance are institution-dependent – in addition to the calibre of students that enrol in an institution, its management, teaching force, and actions to remedy students’ difficulties clearly have a bearing on the performance of students. The institutions in the above phases indicated that they could bring about 10 to 40 percent improvements in their transition rates over each of three years of effort under TEQIP-II. Given the shortage of good technical/engineering skills in India and their importance for national growth and development, it is paramount for TEQIP-III institutions to improve transition, and quality of their graduates, and ensure their employability.

### ***The purpose of this brief***

The objective of this brief is to identify and describe some interventions that TEQIP-III institutions could take to improve the performance of students in undergraduate engineering programs. Although TEQIP-III will include 1.3 engineering institutions (these were part of TEQIP-II, and have already implemented EAP), even these have students who may struggle at entry and/or perform poorly during their college years. Some students may take several extra years to complete their course; some may fail to secure employment at the end of their degree program because of overall low performance or inadequate skills at the completion of the course. This brief is aimed at reducing these forms of wastage of educational resources and, equally important, of human resources. As equity in the outcomes achieved by students is an important goal of TEQIP-III, the participating institutions must ensure that all students perform well academically and achieve their ‘post-college’ goals, securing good jobs or enter postgraduate courses, according to their choice, suited to their capabilities, and in line with the education they have received. In this brief we first discuss characteristics of students who need more support, and then identify several interventions that are being implemented to help them by the institutions such as those that will be in TEQIP-III, describing in some detail a few that could be implemented widely and effectively with relative ease.

### **The Equity Study**

This brief is based on a study of seven engineering institutions carried out in August 2015, including NITs, government aided and private unaided colleges. At all these colleges Principals, Deans, some founders, and top administrators were interviewed; group discussions were held with Heads of Department and cross-sections of faculty; a survey was administered to Final Year students and group discussions held with them; and in-depth interviews were carried out with students who were identified as struggling with academics by the institute and/or by themselves. This multiple-method approach and wide coverage has enabled both a broad and deep understanding of the subject. In addition, this brief build on an extensive literature review, and practical knowledge accumulated during eleven years of implementation of the first and second phases of TEQIP project in about

13 States and 190+ institutions. An important lesson from these various efforts is that every institution faces a different situation e.g., student body, teacher force and institutional setting. Hence, this brief recognizes that ‘one size does not fit all,’ and aims to provide guidance to the institutions trying to evolve their solutions to the problem of student performance.

## WHO ARE STUDENTS THAT NEED MORE SUPPORT?

**Characteristics.** The institutes visited for the Equity study classified as ‘academically struggling<sup>2</sup>’ students as those who secured third division (3<sup>rd</sup> class), failed more than 40 or 50 percent of their subjects in a given year, and/or lost a year or more. These students were generally believed not to have attended classes regularly. Some – but not all – had entered with low marks through either the reservations or management quota.

**Low Self-Confidence or Interest.** In general, poor-performance is found to arise from a complex of factors in the individual student’s college experience, only some of which exist prior to entry. The most important among student factors is reported to be a lack of self-confidence, confidence in the medium of instruction, or application due to lack of interest in the course. These students perhaps do not communicate, do not seek help, and/or have difficulty adjusting to the college environment. The characteristic of such students that was mentioned most widely was their lack of self-confidence, arising partly from inadequate language or communications skills, as well as *leading* to poor communication and participation in the classroom and other academic activities (and extra-curricular activities also in many cases).<sup>3</sup> An explanation sometimes given by faculty and even students for low academic achievement was ‘distraction,’ i.e., some students lacked discipline, fell into bad habits, or viewed college mainly as a time to have fun. Among these were possibly some students who, by their own admission, were disinterested in their studies. It is significant that the factors that produce such students even among those who enter college with good marks are more psycho-social in nature than socio-economic. They are thus amenable to improvement during the college years.

**College Factors.** As discussed below, a number of ‘college factors’ also trigger poor performance: (i) poor teaching either because of poor domain knowledge, or poor pedagogy including a lack of interaction and creativity in the classroom; (ii) improper sequencing or unevenness of curricula or syllabi and related issues; (iii) inadequate exposure of students to ‘real world’ situations before graduation, such as visits to industries; and (iv) inadequacy of discussion on performance, counseling and mentoring, to name a few. As it is the combination of factors that ultimately results in ‘educational wastage,’ there is a substantial

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<sup>2</sup> The irony is, once certain students are classified as needing more support, there is often a bombardment of services made available – professional counseling, remedial and summer courses, mentorship – to name a few. While this blanket approach appears reasonable, it does not necessarily improve student performance, and often dilutes the efforts and resources of the institution.

<sup>3</sup> On the other hand, some students who participated well in sports were also struggling academically. Having entered on ‘sports quotas’ they missed classes to practice and play their games and were unable to make up their losses, they said, because of a lack of support mechanisms in the college.

onus on the institutions to address both student and institutional issues that cause students – ranging from 10 to 25 percent in the final year - to perform poorly.

***Disadvantaged Groups.*** In general, data gathered on final year students in the private colleges did not show that performance was related directly to the student's sex, caste or tribe status, or religion, as proved from the experience of previous phases of the project. Academically underperforming students were not invariably from disadvantaged social groups. In all colleges, there were good-performing students from Scheduled Caste (SC) categories, from rural backgrounds, poor families, first-generation college goers, and first-generation English speakers. Conversely, among the poor performers there were upper caste/class students, well-to-do students from urban areas, and good English speakers.

There were similar nuanced differences among rural students. In southern states, rural students perform relatively well – sometimes even better than urban students – apparently because their success in securing seats in the top colleges encouraged them to work hard and make the best of their opportunity. Some felt pressure to do well *because* they hail from rural backgrounds, would eventually have to support their families, and/or pay back educational loans. Sometimes such family pressures also adversely affect their academic performance.

***Inadequate knowledge of English.*** As engineering textbooks and materials are predominantly in English, inadequate knowledge of English can be a handicap. However, in the southern colleges poor English may not always mean poor performance – for instance visits to colleges in Karnataka shows that some students who did their schooling entirely in Kannada language worked hard to learn English and were able to cope by the second year. Students who came from other linguistic communities (e.g., Hindi, Telugu) and had poor English were at a greater disadvantage as the teachers, who spoke Kannada and English, as they could not explain the material in other languages. The level of English among students in the government colleges in northern (Gujarat) was generally poor and more strongly related to performance, as teachers also were unable to communicate well in English.

Another area of concern is students who do not have a sufficient grasp on the concepts of mathematics, seen especially among students who enter directly into second year with a Polytechnic diploma. These students have not studied maths beyond Class 10, nor during their three-year course, so they are at a considerable loss when they enter second-year engineering which is, even for academically strong students, a tough year.

***Timing of Additional Courses and Repeat Exams.*** A significant difference that emerged between institutions in the Equity study that partly explains why some colleges have a large backlog of students in the final year is the timing of the repeat exams that can be taken by students who fail in several subjects. In the more ideal situation, make-up exams are held within a month or so of the original exams, while in the other colleges they are held a semester or a year later. This has two important negative fall-outs – the students have a heavy load as they must take exams simultaneously for both the new semester's subjects as well as for the subjects they fail; and they cannot attend classes in the subjects they have failed as either the syllabi or the college do not allow this. Thus, they do not get any additional teaching in the subjects that they struggle with unless they resort to coaching classes or other private means. This may in turn result in cumulative failures, leading some students to take six, seven or even more years to complete the four-year engineering course. In the ideal situation, on the other hand, make-up classes are provided by the college during the month before the repeat exams, which is usually during vacation, and the combination of the

additional teaching and exams immediately thereafter enables the students to go on to the next year without a burdensome backlog. Against this background, the study found several practices adopted by institutions to improve the performance of academically struggling students. Broadly, they fall into three categories: (i) student-centered strategies; (ii) strategies to improve teacher effectiveness ; and (iii) strategies beyond the teacher implemented by the college or affiliating university. The strategies are recommended to other institutions and described below to facilitate adoption.

## **STUDENT-CENTERED STRATEGIES TO IMPROVE PERFORMANCE**

***Appointment of Active Student Advisers, Mentors, or Proctors.*** The institution can appoint one faculty member for every 10-15 students entering in the first year. This Faculty Adviser/Mentor/Proctor establishes a close relationship with each student, orients them to college practices, follows their progress regularly (e.g., with at least fortnightly/monthly meetings) and guides them throughout the four-year course. First-year students are important to target because the transition from school to college and/or from home to hostel is often uncomfortable. However, contrary to the belief that only ‘first years’ require counselling and mentoring, students in all four years need this as different problems develop at different times. While the Faculty Adviser (FA) gives academic as well as personal advice, s/he is not necessarily able to address all problems – but plays a role in guiding the student, putting the student in touch with the appropriate assistance, and so on. For example, if a student faces financial difficulties, the FA could help him/her seek a loan from the college administration; if someone has adjustment problems, the help of a Counsellor may be sought. The relationship is more informal than formal, allowing students to ask for help when they need it and share their problems without fear. The FA discusses student performance, finds out whether there are non-academic reasons for a student’s weak or declining performance, and advises on appropriate study or other measures to be taken. The FA might also mediate between a student and other faculty member if necessary, or seek help from a higher-level person (HOD, Dean, Principal). The FA may also keep in touch with parents and talk to them when a relevant problem arises. Faculty may be given some professional training in mentoring and counselling to play this role.

***Promoting Peer Learning Groups.*** The majority of the institutions visited for this case study indicated that peer-to-peer mentorship and tutoring seemed to work best, since students are likely to feel most comfortable with other students. This also encourages and helps students to develop as they find that others have similar problems and get a chance to discuss their academic problems and other issues. Although students feel that they already work a full day, and have to ‘run to catch the bus’ in the case of those who are not in hostels, they also agree that they like to study in groups and it is effective. An organized approach to this involves forming groups of 10-12 students - with varying academic skills, who learn jointly. They can revise lessons after class or on weekends, before exams, etc. and undertake group projects also. Academically stronger students can assist others – the act of tutoring benefits everyone. Peer groups can also help each other. There can be ‘vertical’ integration, i.e., senior students can work with juniors, and student-faculty interactions can also be enhanced, with faculty members being available as resource persons to the student learning groups and even interacting informally with them. A variation of this is the ‘buddy system’ students from different academic levels and/or years are paired and work together.



This does though not discount the importance of faculty mentors, who play an integral role in observing and monitoring student progress and serve as guides throughout students' higher education experience.

***Diagnosing and Tracking Student Performance and Attendance.*** Some colleges start with an initial diagnostic test, supplementing their knowledge of the marks with which students enter the college (Class XII and common entrance test results). Properly devised tests provide information about areas or specific topics in which a particular student needs more support, and therefore what additional coaching s/he requires. Such colleges also collect information about which topics need to be emphasized by the subject teacher for the student group more widely. It is helpful to carry out such tests particularly before 'tough' subjects begin each semester, e.g. to use formative assessments. Formative assessments allow faculty to identify the varying academic levels in the classroom and they can subsequently better tailor their teaching style.. Reviewing student attendance in connection with performance, and advising students about attending classes, making up classes missed, and getting additional help is also useful. A 'report card' system can be used for each student, and carried through for the four years at college.

***Strengthening State Counselling for More Purposeful Selection of Engineering by Students***

An important finding in Karnataka was that many academically struggling students were not interested in studying engineering from the start of their college careers. During the interviews and discussions, many said that they had been 'forced' by their parents to take up engineering, or that they had taken admission in the engineering college though neither they nor their parents really understood what engineering studies entail. The counselling centers at which they opted for their choice of colleges and courses did not provide any counselling.<sup>4</sup> In some cases, they did not get the course they wanted and were disinterested in the one in which they enrolled. Some students and faculty in Karnataka estimated that 30 to 50 percent of students in these top-ranked colleges were studying engineering against their wishes, and that this included the majority of failing students. In contrast, although parental pressure and a lack of counselling were also present in Gujarat, 'disinterest' was less of a problem – the vast majority of students wanted to be engineers, though some did not get their choice of course. Thirty to 40 percent even said that they might continue on to post-graduate studies in engineering or management.<sup>5</sup> Although improving counselling at the centres is a recommendation to state governments, colleges that find this problem gravely affecting the performance of students could take up the matter with their state government.

***Improving Academic Performance.*** Efforts to help students deal with specific academic weaknesses (e.g., in maths) can involve improvements in teacher practices in the classroom – of which many examples are given in the next section, and/or be focused on academically

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<sup>4</sup> A key recommendation of the overall study, not discussed here because of the more focused nature of this note, is that State governments could develop these centers to provide active and substantive counseling to students and parents who visit them. <sup>5</sup> There may be a variety of explanations for the situation in Gujarat including a high value placed on education and the availability of a broad range of engineering jobs because of the State's industrialization.

struggling students. Many colleges offer make-up classes either during the semester (say, in the evenings, on weekends or during periods of preparatory leave) or vacations. Another approach is to provide a two-week period (in addition to preparation leave) when no classes are held but teachers are available to help students in challenging subjects. . Extra inputs could also be provided in more innovative ways, such as:

- Tutorial classes where additional problems are solved and students interact with each other in addition to a faculty member or senior post-graduate student.
- Where there are subjects with and overall high number of failing marks, a ‘Student Academic Support Program’ could systematically provide extra classes, extra notes and extra guidance.
- Student and faculty collaborations on projects (which may be integrated in the curriculum) where teachers are available to students formally and informally..

***Enhancing English and Communication and Presentation Skills.*** A college can set up an English language lab where students can listen to tapes and use workbooks to improve their English, particularly spoken English, which is often the most challenging.. Alternatively, holding regular English tutorials, which cover both grammar and everyday English, can be helpful. Such tutorials can also help students to gain confidence, for example, by asking questions. Another way of improving English language skills as well as communication and presentation skills is by ensuring that students have opportunities right from the first year to develop and make presentations in the classroom. All students, and not just those who perform well, should be given chances to participate. Since this approach is time consuming, and the syllabi already extensive, teachers need to assess where it can be used to good effect and without running the risk of having to “rush at the end of the semester” which is a common complaint. Students feel that language and soft-skill development should be provided throughout their education (not only in the last two or three semesters, as is commonly done for students to do well in job interviews). The programs need to be interactive and oriented to confidence-building, rather than ‘exam-oriented,’ ‘job-oriented,’ and ‘one-off.’

## **ENHANCING CLASSROOM AND TEACHER EFFECTIVENESS**

All students appreciate good teaching skills and good domain knowledge among faculty, but often point to the difficulties they face with faculty who have less (or outdated) knowledge, and those who are not able to impart what they know because of inadequate teaching skill or experience. Several suggestions emerged from our experience of previous phases and discussions with students, faculty and administrators in the engineering colleges with regard to improving the effectiveness of teaching.

***Improving Classroom Practices.*** One of the most critical needs is to ensure classroom sizes in which teachers can give adequate attention to the students and involve them in the daily lesson. To enhance classes teachers could adopt one or more of the following approaches.

- Start by asking students what they know and build their knowledge and confidence by teaching some familiar material and gradually moving to a new or difficult topic.
- Explain the importance of a topic being taught and its relevance to the ‘real world,’ industry, etc.

- Give practical examples particularly when explaining difficult concepts. Balancing theory and practice is an important request from students – which also means giving more time to lab work, projects, industrial visits, internships, and apprenticeships.
- Organize lectures by points, including adequate examples in each, using materials beyond the textbook!
- Move around the classroom and interact with students while they solve problems or read texts, or even while just giving the lecture.
- Speak clearly and audibly.
- Use media beyond ‘chalk and board,’ OHPs and Power-points - classrooms can be equipped with charts, models, projectors and videos to make instruction more visual and tactile.
- Give feedback to students on their performance and how to improve it. Students say they rarely get constructive feedback; in some instances, they get no feedback at all. Besides making such feedback part of teachers’ responsibilities, they need to be trained in how to provide it.
- Be open to questions and to feedback from students about the teaching contents and style<sup>5</sup>
- Be available for formal and informal contact after class.

***Increasing Student Participation in the Classroom.*** Both faculty and students agree that student participation in the classroom must be encouraged because it engages students more, builds their confidence, and helps clear their doubts. There are many ideas for teachers to increase student participation, enjoyment and effectiveness.

- Ask students questions at the beginning of each class about the previous lesson, thereby helping them to revise the earlier material and providing continuity.
- Ask students what they have understood in a class after 20-30 minutes, and ask them to summarize the main points at the end of a class.
- Give students a problem at the end of a class to solve and present in the next class.
- Ask students to solve problems on the board, or on paper individually or in groups.
- Divide students into groups and ask each group to research a topic from the syllabus and present a roundtable on it. Mixing students of different abilities, or varying language skills, is useful. The groups’ topics may be different or the same – in the latter students present for 10-15 minutes each, showing how an issue can be looked at from different perspectives or different evidence can be collected, etc. Having one group of students present and another ask questions is a good way to get students to interact, think and discuss. This can be extended to solving a problem or doing a more substantial project,

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<sup>5</sup> An approach covering several of the suggestions made by teachers and students in the Equity study was developed by Angelo and Cross (1993) and is recommended by R.V. Hogg and M.C. Hogg (1995) “Continuous Quality Improvement in Higher Education” *International Statistical Review*, 63, 35-48. It consists of ‘five steps’: listen, stop, reflect, write and give feedback. Students begin by listening to a lecture or demonstration. Then, after a portion of the presentation has been completed, the teacher stops. For a few moments the students reflect on what they were doing during the presentation and how their behavior while listening may have helped or hindered their understanding of the information. They then write down any insights they have gained. Finally, they give feedback to the teacher in the form of short, anonymous notes.

and even a multi-disciplinary project. Preparation of project reports by students and their 'defense' before the class is also successful.

- Create a 'safe space' for students to ask questions, so that they are not discouraged from asking a question that may seem simple to others.
- Increase the amount of 'hands-on' work in labs, workshops, and projects (which could involve faculty also). Increase team assignments, encourage and reward teamwork, especially where 'mixed' teams (peer groups) are assigned.
- Give assignments; ask the students to prepare charts and review these collectively with the students, selecting the most useful to display in the classroom. On-line assignments are also useful, as well as other on-line materials including movie clips, simulations, and lab demonstrations.
- Move 'back-benchers' to the front, helping to get less confident, bored or disruptive students more engaged.
- Undertake continuous assessment, ensuring that these results count in the final grade/marks.

## **IMPROVING TEACHER EFFECTIVENESS**

***Updating Domain Knowledge.*** The need for having robust and up-to-date domain knowledge is well understood in the engineering sector given the rapid development of technologies, new areas and even concepts. Traditional methods such as sending faculty on exchange programs, to attend conferences, or to do PhDs in cutting-edge institutions are essential but cover relatively few. Some colleges pay all expenses for faculty to present papers at national or international conferences. Some give faculty members leave without pay with liens on their job, while some even provide full paid leave for upgrading qualifications. The best colleges earmark a proportion of their budget for faculty development activities. Improving domain knowledge can also be done for larger numbers of faculty in several ways. Regular faculty seminars on new topics (which could also include senior students); library corners with compilations of recent journal articles, books, textbooks, etc.; seminars and workshops organized jointly with other colleges are some ideas. Industry interactions on campus and joint industry-institute projects can reach more faculty and include students as well. There is considerable scope to innovate and develop broader-based activities that constantly encourage and help faculty (both the young and more senior) to update themselves.

***Training in Pedagogy*** is also recognized as being needed widely for new teachers as well as some senior ones for improving the teaching and training competence of faculty. The training may be offered in two modules: (i) Basic Pedagogy (ii) Advanced Pedagogy, each of one-week duration including both theory and hands on learning. Under TEQIP-III all teachers in the selected institutions would have at-least one week of such training using the latest teaching methodologies. The institutes could devise ways to deepen pedagogical training especially for teachers who really need to improve their teaching skills, and others who are really interested in achieving excellence in teaching, motivated by a desire to develop the young minds for whom they are responsible, to innovate, and so on. Training in pedagogy must be designed to deal with students with all different types of learning styles. For example, methods that work well for all students are 'interactive methods' such as those

discussed above. Some colleges have used videography for teachers to 'see' themselves teach, and obtain feedback from trainers or other teachers.

Further, all the institutes are required to develop annual action plan for faculty development. The following areas may be given importance while formulating the Action Plan for faculty development:

- Upgradation of qualifications
- Improving competence in teaching-training
- Development of modern learning resources and teaching aids
- New techniques in research
- Improving competence in research and consultancy
- Deputation to seminars, conferences and presentation of research papers
- Interaction with peer groups within India and abroad
- Establishing linkages with academic and research institutions and industry.
- Management of industry interactions
- Student counselling
- Student performance evaluation

The Institutions should submit a detailed Action Plan on the Faculty development in their respective Institutional development proposals.

***Fostering Positive Teacher Behaviours.*** A third important area for improvement of teacher performance is their behaviour toward students. Students report that some teachers not only dislike students asking questions in the classroom, but also are rude to them and, if approached after class, humiliate or punish the student (e.g., by giving lower marks, etc.).

Several approaches are used to improve such behaviours, including **Faculty Appraisal**, discussed below.

***Teacher's counselling:*** An important 'first resort' is to counsel teachers who show bad behaviours, help and guide them. Besides having a formal Counsellor, some colleges form senior-junior pairs of teachers –both can learn from each other, e.g. the more 'expert' can help the other improve his/her domain knowledge, etc. These pairs can sit in on each other's classes, interact with the others' students, and provide 'real time' feedback and advice.

***Faculty Appraisal System:*** Faculty appraisal can start with a self-assessment form which is rigorously reviewed by the HOD, Deans, Faculty Committee, etc. It can usefully include student evaluations. While some institutes are reluctant to consider student evaluations because they feel that students 'give lenient teachers high marks and strict teachers low marks,' others give 'incentive marks,' for example, to teachers who work diligently and are appreciated by students. Institutes may also find their own way of taking student evaluations of teacher performance and behaviour – perhaps they can ask more detailed questions about why students like or dislike a particular faculty member. In the Faculty Appraisal, marks can be given for a teacher's participation in a range of activities such as:

- Improving students' examination scores or ensuring 'no failures'
- E-enabling courses by making materials, manuals, questions and answers available to students
- Helping to improve the library, labs or other teaching facilities
- Helping students to get internships and placement
- Helping to make their department a centre of excellence
- Teaching new courses
- Participating in peer teaching (where faculty give feedback on the teaching style of their peers)
- Using training opportunities provided to them
- Improving their qualifications
- Going to rural high schools and inviting students to the campus to interest them in applying
- Filing for patents, etc.

Teachers could be given incentive pay for scoring above a certain level or for specific 'rare' achievements such as 'first publication in a peer-reviewed journal', obtaining a patent, etc. *However, kindly note that such incentives pay cannot be funded out of TEQIP-III funds.*

## **BEYOND THE TEACHER**

Several other efforts involving the institution more broadly could help weak students.

***Improvement of Course Curriculum and Content.*** While significant curriculum revision may have been a lengthy and distant affair in the past, it has been made easier with autonomy as each institution can assess student difficulties within its own context (e.g., availability of faculty, numbers and expertise) and make suitable adjustments.

- Include students in the assessment and revision of curriculum —choosing from a diverse range of students and levels of academic performance.
- Properly sequence curriculum and syllabi – going from the simple to the more complex, and ironing out unevenness. For example, students in some states consider the first-year curriculum to be easy and the second year very hard - covering some second-year concepts in the first year would leave more time in the second year to go over difficult material again. (In other states, students feel that the first year is quite difficult; this difference points to the need for solutions to be contextual.)
- Develop learning objectives. Faculty of a department can get together to design the learning objectives of individual subjects and the overall curriculum. If students are told the necessary learning outcomes in advance, they have a goal to work towards.
- Integrate theory and practical experience. Students and faculty feel that time in labs needs to be increased, more project and group work done, and more practical exposure gained.

- Identify appropriate methods and provide the relevant technology for teaching different course contents, particularly to balance theory and practice.
- As discussed above, schedule repeat exams within a few weeks of the original ones, and provide extra classes in the interim to students who must repeat the exams.
- Include members from industry and other institutes in departmental Boards of Studies. They can assess the curriculum and make necessary changes in keeping with new requirements in the industry.

***Augmented Placement Cell.*** An important suggestion concerns the “Training, Counselling and Placement Cell”. Students advocate that this be more interactive – a place where they can interact with an active placement officer, “trained friendly counsellors,” other faculty, fellow students, even alumni and industry representatives to get advice on future careers and how they are preparing for them throughout their four years of college and not just “at the tail end”. This would provide guidance, support and motivation. A database on alumnus, would help them make contacts not only with prospective employers but with others who took up jobs in particular industries, companies, areas, etc. They can also follow progress in job placement of their cohort. This renovated or innovative placement cell could have several important roles in addition to organizing job interviews and securing job placements: organizing industry visits in at least the 3<sup>rd</sup> and 4<sup>th</sup> years which could make a substantial difference to student learning and attitudes; getting good guest lecturers; obtaining ‘real live’ projects from industries; and securing internships for students in the summers.

The table below summarizes the activities institutions can take up under TEQIP-III

S. No	Items	Actions (suggestive)	Frequency	Monitoring Indicators
(i)	To identify students who will require more academic support	<ul style="list-style-type: none"> <li>➤ Constitute a committee of 4-5 members from basic sciences and humanities/communication/ English/ any other related department</li> <li>➤ The committee will set a question paper containing questions that will test the basic pre-requisite for studying engineering.</li> <li>➤ With this question paper conduct 1<sup>st</sup> assessment for all the 1<sup>st</sup> year students.</li> <li>➤ Students scoring below 60% shall be considered will likely require additional support. The syllabi (proficiency module) of the course are available on <a href="http://www.teqip.in/documents">www.teqip.in/documents</a> (the above question papers may contain questions pertaining this syllabi)</li> <li>➤ These proficiency modules are also a part of the Induction program and may be extended through extra- classes for students in need.</li> <li>➤ Second assessment of the students who took proficiency module with the similar difficulty level as the earlier question paper</li> <li>➤ Students scoring below 60% in 2<sup>nd</sup> assessment will also likely require additional support.</li> </ul>	Diagnostic tests and plans completed at the beginning of each semester; remedial measures carried out continuously thereafter	Percent of students transiting from First to Second year with all first year courses passed
(ii)	To improve language competency, soft skills and confidence levels	<ul style="list-style-type: none"> <li>➤ A college can set up an English language lab where students can listen to tapes and use workbooks to improve their English, particularly spoken English</li> <li>➤ Conducting regular English tutorials, covering both grammar and everyday English</li> <li>➤ Opportunities for students to make presentations in the classes</li> <li>➤ Guidance tools for teachers to transact with students that are culturally or linguistically less exposed to professional technical education / by including English as part of the main syllabus</li> </ul>	Continuous	Better transition rates for first and second year students
(iii)	Institution to improve non-cognitive and soft skills including communication and presentation skills through	<ul style="list-style-type: none"> <li>➤ Ensuring that students have opportunities right from the first year to develop and make presentations in the classroom</li> <li>➤ Clause in the service agreement of the employability skill training provider asking delivery of extra classes for students who may require them</li> <li>➤ Easily accessible classes (taking into account student schedules) in the language</li> </ul>	Continuous	Improvement in job placement of students, especially among those with disadvantaged backgrounds



S. No	Items	Actions (suggestive)	Frequency	Monitoring Indicators
	their wide use in curricula / project based work, and where needed, to provide special skills training to students with priority to the weak students	lab. <ul style="list-style-type: none"> <li>➤ .</li> <li>➤ Stagger difficulty of questions based on student achievement levels Organize doubt clearing classes for these students.</li> </ul>		
(iv)	Give under-qualified teachers priority in opportunities to upgrade their domain knowledge	<ul style="list-style-type: none"> <li>➤ Identify the faculty members who do not have Masters and/or PhD.</li> <li>➤ Manage enrolling few faculties every year at nearby QIP center for qualification upgradation.</li> <li>➤ Promote faculty to enroll in Part-time PhD</li> <li>➤ Provide opportunities / promote faculty to participate in research, development activities and consultancy</li> <li>➤ Deputation to seminars, conferences and presentation of research papers- expenses to be borne by the institute as per the applicable norms</li> <li>➤ Enhancement of research and development activities</li> <li>➤ Enhanced interaction with industry</li> <li>➤ Conducting Professional Development Programme for faculty</li> </ul>	Yearly	<p>Increase in the percentage of teachers enrolled in M. Tech. and Ph. D. reported yearly</p> <p>Number of faculty participated in research/ conference and papers presented/ publication</p> <p>Increased number of students transition from first-to-second year</p>
(v)	Training of teachers in subject matter and pedagogy, particularly to improve the performance of weak students/ transgender students	<ul style="list-style-type: none"> <li>➤ Training Needs Analysis (TNA) to be carried out by external expert for all teachers to understand the skills required to effectively teach to different learning styles</li> <li>➤ .</li> <li>➤ Prepare Faculty Development Plan using identified providers for Pedagogy (IITs) or National Training Calendar for subject training), giving priority to the teachers with the most significant gaps in knowledge and skills as diagnosed by the TNA</li> <li>➤ Organise training in pedagogy to help students with the following: <ul style="list-style-type: none"> <li>• Special needs achieve their learning goals,</li> <li>• Understanding of equity and equality</li> <li>• Students' rights and entitlements, i.e. non-discriminatory practices</li> </ul> </li> <li>➤ Conduct awareness programmes for teachers of the institute about the approaches to teaching, evaluation</li> </ul>	TNA to be done before the preparation of Institutional Development Proposals; reporting every six months and remedial actions on a continuous basis	<p>Percent of planned training completed as reported/ aggregated 6 monthly</p> <p>Satisfaction survey results</p>

S. No	Items	Actions (suggestive)	Frequency	Monitoring Indicators
		<p>procedures, etc., which they should address in the case of students, etc.</p> <p>➤ Organise domain training on the basis of link up with industry to keep abreast of cutting edge technology</p> <p>➤ Institutions to submit half-yearly reports to the SPIUs regarding progress in training (by name, department, individual characteristics (including SC/ST/OBC, M/F, age, years of service, level, degree qualifications), type and duration of training received, etc., and the SPIUs to send aggregated reports to the NPIU</p> <p>➤ Training providers to furnish training evaluation results (which indicate the extent to which the gaps in a trainee’s knowledge or skills including teaching of weak students have been addressed) to Institutions and the SPIUs</p> <p>➤ Institute to carry out Satisfaction Survey/ feedback to assess training achievements</p>		
(vi)	<p>Make campuses physically and socially gender-friendly, including provisions for students of transgender; especially provide adequate and suitable facilities to women students and faculty</p>	<p>➤ Institutions to specify in their IDPs what actions they would take to ensure a gender—friendly campus—both ‘soft’ actions, and civil works where necessary. Some of the actions could be:</p> <ul style="list-style-type: none"> <li>• Construction of separate toilets for boys and girls</li> <li>• Construction of Gender-inclusive toilets for trans-gender students</li> <li>• Counselling facility to students</li> <li>• Ensuring that the institute has a policy on discrimination and harassment and it includes protections for gender identity and expression</li> <li>• Ensuring institutional policies and resources are trans-inclusive, regardless of the number of “out” trans students</li> <li>• Raising awareness by incorporating gender identity topics into orientation sessions for new students, staff, and faculty</li> <li>• Facilitating online campus resource guide for new and prospective female and trans students.</li> <li>• Regularly sponsor female and non-binary trans speakers and performers,</li> </ul>	<p>At the time of IDP and actions implemented as proposed</p>	<p>Institutions to provide descriptive reports of actions taken including number of beneficiaries</p>

S. No	Items	Actions (suggestive)	Frequency	Monitoring Indicators
		etc.		
(vii)	Hold innovation and Knowledge Sharing Workshops yearly to improve knowledge sharing	<ul style="list-style-type: none"> <li>➤ The SPIUs in association with the institutions to organize thematic workshops</li> <li>➤ Institute can invite external experts to share their experiences and ideas</li> <li>➤ Experts from various industries can also be invited</li> <li>➤ Alumnus can also be a part of these workshops</li> </ul>	Yearly	Number of thematic workshops organized, participants attended.
(viii)	Sharing information and knowledge about engineering courses and institutions	<ul style="list-style-type: none"> <li>➤ Institutes to organise camps at the school in the rural areas to share information and knowledge about engineering education.</li> <li>➤ Students from the third and final year to participate in these camps</li> <li>➤ Discussions can be held on entrance exams requirement, scholarships available, and future prospects to encourage students from the rural areas</li> </ul>	Yearly	Increased number of students from the rural areas, especially girls
(ix)	Provide appropriate infrastructure for physically challenged students	<ul style="list-style-type: none"> <li>➤ Constitute a committee of student representatives and faculty member (preferably 1 from PD category)</li> <li>➤ Committee will prepare a report providing requirement of facilities like ramps, lifts, toilets (separate for male and female students and faculty), braille signages and auditory signals, tactile flooring, etc. in academic and hostel area for physically challenged students.</li> <li>➤ The gap in the requirement and available facilities will be put in the immediate BoG meeting for necessary actions.</li> </ul>	As required	Increased number of disabled students due to improved facilities
	Special efforts for training/ internship/ placement of weak students	<ul style="list-style-type: none"> <li>➤ Establishing Industry-Institute Partnership Promotion Cells</li> <li>➤ Shortlist select alumni members working in reputed firms. Connecting these alumni with the weaker students for guidance related to internship and placements</li> <li>Organize annual meet of various industries;</li> </ul>	Continuous	Number of students with placements
(x)	A two-tier grievance redress mechanism (GRM)	<ul style="list-style-type: none"> <li>➤ Depute EAP coordinator as the Grievance Redressal Officer</li> <li>➤ Introduce, and publicise widely, a grievance redress mechanism (GRM) committee at the institution. The committee may have 4-5 members consisting of one female</li> </ul>	Continuous	Placing of GRO  Number of complaints received and time taken to address

S. No	Items	Actions (suggestive)	Frequency	Monitoring Indicators
		<p>member</p> <ul style="list-style-type: none"> <li>➤ Provide multiple channels for filing complaints. In addition to a hotline (telephone), an email address, complaints box, etc. to ensure anonymity should be shared with the students/ faculty</li> <li>➤ The complaints to be resolved in 14 working days, and actions taken to be informed to the complainant. Any unresolved or unsatisfactory case to be reported to the state level GRM for necessary action.</li> </ul>		<p>grievances</p> <p>Number of unsolved cases / referred cases to SPIU</p>
(xi)	Ensure that institutional mechanisms to protect and address the needs and concerns of women students are established.	<ul style="list-style-type: none"> <li>➤ Constitute a gender committee at the institution</li> <li>➤ Circulate hotline (telephone) and email address where students/faculty may lodge issues</li> <li>➤ Counselling to needy female students / staff</li> </ul>	Continuous	<p>Establishment of Gender committee</p> <p>Improved students' performance due to counselling</p>
(xii)	Peer Learning Groups of students	<ul style="list-style-type: none"> <li>➤ Develop Peer Learning Groups of 10-12 students (from diverse academic backgrounds/levels/genders/social background), for joint study and joint projects (faculty to be the resource person)</li> </ul>	Continuous	<p>Improvement in student's performance / better marks / improved transition from first to second year</p>
(xiii)	Appointing Student Mentors and Faculty Advisers for Students	<ul style="list-style-type: none"> <li>➤ Assign senior student as mentors for 6-8 junior students</li> <li>➤ Appoint Faculty Advisers for 10-15 student mentors</li> <li>➤ Faculty Advisers to guide the students and monitor their progress</li> <li>➤ The Student mentor should meet minimum thrice in a week and faculty advisor once in a week</li> <li>➤ FA may also keep in touch with parents and talk to them when a relevant problem arises</li> <li>➤ Faculty should be given some professional training in mentoring and counselling to play this role.</li> </ul>	Continuous	<p>Satisfactory progress in implementation of the proposed activities and achievement of targets, based on the reports received from the mentors</p>

\* Shall be developed by the experts (from IITs and NITs).