Faculty Development for Educating Engineers of 21st Century

Dr. Hemlata Vivek Gaikwad
Department of Management Studies
Rajarambapu Institute of Technology,Maharashtra, India
hemlata.gaikwad@ritindia.edu

Abstract— **Faculty development is a critical element of the institutional effectiveness in engineering education. Faculty who gets involved in continuous professional development gets benefitted in terms of increased vitality, informed latest pedagogy, teaching innovations, and perform scholarly teaching. Moreover, faculty development contributes to the effective use of emerging technologies and establishes a firm foundation for the overall development of high-quality programs and curricula .At the stage when we are talking about outcome-base education, improving quality of engineering graduates , developing attributes as listed by ABET , faculty development becomes a prime goal. The engineers of the 21st century must have the desired skill set to perform outstandingly and achieve the global standards .We can build on that progress only if we pay keen attention to the challenges associated with genuinely improving teaching and learning which ultimately links to the development of the engineering faculty. If we ignore these challenges, the 21st century skills movement will not produce any results as desired.**

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I. INTRODUCTION

"The quality of a nation depends upon the quality of its citizens. The quality of its citizens depends upon the quality of their education. The quality of their education depends to a greater extent, if upon a single factor i.e. the quality teachers". **- The American Commission on Higher Education.**

Importance of Education:

Education is a powerful and fundamental force in the life of a man which is instrumental in shaping the destiny of the individual and the future mankind. Education is a significant tool for ultimate development. As stated by our philosophical gurus "Education is for life and merely not for living. Education must endow humans with a mindset and behavior pattern which is conducive to happy, constructive and purposeful life, which helps them to achieve the final aim and goal of human birth. Hence value education is the need of the hour. In order to ensure this human beings must come out of qualities like lust, anger, greed, hatred and violence and develop a moral character. Thus end of education is character and end of the culture is perfection".

Swami Vivekanand said "Education can unlock all doors for a progress. A nation advances in proportion to education and intelligence spread among masses".

But now a days the world is becoming a place in which the human population is becoming more crowded, more consuming, more polluting, more connected, and in many ways less diverse than at any time in history. Considering the problems faced by our planet today and the problems expected to arise in the first half of the twenty-first century, the engineering profession must revisit its mindset and adopt a new mission statement - to contribute to the building of a more sustainable, stable, and equitable world.. As we enter the twenty-first century, we must embark on a worldwide transition to a more holistic approach to engineering. This will require: (1) a major paradigm shift from control of nature to

participation with nature; (2) an awareness of ecosystems, ecosystems services, and the preservation and restoration of natural capital; and (3) a new mindset of the mutual enhancement of nature and humans. In addition, engineering educators must take a closer look at how engineering students are being prepared to enter the "real world." Current graduates will be called upon to make decisions in a socio-geo-political environment quite different from that of today. Engineers of the future must be trained to make intelligent decisions that protect and enhance the quality of life on Earth rather than endangering it. They must also make decisions in a professional environment in which they will have to interact with people from both technical and nontechnical disciplines. Preparing engineers to become facilitators of sustainable development, appropriate technology,

To impart such quality engineering education, we need the following pre-requisites, such as:

i) Qualitative teachers
ii) Qualitative input
iii) Qualitative teaching and evaluation
iv) Qualitative infrastructure
v) Qualitative syllabus
vi) Qualitative leadership
vii) Qualitative research

Faculty Development:

If we take into consideration the pre-requisites of quality education, we found that the most important pre-requisite is Qualitative Teacher and creating qualitative teacher Faculty Development is the important way. Faculty development has assumed heightened importance in recent years. It is evident from the international literature that there are often overlapping descriptions of faculty development. Steiner and Mann describe faculty development as, "A planned program or set of programs, designed to prepare institutions and faculty members for their various roles, with the goal of improving instructors' knowledge and skills in the areas of teaching, research and administration". Whitcomb describes the goal of faculty development as to sustain the vitality of faculty members, both now and in the future. Furthermore, according to Swanwick, faculty development should go beyond teaching teachers how to teach, to include efforts to enhance educational infrastructures and build educational capacity for the future.

The term ‘faculty development’ has been traditionally used to describe the activities undertaken by academic staff in educational institutions and implies that some individual intellectual and professional growth will take place as a result of these programs. Simply stated it includes all activities taken up by the faculty in an institution targeting their all round development, personally or professionally and finally implying the growth of the institution. More recent descriptions include institutional growth as well, and most definitions of faculty development in literature reflect the role of the institution in the process in form of free time or fees.

Faculty development simply means overall development of teachers. The development of teachers skill, knowledge is vital important in nation development. The teacher is one of the pillars of the society and the country. Without good teachers, no country can progress. The future of the nation is built by teacher through the process of education. A nation cannot afford to leave its future in the hands of incompetent teachers.

For the professional development of teachers, the UGC established 51 Academic Staff Colleges conducting orientation and refresher courses. They are doing their best but certain aspects of pedagogical role of teachers are left out.

Qualitative Teachers:-

The main task of teachers in engineeringr education is to create a learning environment in which the students are encouraged to think carefully, rationally and express their thoughts critically. Dr. Abdul Kalam remarked, "The teachers have to teach humanity and humanism to the students. Higher education today produces intellectual monsters but not intellectuals with human faces. Now teacher's role has changed from teacher to knowledge workers, consultant and counselor". There are many determinants of quality of learning of which one is the quality of teachers. The quality of teachers lies in the quality of training. Though certain competencies are in born, either it has to be modified or new competencies have to be developed through proper training. It motivate and up to date the knowledge of a teacher. The ability of a teacher, vision, capacity and understanding can be refined and extended through training. The teacher needs to be trained from time to time so as to keep pace with the development in related areas and to work at the maximum efficiency level. It is necessary for the following purposes.

i) To increase the performance level of the teacher and to develop in such a manner that teacher can rise to the position of higher responsibility.

ii) To ensure effective utilization of human resource.

iii) To constantly develop manpower to meet the current as well as future needs of the education.

Major Constraints:

The American Commission on higher education remarked that the quality of a nation depends upon the quality of its citizens. The quality of its citizens depends upon the quality of their education. The quality of their education depends to a greater extent, if are to identify a single factor, upon the quality teachers.

Hence it is most important to increase the quality of the teachers. The difficulty of involving engineering and science faculty in instructional development is well known to faculty developers who have tried. Schulman (2002) notes that each

discipline has its own "pedagogical content knowledge," so pedagogical techniques that are perfectly suitable in some disciplines may be ineffective in others. Lee (2000) supports this notion, observing that most faculty developers work with ease in the soft disciplines (e.g., English, psychology, social work) due to their own academic training in related areas, but have difficulty in engineering and the physical and mathematical sciences, being less familiar with the nature of the subject matter and methods of inquiry in those areas.

Engineering professors are particularly quick to discount the relevance of teaching workshops to their subjects, students, and problems, with many arguing that the learner-centered teaching methods presented in the workshops are just "spoon-feeding" and inevitably lead to lower standards and inflated grades. Persuading them to try those methods—or even inducing them to attend workshops or seminars—is consequently a continuing challenge for faculty developers. But unfortunately there are so many constraints faced by teachers in this regards. The major constraints in faculty development are listed as follows.

1. **Behavior of teacher:**

   The status of the teacher reflects the socio-cultural ethos of a society. It is said that no people can rise above the level of the teachers. Teachers play significant role in the society. But, today, we find the teaching profession has been experiencing a burn out a state of frustration and hopelessness inflicting the minds of the teaching community. Some of the teachers are having negative approach; of them some are involve themselves in politics and creating undesirable politics in teachers, students, management and the society at large. Some teachers conserve time in different way that they go to the class 10 minutes late and come out of the class 10 minutes before ringing the bell. Some teachers engage themselves in the business run by their spouses, brothers, children's etc. Some teachers engage themselves in the private tuitions for monetary benefits. Some teachers assign their own college work to their juniors. There are the teachers who dictate the notes that they got from their teachers when they were students. Some teachers waste their class time by reading newspapers and chatting with each others.

2. **Infrastructure Constraints:**

   The infrastructure facilities are so poor. It is a major constraint for faculty development. The various laboratories such as Science lab, Language lab, Guidance and Counseling lab, etc, sports and games facilities, music facilities are either not there or mostly in very poor status. The library facilities are also very poor. In most of the places there is less or no facilities of

advanced library with OPAC system, INFLIBNET N-list facility, inter colleges borrowing systems etc.

3. **Poor Research:**

There is an absence of research culture in general and also absence of promotion of research. The research which is going on to some extent is more of descriptive and evaluative research than suggestive. There is more of borrowed methodology than indigenous. There are mismatches between research trend and problems. The research in education is replicate and repetitive nature. The research problem, nature, methodology, approach etc. are repeated. Philosophical and historical studies are very rare. There is more of quantitative research than qualitative.

4. **Lack of Motivation:**

Teacher once appointed with required basic qualification are need not to be achieve additional qualification or skills as the part of service condition. Therefore most of the teachers did not made attempt to improve their skills and qualities. There is no linkage between faculty development and awards and rewards.

5. **Examination Oriented Teaching and learning System:**

The whole system of teaching and learning is totally exam oriented. Therefore teaching is limited only to giving information and explanation about curriculum, because students are not interested in learning extra -curricular and co-curricular contents. Students also interested in clearing the examinations and not in overall development. There is no challenge from students to the teachers as a result teachers neglect self development.

6. **Lack of Training:**

There is no proper training system for teachers in engineering education. Some orientation and refresher programmes are compulsory but they are not implemented seriously. The facilities of training programmes are very limited as compared to number of faculties. The quality of the training facilities available is also not up to the mark.

7. **Inadequate Technology Infusion:**

Total education process is largely traditional as well as faculty development programmes are also traditional. Pace of modernization is very slow. There is very limited use of Educational Technology, ICT, Media lab, Internet and Wireless Fidelity (Wi-Fi) facilities in overall education process and also in faculty development programmes.

8. **High Teacher Student Ratio:**

The Teachers Students Ratio is very high in engineering education also there is a shortage of qualified teachers in engineering education in India. The teachers are engaged in their daily routine of teaching and evaluation such as giving information, dictating notes, assessing home assignments and answer sheets etc. Therefore they have very limited time to self development.

Solutions:

As the quality of education is mainly depend on the quality of inputs and out of these inputs the most important input is a qualitative teacher. The quality of the teacher can be improved with the help of faculty development programmes. Faculty development refers to policies and procedures designed to equip prospective teacher with the knowledge, attitudes, behaviours and skills they require to perform their tasks effectively in the classroom, institution and community. Faculty development is hampered due to the above mentioned constraint and to minimize these constraints the following suggestions may play important role.

1. **Behavioural Training:**

Faculty development programmes must be designed to change the behavioural aspects of the teachers. The behavioural training must be provide d to the teachers which can change the attitude, thinking, behavior of the teacher which improves the quality of the teacher. The training should be such that made the teacher to be knowledgeable and have an analytical mind and try to develop analytical mind of his students. Maintain high level of proficiency and make continuous improvement in quality.

2. **Provide Infrastructure Facilities:**

Adequate fund should be provided by Government, AICTE and UGC to all the institutions to enhance the infrastructure facilities such as adequate building, laboratories, libraries, information centers etc. Advanced infrastructure facilities strengthen the teaching learning process as well as empower the teachers and students.

3. **Promotion of Research:**

Now a days research has got the most important role in education process. Therefore teacher must take lead in research activities. He should regularly visit to library and visit to other Universities and Colleges. He should publish regularly in professional journals and periodicals. The teachers must be attained the various conferences, seminars, workshops and symposia. The research must be realistic and useful for the society. The research work should be properly awarded.

4. Reward the Performance:

In order to encourage competitive spirit among the teachers in their field the special promotional and financial benefits should be encouraged. The performance of the teacher and monetary and non-monetary benefits must be interconnected. There may be a provision for additional reward for the best performance. For this purpose performance indicators should be fixed and the evaluation procedure should be determined. New Academic Performance Indicators (API) is the first step towards this way.

5. Training Facility:

For faculty development, professional training of teachers is the basic requirement. The number of training institutions must be increased. Specially designed orientation programmes for all the new entrant teachers should be organized as well as organize refresher courses for all the teachers at least once in five years. Few important teaching skills must be practiced during orientation and refresher course. Stimulate lecturers to attain workshops, conferences, seminars etc. The programme should be acquainted with research methodology.

6. Technological Support:

Adequate Technology Facilities should be provided by institutions and management to teachers. In teacher's education, teacher trainees and the teaching communities are adapting to new technologies. The basic agenda is to provide the trainees with the latest skills in the era of rapid technological transformation and innovation. The colleges should be linked with interactive classrooms, where modern communicative technologies are used to provide teaching aids as well as materials to students from a central database**.**

7. Change in Teaching Learning Process:

At present the whole educational process is exam oriented. There is a need to change the attitude about the education process. The teaching learning process should be student centric and the aim of it should be to create a learning environment in which the students are encouraged to think carefully, rationally and express their views critically. The curricula can be digitized and teaching carried out through multimedia and other teaching aids in a large size.

8. Expansion of educational Institutions:

In India teacher student ratio is very high, therefore the teachers are burdened with routine work. They cannot spare time for research as well as self improvement. There is a need to start more educational

institutions which can provide education to the masses. If there is a increase in educational institutions it will reduce teachers student ratio and it will definitely help the faculty development.

9. **Online Faculty training programs** : According to UN estimates India would account for almost26 percent of the increase in the global working-age population over the next 10 yearsThe challenge is to develop a robust education system that would ensure sustainable flow of skilled workers. Indian Institute of Technology, Bombay is imparting training programs for engineering college teachers across the country using the online facilities which is interactive. Open source tools are being extensively used in this program.More of such programs can be organized by the technical institutes and get access to best training , by best trainers at just a mouse click.

Conclusion:

The point of our argument is not to say that moulding faculties how to think, work together better, or use new information more rigorously is not a worthy and attainable goal. Rather, it seeks to call attention to the magnitude of the challenge. Efforts to create more formalized common teaching standards would help address some of the challenges by focusing efforts in a common direction. But common standards will not, by themselves, be enough.The past few decades have seen great progress in education reform all over the globe but that has especially benefited less-advantaged students. We can build on that progress only if we pay keen attention to the challenges associated with genuinely improving teaching and learning. If we ignore these challenges, the 21st century skills movement risks becoming another fad that ultimately changes little—or even worse.

References

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1) REFERENCES

2) G. Eason, B. Noble, and I.N. Sneddon, "On certain integrals of Dey Bani, Saxena Manoj and Gihar Sandhya, (2006), Teacher Education in Communication Age, Wisdom Publications, New Delhi,
3) Rymbai B.B., Need for Professionalism in Higher Education Teachers, University News, Vol.49 No.25, June 20-26,2011
4) Pawar Anad,Impact of Teacher Training on Teacher Competencies, University News, Vol.49 No.28, July 11-17,2011
5) Balamohandas and Sharma Minakshi,Quality Teachers: A Must for Quality Higher Education, University News, Vol.50 No.03, Jan 16-22,2012

6) Jahnabee Boruah, Role and Responsibilities sof Teachers as An Architect of the Nation, University News, Vol.49 No.36, Sept.5-11,2011
7) Goal D.R. and Goal Chhaya, Current Issues in Teacher Education, University News, Vol.49 No.38, Sept.19-25,2011
8) Sahoo S.N., Teacher Education in India: Challenges and Opportunities, Dey Bani, Saxena Manoj and Gihar Sandhya, (2006), Teacher Education in Communication Age, Wisdom Publications, New Delhi,
9) www.asee.org
10) http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/FD-Model(JFD).pdf