

# **The Process of Bringing Excellence in Engineering Education by Nurturing and Engaging High Performing Faculty Teams**

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## **Abstract**

In a globalized and knowledge-based economy engineering institutes need high performing, intrinsically motivated, and outstanding faculty team members who have to concentrate on establishing interdisciplinary research programs leading to Ph.D. degrees, global publications, establishing multidisciplinary postgraduate programs, developing outstanding instructional packages, bidding for global consultancy projects under International Development Agencies, and offering services to diverse global faculty members. However, most of the affiliated institutes don't enjoy administrative, financial, and academic autonomy. Under these tough environments, the educational administrators have to nurture excellent faculty teams and motivate them to undertake complex projects and problems to solve, develop diverse global participants programs, and bid for research and development projects under various International Development Agencies. This research work centers on the feedback of 255 faculty members on the process of achieving excellence through setting goals, creating an academic eco for excellence, counseling, coaching, mentoring, supporting, collaborating, sharing in the resources, inquiring about the development process, and resolving all bottlenecks and resistance. The educational administrators have to follow appreciative inquiry, recognize the outstanding contributions of the high-performing faculty teams, and reward them. This will create an environment for many other faculty teams to follow the best path for creating excellence. Ultimately, the colleges can reach excellence and their contribution and accomplishment will be rewarded. Further research on this transformation process is suggested.

**Keywords:** Nurturing, mentoring, motivating, facilitating, faculty autonomy, scaffolding, high performing faculty teams.

## **1. INTRODUCTION**

In this 21<sup>st</sup> Century, technical universities need to focus on high-performing graduates with desirable attributes. In the last five years, more than 1000 engineering colleges were closed due to a shortage of qualified faculty members. Many self-financing engineering colleges find it difficult to retain qualified and high-

performing faculty team members. The potential high-performing faculty members usually plan to acquire postgraduate degrees under the Quality Improvement Programs of the All India Council for Technical Education. Many outstanding faculty members would like to offer consultancy programs for engineering companies. They also wanted to get research funds from AICTE, CSIR, DRDO, DST, etc. The management has to encourage all these scientific activities so that they can contribute to the knowledge capital and human capital. This will make the region more competitive. Further, the management has to invest funds for resources so that the faculty can utilize them. This can be reequipped through the revenues that can be earned through consultancy projects. Only outstanding institutions can attract t excellent students. The overall status of various colleges has to be evaluated for identifying the gaps. Only a few educational administrators have focused on them in the development of outstanding programs and assist the faculty members to reach excellence. This research attempts to focus on the high-performing faculty members in self-financing, affiliated, autonomous and universities. The outcome will be very useful for developing appropriate interventions. This will enable the growth of engineering industry in each region.

## **2. LITERATURE SURVEY**

A set of current literature on the process of developing excellence in engineering education have been selected. Synthesis of the best practices are presented. In the 21<sup>st</sup> Century, most of the outstanding universities have focused their attention to create excellent faculty teams in every branch of arts, science, engineering, technology, etc. A focused survey will provide the best practices. Lesley University (2019) [10] focused on the high-performance work culture. The following eight factors are identified: Leaders, Workforce, Work Practices and Systems, Strategic and Frequent Communications, Organizational Structure, Dependable Data & Analysis, Innovations in Teaching,

and the Spirit of the University. This university proposed the following initiatives for high-impact actions.

- Supporting the cultural changes;
- It provided a strong base to begin strategic visioning and planning;
- Begin to embrace the desired behaviors;
- Developing a Manager's Training Academy;
- Reframing and redesigning the University Performance Evaluation System into Performance Feedback System;
- Providing online training in giving and receiving feedback;
- Establishing online training in decision-making and conflict resolution;
- Instituting a standard method to clearly define responsibilities at all levels and track progress;
- Instituting an integrated system for data collection, metrics, and analysis, including framework on how initiatives might be measured; and
- Instituting opportunities to support cross-school interactions.

Eberly Center of Carnegie Mellon University, USA focused on teaching excellence and educational innovation. The factors considered are [3]:

- Assessing individual as well as group learning and performance;
- Assessing process as well as products;
- Making the assessment criteria and grading scheme clear;
- Finding samples of group project assessment tests;

Daniel Fusch (2010) [2] focused on the identification of creative, meaningful, and low-cost ways to reward and retain high-performing faculty. According to him, explore a variety of low-cost and one-time expenses that allow you to appreciate faculty.

Maria Doyerup et al. (2016) [11] concluded that those who do more, who accomplish more should earn more. For productivity-based compensation, the devil is in detail. According to Bradley Kirkman et al. (2016), teamwork achieves best when top performers are rewarded. People are more likely to do for which they get recognized and rewarded. He suggested team-based recognition and rewards since more responsibilities are assigned to teams.

AICTE suggested sharing the project gains after meeting the direct expenditure and remitting 50% to the institute. Many institutes pay three increments to

the faculty members who receive Ph.D. degree in-service. Many deemed universities pay a lumpsum grant of Rs. 2000/- when they publish a paper in any reputed international journal. As per the Ministry of Education guidelines, the faculty will have to be reimbursed the cost of travel and registration fee when they present their paper at a national or international conference.

The Fraser Institute, Canada has recommended the following guidelines for rewarding university professors [5]:

- Replace illusory performance reviews with rigorous and objective evaluations;
- Performance and rewards should be linked closely;
- Poor performers would receive no bonuses and be placed on probationary watch leading to possible dismissal in the absence of improvement;
- Establish flexible contracts for faculty members that combine elements of basic employment agreements with incentives for drive, imagination, and productivity;
- Teaching and research should be evaluated separately;
- Faculty who neither conduct research nor publish should have their compensation reduced accordingly;
- Average faculty who are not also scholars have their tenure revoked;
- University tenure systems should be replaced with renewable performance-based contracts;
- Traditional lifetime tenure should be limited to truly exceptional scholars;
- Sabbaticals should not be automatic, but awarded in a system of unrestricted results-oriented competition; and
- The individual ability not to pay equity should determine questions of academic remuneration.

Principles for Faculty Reward Systems in a High-Performance Academic Culture of Ohio State University, USA [26]

- In annual performance appraisals, involve a face-to-face interaction;
- Create an explicit agreement with each faculty member about the expected foci and the levels of achievement expected of him/her in an academic year;
- The overall mix of contribution patterns should be such that the portfolio of department/college objectives is achieved;

- Define initial salary levels, annual increases, and support resource distributions based on the market trends;
- Create explicit promotion standards to reflect the desire for excellence in the pattern of contributions expected of faculty members;
- Maintain a multi-faceted institutional responsibility that must be achieved by the skills of faculty collectively;
- For faculty members who are having joint appointments, create explicit a priori agreements about how rewards will be distributed for specific activities;
- Clarify agreements about teaching effectiveness or service contributions before any evaluation period;
- Clarify the interdisciplinary contribution on promotion and tenure decisions to encourage each activity;
- Distribute college/department resources for travel, research assistance, secretarial support, etc. based on the performance level of individual faculty members;
- Respond affirmatively to markets created by other top tier institutions;
- Promotion standards should be explicit and reflect the desire for excellence in the pattern of contributions expected of faculty members;
- Resource distribution should be based on the credit hours, research work, and other services rendered by the faculty members;
- Teaching assistants and travel funds should be based on the teaching effectiveness and publication in top tier journals; and
- The department/college leadership is to proactively assess the market value of faculty and allocate resources in a way consistent with such assessments.

#### Inference

The educational administration has to consider the performance of the faculty members like conducting postgraduate courses, guiding interdisciplinary research programs, undertaking sponsored research projects and bidding, winning, and completing development projects under international development agencies. Institutes should reward high-performing faculty. The prescribed advance increments for getting a Ph.D. degree and bringing internal revenue have to be rewarded.

KerryAnn O'Meara (1997) [8] concluded that scholars of higher education have long recognized that existing reward systems and structures in academic

communities do not weigh faculty professional service as they do teach and research. Many universities have found innovative ways to define, document, and evaluate faculty professional service in the traditional promotion and tenure systems. Many institutions have created alternate faculty reward systems, including faculty profiles in service, merit pay, and post-tenure reviews emphasizing service.

Teacher Performance Management Suggested by Education and Manpower Bureau (2003) USA [4]

It suggested implementing a school-based management system based on the Education Commission Report No. 7. It consists of the following three teacher appraisal models:

- Model-1. Accountability Model: Deals with recommendations for promotion, etc.
- Model-2. Professional Development Model: Focuses on professional development/improvement
- Model-3. A combination of Accountability Development Model: Performance appraisal, mentoring, and induction program.

James Jacob, et al. (2014) [6] concluded that the higher education professional development trend increasingly focusses on areas of quality improvement, quality assurance, and optimal technology delivery models to achieve academic excellence. According to them, world-class universities rely on their faculty professional development centers for an array of professional development programs to support teaching, research, and student learning. They concluded that a relevant rewards structure should be established to help empower professional development centers to attract faculty. To inspire proactive participation and substantial research, teaching, and learning outcomes incentives must be identified from those who are involved with the design and implementation of professional development programs.

The University-wide task force on faculty rewards of the University of California [13] suggested that tenured faculty should be permitted, from time to time and with approval, to emphasize particular areas of professional endeavor consistent with the broad mission of the University and be rewarded for meritorious achievement in these endeavors.

The University of Nebraska Medical Center (UNMC) [27] developed guidelines for reward and recognition. The most significant awards are: (Table-1)

**Table-2.8.1 UNMC Guidelines**

<b>Title of the Award</b>	<b>Recognition</b>
Gold U Award	UNMC community who consistently deliver outstanding performance & service
Outstanding Faculty Mentor of Graduate Students	Faculty who exemplifies excellence in the mentoring of graduate students over five years.
Outstanding Teaching Award	A meritorious record of excellence in teaching activities
Spirit of Community Service Award	Faculty members who, through a continuing commitment to the surrounding underserved or isolated communities have used expertise, resources, talent, and time without remuneration.
Outstanding Research and Creativity Award (ORCA)	Faculty who has conducted outstanding research or creative activity of national/international significance
Outstanding Teaching and Creativity Award (OTICA)	Faculty who has developed meritorious and sustained records of excellence in teaching and creativity related to teaching.
University-wide Departmental Teaching Award (UDTA)	Department which has outstanding esprit de corps in its dedication to the education of students at the undergraduate, graduate, or professional levels.
Engagement Award (IDEA)	Faculty who has extended his academic expertise beyond the boundaries of the university in ways that have enriched the broader community.
The UNMC Scientist Laureate Award The Distinguished Scientist Award	Based on the researcher's history of leading outstanding research program (s), publishing research results in journals of the highest quality, and showing an ability to attract and retain additional funding. Based on the researcher's history of leading outstanding research program(s), publishing research results in journals of the highest quality, and showing the ability to attract and retain additional funding during the past 5 years.

National Science Foundation [14]: Critical to the quality of engineering education is a faculty that is diverse in cultural and professional experiences, that is committed to lifelong learning and scholarship, and that places primary emphasis on educating professionals. In particular, we must develop rewards and incentives that promote the contributions of all faculty and signal clearly that they are valued, colleagues.

Hymie Rubenstein (2000) [5] suggested that performance and rewards should be linked closely. According to him one model for doing so is to set baseline salaries for minimally adequate work and augment this with non-cumulative performance bonuses. Sabbaticals should be awarded in a system of unrestricted results-oriented completion. Individual ability should determine questions of academic remuneration. Public Policy Sources, No.44 of Canada suggested that strengthening of performance bonuses and other rewards; the institution of rigorous performance reviews; the individualization of employment and performance contracts; the separate remuneration of teaching and research; the gradual replacement of tenure with renewable contracts; and the competitive awarding of sabbaticals. According to Kemp and Walker (2001) [9] stated that culture proves

to be a critical component in understanding the process of a planned change of transformation in colleges today. The significance of organizational culture becomes particularly clear as we operationalize institutional transformation. James and Kathleen [ 7] proposed a theory of gradual institutional change grounded in a power-distributional view of institutions that emphasizes ongoing struggles within but also over prevailing institutional arrangements.

Findings of Previous Studies in the Transformation of Indian Engineering Education (Thanikachalam. V. 2016-2021) [16-25]

- Indian Engineering Education has to be transformed through academic autonomy to high-performing faculty teams
- Institute's culture values have to be built to facilitate high performing institute
- Institutional transformation and development in engineering education have to meet volatility, uncertainty, complexity, and ambiguity
- Institutes have to create the desired ecosystem in the fast-growing institutes in India

- Faculty performance improvement is through effective human resource management practices
  - Sustainable human resource development and technology are through performance improvement
  - A self-planned faculty quality improvement program will lead to institutional development
  - ‘Corruptocracy’ will hurt high performing faculty in engineering education.
7. Institutes need to have consultancy units to utilize the advanced resources and trained faculty members.
  8. The dissertation works of the graduate students, preferably, are to be from the MSMEs.
  9. Most of the chairpersons of governing councils are not aware of the perspective planning and strategic planning in the institutions.
  10. They never get the true picture of the institute’s administration.
  11. The Board is not aware of the new projects offered by the Ministry of Education.
  12. The Board is not fixing any goal in publication, video production, interdisciplinary research, long-term faculty development, services to the states or industries, new overseas teachers’ programs, postgraduate programs, international conferences, consultancy projects for IDAs, etc.
  13. Many needed departments are closed since the CEO is not planning any leadership development program but he focuses on his personal development. For him, all the faculty cannot contribute!
  14. There is a need for guidelines for set righting the deviations and putting the colleges on the right path.
  15. There is a need for a continuous effort to fill up the gaps between the modern industry and the programs
  16. There is a need for generating internal revenue for creating corpus funds for developing the resources.

Lessons Learned from the Decisions Made by the many CEOs [Thanikachalam. V. 2021. 25]:

1. Many new CEOs focus as specialists in their branches but they do not consider the required steps in the educational transformation of engineering colleges and leading the development in many engineering branches.
2. There are no effective Grievance and Redressal Systems in many institutes.
3. Short sightedness results in bottlenecks in developing knowledge capital and human capital and makes the institute go down in the ranking.
4. There is no strategic plan to develop the institutes and create Centers of Excellence in Engineering Education.
5. The ever-increasing vacancy in faculty did not facilitate the growth of the institute in research and innovation.
6. Disruptive technologies bring great challenges in many engineering programs.

## 2.1 Suggestions made by the NEP 2020:

Suggestions made by Draft NEP 2019 to bring Excellence [8]

Table-5 NEP 2019 Suggestions

Draft NEP 2019 Paragraph	Page	Suggestion
9.1	207	All higher education will happen in multidisciplinary institutions with teaching programs across disciplines and fields to ensure optimized resources integration across disciplines and vibrant, large education communities.
10.	212	New institutional architecture with large, well-structured, vibrant multidisciplinary institutions for teaching, research, which will significantly expand reach and capacity.
13.1	259	Higher education faculty must be valued and supported with excellent preparation and conducive working environments.
13.1.6	261	Faculty recruitment will be based on academic expertise and depth, teaching capacities, and dispositions from public service.
13.1.9	262	Faculty will be empowered to make curricular choices for their courses and to pursue research with academic freedom.
15.1	285	All teacher education will happen in multidisciplinary institutions-teacher education will be an integral part of the higher education system.
15.2.2.	287	Good teachers are prepared and developed by good teacher educators. Faculty of teacher education must be experts in diverse fields, both theoretical and practical.
16.1.3	296	The preparation of professionals must involve education in the ethic and importance of public purpose, an education in the discipline, and an education for practice-professional education must not happen in the isolation of specialty.
17.1	311	Each higher education institution will be governed by an independent Board- this will ensure a clear chain of responsibility and accountability within.
17.1	312	Institutional governance will be based on full autonomy-academic, administrative, and financial-for all higher education institutions with financial certainty and backing.
18	322	Regulation must be responsive and minimalistic-light but tight-to ensure public-spiritedness, equity, excellence, financial stability, and probity, along with good governance.

### Ultimate Suggestions from NEP 2019 (p 9.7).

- Higher education institutions will be governed by Independent Boards, with complete academic and administrative autonomy.
- Clear merit-based procedures for appointments of the Board of Governors (B.O.G), the Chancellor, and the Vice-Chancellor/ Director/ Chief Executive of HEI will ensure elimination of external interference, including from government, and will aim to engage high-capacity individuals who are invested in and have

a strong commitment towards the institution. Accountability for educational outcomes will flow concomitantly to the Board of the institution.

Mechanisms will have to be established to align all stakeholders, including the government (and its bodies), for the long-term According to NEP 2019 (P 13.1, Page 257 to 263):

- “Motivating and energizing faculty to achieve high quality in higher education.

- Ensuring service conditions conducive to excellent teaching and research.
- Enabling vibrant university communities through faculty empowerment.
- Incentivizing excellence through merit-based career management
- Creating a culture of excellence through outstanding institutional leadership.
- Higher education faculty must be valued and supported with excellent preparation and conducive working environments.
- Adequate physical infrastructure and facilities
- Ensuring faculty availability
- A judicious mix of capabilities within each institution.
- Institutional autonomy for recruitment
- Faculty recruitment will be based on academic expertise, and depth, teaching capabilities, and dispositions for public service.
- Empowering and motivating institutional culture
- Faculty will be empowered to make curricular choices for their courses and to pursue research with academic freedom.
- Faculty recruitment and development, career progression, and compensation management to be part of the Institutional Development”.

There can't be a better prescription from any other policymakers for excellence. It is hoped that the program of action will be based on these so that all stakeholders will follow.

#### Synthesis

Almost all global universities recommend incentives to high-performing faculty members. In-depth, Indian studies focused on: 1. Academic Autonomy to High-Performing Faculty Teams, 2. Building Institute's Culture Values, 3. Meeting the Volatility, Uncertainty, Complexity, and Ambiguity, 4. Creating Desired Ecosystem, Effective Human Resource Development Practices, 5. Performance Improvement, 6. Encouraging Self-Planned Faculty Quality Improvement, 7. Eliminating Corruptocracy. The National Education Policy (2019) provides

guidelines to the leadership and to the Board of Governors to bring excellence.

### 3. OBJECTIVES OF THE RESEARCH

- Analyze the current practices in nurturing, developing, and caring for the best faculty teams in different engineering institutions in various global universities.
- Conduct an open survey about the desired improvements through engaging the faculty members in the institutional development activities in India.
- Suggest guidelines for nurturing the engineering faculty members from a synthesis of best practices of various engineering institutions.
- Suggest appropriate implementation plan in all types of engineering institutions.

#### 3.1 Research Methodology

It is based on the social science methods prescribed by Guba and Silverman. The survey method can be effectively used in this research work. The inputs from the All-India Council for Technical Education (AICTE), National Education Policy 2020, the outcome of various projects, and the initiatives of well-performing universities can be considered to suggest many transformations.

The following are the key questions for investigating the current practices in various engineering institutes like self-financing colleges, affiliated colleges, autonomous institutes, state and deemed universities.

- Whether all engineering institutes engage the faculty members in consultancy works?
- Whether all engineering institutes share the project gains with the faculty members?
- Whether the engineering institutes facilitate the faculty members in joining international universities for updating their competencies?
- Whether the institutions permit the faculty to present papers in the international conferences as per the norms?
- Have they constituted an Academic Counsel to review various programs, curricula, instructional methods adopted, and on-the-job training?
- Whether the institutions permit the faculty members to bid for global development projects?

- Whether the institutions permit the faculty members to publish print materials through reputed international publishers?
- Whether the institutions Academic Councils, Consultancy Centers, Faculty Development Centers, Interdisciplinary Research Units and follow the ethical standards?
- Whether the administration supports all development activities of the faculty members?
- Whether the institutions plan diverse global faculty development programs?
- Whether appropriate mass open online programs in the curriculum development, instructional materials development, instructional design, flexible courses, industrial training, undertaking problems from MSMEs for dissertation works can be implemented?
- Can we assist the faculty members to adopt self-directed learning in various cutting-edge technologies to meet the needs of planning new programs regard to Industry-4.0?
- Can we offer in-house programs in collaboration with the National Institutes of Technical Teachers Training and Research?
- Can we induct the faculty to attend various webinars that are offered by various authors who conducted research and published papers in the international conferences, symposia, seminars?
- Can we offer industrial exposures and short-term industrial training to the faculty members?
- Can we recruit adjunct faculty members from the industries on a short-term basis?
- Can we establish a manufacturing center which will take up contract manufacturing of components based on the modern equipment procured?

Focus: Desired performance in the development activities, faculty engagements in these activities, and the assistance provided by the management was included in the first part of the questionnaire. In the second part, a response to the faculty development programs and the initiatives taken by the management was included. In the third part, the controlling mechanism for faculty development activities was included. On the whole these three-part questions will bring the current status, excellence, shortfalls, and new focus that has to be made.

All the faculty members have undergone at least two courses in institutional development or curriculum development or establishing quality improvement programs. A detailed research project proposal and an invitation for their participation have been sent along with the draft

### **3.3. Population and Sample**

A questionnaire was developed to cover all the three components was prepared and sent to collect responses from 255 faculty members [ 98 self-financing colleges, 122 affiliated colleges, 20 autonomous colleges, 10 deemed universities, and 5 state technical universities in the southern region]. Considering the active input from the trained faculty members, the sample is justified. Since the numbers of deemed and state universities are very small compared to self-financing and affiliated colleges are small, the sample is accepted for research.

questionnaire. Based on their validation, the final edited questionnaire has been sent to all of them. The completed feedback and information were returned within 30 days. The results are presented in Table 3.1.

**Table-3.1: Analysis of Part-1 Feedback to the Questionnaire**

No.	Factor	Private Self-Financing Colleges (98)	Government and Affiliated Colleges (122)	Autonomous Colleges (Govt & Private) (20)	Private Deemed Universities (10)	State Technical Universities (5)
1	Engagement in Developing Consultancy Projects for Local Government Departments	1.2 (24.0%)	3.1 (62%)	3.4 (68%)	3.5 (70%)	4.5 (90%)
2	Engagement in undertaking Institutional Development Projects under International Development Agencies	1.3 (26%)	1.6 (32%)	1.8 (36%)	2.9 (58%)	3.1 (62%)
3	Engagement in Interdisciplinary Research Programs in Engineering	0.9 (18%)	2.3 (46%)	3.9 (78%)	4.6 (92%)	4.7 (94%)
4	Engagement in outstanding Instructional Package Development (Print, Video, and MMLP)	0.9 (18%)	1.2 (24%)	2.1 (22%)	2.4 (48%)	2.8 (56%)
5	Engagement in Developing Diverse Global Student Development through Government of India	0	0	1.5 (30%)	3.1 (62%)	3.3 (66%)
6	Engagement in Developing Diverse Global Students Development through Letters of Invitation (LOI)	0	0	1.6 (32%)	3.5 (70%)	3.6 (72%)
7	Rewarding the faculty for publication of research articles	1.7 (34%)	3.1 (62%)	3.9 (78%)	4.1 (82%)	4.4 (88%)
8	Rewarding faculty for selection by international universities	1.9 (38%)	2.9 (58%)	3.2 (64%)	3.9 (78%)	4.5 (90%)
9	Rewarding the faculty for global services	2.1 (42%)	2.4 (48%)	3.8 (76%)	4.2 (88%)	4.6 (92%)
10	Rewarding the faculty for offering international seminars	1.9 (38%)	2.3 (46%)	2.9 (58%)	4.1 (82%)	4.4 (88%)
11	Group Average	23.8%	36.6%	56.2%	72.6%	79.8%

### 3.2.1 Discussion

Most of the self-financing colleges do not focus on developing consultancy projects, institutional development under IDAs, interdisciplinary

research, instructional package development, global faculty/student development, rewarding faculty members for their excellent accomplishments, etc. Under these conditions, it is very difficult in retaining high-performing

faculty teams. These institutions will not attract high performing students also.

The rank order is as follows: State Technical Universities-1, Deemed Universities-2,

Autonomous Colleges-3, Govt. Affiliated Colleges-4, and Self-Financing Colleges-5. There is an urgent need to focus on the high-performing faculty members through rewarding based on their services and accomplishments.

**Table-3.2: Analysis of Part-2 of the Feedback to the Questionnaire**

No.	Factor	Private Self-Financing Colleges (98)	Government Affiliated Colleges (122)	Autonomous Colleges (Govt. and Private) (20)	Private Deemed Universities (10)	State Technical Universities (5)
1	Not permitting the faculty members to join foreign universities for a short-term course when invited	1.2 (24%)	0.3 (6%)	0.4 (8%)	0.3 (6%)	0.10 (2%)
2	Not circulating the letters of invitation sent by the IDAs	NA	0.3 (6%)	0.6 (12%)	NA	0.3 (6%)
3	Not permitted to apply for the fellowships offered by the Ministry of Education under the bilateral agreements	NA	0.4 (8%)	0.8 (16%)	NA	0.1 (2%)
4	Not permitted to present the papers at the international conferences	2.0 (40%)	0.3 (6%)	0.7 (14%)	0.2 (4%)	0.1 (2%)
5	Not permitted to bid for development projects under IDAs	NA	0.6 (12%)	0.5 (10%)	0.4 (8%)	0.2 (4%)
6	Not permitted to apply for projects under IDAs	NA	0.6 (12%)	0.7 (14%)	NA	0.6 (12%)
7	Not permitted to publish textbooks	0.5 (10%)	0.1 (2%)	0.1 (2%)	0.3 (6%)	0.1 (2%)
8	Not permitted to offer faculty training programs under ongoing development programs	NA	0.3 (6%)	0.6 (12%)	NA	0.5 (10%)
9	Not permitted to plan international conferences	0.4 (8%)	0.4 (8%)	0.4 (8%)	0.3 (6%)	0.5 (10%)
10	Not permitted to offer an online course for a foreign university	NA	NA	NA	NA	0.8 (16%)
	Group Average	8.2%	6.6%	9.6%	3%	6.6%
	Positive Score	91.2%	93.4%	90.4%	97%	93.4%

### 3.2.2 Discussion

Many focus points do not apply to self-financing institutes. State Technical Universities facilitate to an extent of 93.4% in all development activities, but deemed universities are facilitating to an

extent of 97% wherever they are active. All institutes could participate in global programs, undertaking projects under IDAs, etc. This demands high-performing faculty members. Many self-financing colleges should recruit well-accomplished faculty members for their survival.

**Table-4 Analysis of the Feedback to the Questionnaire Part 3**

No	Issue	Private Self-Financing Colleges (98)	Government Affiliated Colleges (122)	Autonomous Colleges (Govt. & Private) (20)	Private Deemed Universities (10)	State Technical Universities (5)
1	Academic Council	2/98 (2.04%)	4/122 (3.28%)	20/20 (100%)	10/10 (100%)	5/5 (100%)
2	Academic Audit	22/98 (22.45%)	101/122 (82.79%)	20/20 (100%)	10/10 (100%)	5/5 (100%)
3	Consultancy Center	15/98 (15.3%)	89/122 (72.95%)	20/20 (100%)	10/10 (100%)	5/5 (100%)
4	Student Services Cell	33/98 (33.67%)	45/122 (36.89%)	16/20 (80%)	10/10 (100%)	5/5 (100%)
5	Faculty Grievance Cell	16/98 (16.33%)	76/122 (62.30%)	18/20 (90%)	10/10 (100%)	5/5 (100%)
6	In-house Faculty Development Unit	12/98 (12.24%)	43/122 (35.25%)	14/20 (70%)	10/10 (100%)	5/5 (100%)
7	Instructional Package Development Unit	2/98 (2.04%)	9/122 (7.38%)	3/20 (15%)	4/10 (40%)	2/5 (40%)
8	Interdisciplinary Research Programs	3/98 (3.06%)	98/122 (80.33%)	8/20 (40%)	9/10 (90%)	5/5 (100%)
9	Ethical Standards	56/98 (57.14%)	112/122 (91.80%)	17/20 (85%)	9/10 (90%)	5/10 (100%)
10	Supportive Management	90/98 (91.84%)	95/98 (77.87%)	18/20 (90%)	8/10 (80%)	4/5 (80%)
	Group Average	25.695%	55.084%	77%	90%	92%

### 3.2.3 Discussion

The State Technical Universities are maintaining excellent standards and the deemed universities are closely following them. Almost all the institutes can establish instructional package development units which will produce print materials and Multimedia learning packages. Many British Universities have established publication units in many parts of the world and published print material for all types of educational institutions. Autonomous institutes have to focus on interdisciplinary research programs. Government affiliated colleges should establish Student Services Cell, Academic Council, and In-house Faculty Development Units. Self-financing engineering colleges have a focus on development issues.

### 4. CONCLUSION

Most of the self-financing institutions have to improve the performance of the faculty members through preservice training and continuous in-service training programs.

The government-affiliated colleges and autonomous colleges have to establish Academic Councils, Consultancy Centers and conduct Academic Audits. All these institutes have to establish student service centers to counsel, coach, and mentor the students and expose them to advanced industrial design and manufacturing activities.

The deemed universities and state technical universities have to focus on the interdisciplinary postgraduate programs, bid for diverse global programs under various International Development

Agencies, and plan multidisciplinary research and development projects.

All the engineering institutes and universities have to continuously monitor the innovations and reward the high-performing faculty teams. All the engineering institutions have to focus on excellence and innovation to manage the fast-growing global competition in human and knowledge capital development. None of the institutes and the high-performing faculty should not suffer due to improper selection of CEOs, and Chairpersons of the Board of Governors. Best high-performing leaders have to be encouraged for further development of human and knowledge capital.

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