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ROLE OF UNIVERSITIES IN INTERNATIONAL COLLABORATION IN ENGINEERING EDUCATION – FACULTY DEVELOPMENT

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I) INTRODUCTION :

The exponential growth in technical education has not translated into any significant growth in the number of quality graduates due to restricted availability of qualified faculty. The quality of education and training being imparted in the engineering education institutions varies from excellent to poor, with some institutions comparing favourably with the best in the world and others suffering from different degrees of handicaps. As such, there is currently a wide gap between quantity and quality in technical education.

Universities can be looked upon as potential sources to address this problem. The University is a composite totality, so long as its constituents, its faculty members and students, research scholars and administration imbibe a commonality of purpose, a corporate consciousness. The advancement in the field of information technology has given birth to globalization. In such a global scenario the role of the universities has to be redefined. Universities are no longer centres of learning, established in isolation from the main stream of social happening. The university will continue to be the key institution, where fundamental research of knowledge has to be nurtured.

II) FACULTY DEVELOPMENT :

Faculty development means the process which is undertaken to bring about qualitative changes in the competence of individual faculty members in fulfilling their obligations to achieve the goals and objectives of their institutions. It comprises of :

a) Improved teaching and learning necessary for deep understanding of technical information and skills –

The effectiveness of teaching learning process is a function of multitude of factors like teacher, student, course curriculum, course planning and assessment. Hence, to have effective learning by the student, faculty development is must.

However, shortage of training opportunities and attention to overall growth of faculty is adversely affecting impartation of quality knowledge and skills to the students, thereby lowering their overall development and employability. At times, the faculty also lack in communication and pedagogical skills and industry academic collaboration is also at nascent stage. Hence, the process of faculty development becomes highly imperative.

Improvements in instructional programs may involve subject integration, just-in-time instruction, writing across the curriculum, or any of a variety of other non-traditional approaches that have been found to improve learning. The quality of a teaching program is primarily related to the quality of the instruction that takes place in individual classrooms. For the new curricula and instructional methods to have the desired impact, a reasonable percentage of the faculty must participate willingly and competently in both their delivery and their assessment.

b) Implementation of latest teaching strategies –

There are various types of technologies currently used in traditional classrooms-viz-Interactive whiteboards, wireless classroom microphones, class websites, class blogs and wikis, online media, digital games, video cameras, document cameras, LCD projectors. Podcasting which requires a computer, microphone and internet connection has the capacity of advancing a student's education beyond the classroom. It can help in sharpening students' vocabulary, writing, editing, public speaking, and presentation skills. Distance learning technologies take many forms such as computer simulations, interactive collaboration/discussion and the creation of virtual learning environments connecting regions or nations.

c) Creating practical learning environment provided by laboratories and workshops-

Laboratories and practical classes have been a substantial part of the teaching repertoire in Science and Engineering for many years. In recent years, some Universities have developed virtual laboratories, which minimize physical requirements and allow all students access to laboratory equipments through the integration of instrumentation and the use of simulation software. Many more universities supplement laboratory practice with some simulated, computer based

experience. The workshop provides the ability to delve into a topic and learn to dissect the information for mass consumption. It exemplifies the importance of being able to present effectively on scientific material to a general audience.

d) Effective assessment methods to determine quality and improve the learnng process-

Assessment plays a key role in how teachers teach and how students learn. Effective assessment should take account of different learning styles, be consistent in its approach, involve students and take account of their opinions and share information across departments.

Benefits of assessment for teachers -

- reflect on the quality of their own and colleagues' teaching
- assess and identify student's learning needs
- determine the appropriate level, depth and pace of work for pupil
- plan and provide effectively for students learning needs

e) Understanding properly the changing role of teacher in various areas including research-

With Information and Communication Technology (ICT), the role of teachers has changed and continues to change from being a instructor to become a constructor, facilitator, coach and creator of learning environment. By the use of ICT in the learning process teachers are no longer following the traditional ways of teaching and that is the reason why the role of a teacher must change. In order for teachers to be able to integrate the use of ICT in teaching various skills, they need to be developed in vast array of competence. It should be remembered that teachers need a system of support at various level for integrating technology and overcoming their isolation as they struggle with new and unfamiliar approaches to teaching and tools for learning. They also need technical support in resolving problems related to hardware, software and computer networks; problems that often interfere with or even derail the learning of both teachers and students. Therefore, a genuine and sophisticated integration is necessary. Teacher training in this regard, thus, become crucial.

Faculty development programs should also include the organization of :-

i*) Conferences/Seminars*

The institute should regularly organize International / National Conferences / Seminars to provide a platform for the academicians, researchers, industrialists and students to share their views on contemporary issues. This will help them in sharing their knowledge amongst themselves, which will be mutually beneficial to them.

ii) Research Methodology Workshops

The institute should conduct Research Methodology workshops for resulting into the academic contribution and to have better understanding of research methodology, as research is significantly important in faculty development. Faculty members should be encouraged to publish/present papers in journals/conferences and file patents on the topics of their research. Research should be carried-out in such a way so that the technology can reach to masses and always be useful in sustainable development.

In addition to the above, Faculty Development Program should also include programs for improving the skills of the faculties to face the upcoming changes in the current education scenario; training sessions to know innovations in teaching; various national & international events etc.

III) REVIEW OF INTERNATIONAL COLLABORATION IN ENGINEERING EDUCATION :

International collaboration in engineering education sector is a rapidly growing component of core research activity for all countries. It is driven by a consonance between top-down and bottom-up objectives. Collaboration is encouraged at a policy level because it provides access to a wider range of facilities and resources. It enables researchers to participate in networks of cutting-edge and innovative activity. It is therefore unsurprising that collaborative research is also identified as contributing to some of the highest impact activity. It is also important to recognise that collaboration may serve purposes in addition to research excellence, such as gaining knowledge of other research systems and building strategic partnerships. Since each country has its own portfolio, policies and priorities, the relevance and

vitality of collaboration in the emergent global context will rest on the ability to come up with new models for partnership and ambitious goals as to what it might accomplish. Few of the existing international collaborative programs in engineering education are -

a) The Indo US Collaboration for Engineering Education (IUCEE)

The Indo US Collaboration for Engineering Education (IUCEE) program was conceptualized by over 150 leaders of engineering education and businesses from US and India in 2007 to help create good quality engineering talent in order to find solutions to the global challenges facing humanity such as energy, environment, health and communications. IUCEE is aiming to build a solid base for engineering education and research by strengthening the four pillars of education:

i) learner-centric teaching
ii) research excellence
iii) outcome based quality supported by accreditation
iv) innovation and entrepreneurship

American Society for Engineering Education (ASEE) along with academic and business leaders from leading US and Indian universities have launched an initiative to build US-India collaborations in order to make engineering education and research more relevant to the needs of the global society and to the aptitudes and aspirations of new generation of youth. This synergy between US and India provides the opportunity for the two countries to collaborate on building the next generation technical workforce using new paradigms. Pan IIT, an organization of the alumni and faculty of Indian Institutes of Technology, has provided a strong foundation for building this collaboration.

b) International Committee on Engineering Education and Innovation (ICEEI)

ICEEI is actively promoting the International Decade for Engineering Advancement (IDEA). The International Decade for Engineering Advancement (IDEA) is a major ten-year collaborative endeavor in advancing engineering education, research, and development on a global scale. The goal is to cultivate a new generation of engineers and engineering technology capable of significantly

improving wealth creation and distribution as well as enhancing quality of life and human conditions worldwide.

Some of the programs carried-out at national level to improve the quality of technical education include –

i) Technical Education Quality Improvement Programme (TEQIP)

Technical Education Quality Improvement Program (TEQIP) of Government of India aims to upscale and support ongoing efforts of Government of India to improve quality of technical education and enhance existing capabilities of the institutions to become dynamic, demand driven, quality conscious, efficient and forward looking, responsive to rapid economic and technological developments occurring both at national and international levels.

ii) Quality Improvement Program (QIP)

Teachers in engineering institutions get an opportunity to study at IIT/NIT under the quality improvement program (QIP). The Government of India launched the Quality Improvement Program (QIP) in the year 1970. One of the main objectives of the Program is to upgrade the expertise and capabilities of the faculty members of the degree-level engineering institutions in the country.

iii) National Program on Technology Enhanced Learning (NPTEL)

The National Program on Technology Enhanced Learning (NPTEL) is a Government of India sponsored collaborative educational programme. The main objective of NPTEL program is to enhance the quality of engineering education in the country by developing curriculum based video and web courses.

iv) Mission10X

Mission10X is a not-for-profit trust initiated to enhance the employability skills of fresh engineering graduates in India. With the aim to cater to the substantial number of engineering graduates in India who lack employability skills, Mission10X, as a part of the Wipro Quantum Innovation project, planned to create a significant change in the employability landscape.

IV) THE ROLE OF UNIVERSITIES :

'Train the Trainer' model has to be developed by the university. It should be based on exposure of global practices, judicial use of technological tools for education and innovative initiatives in faculty development. The role of universities should be to provide the faculty with the resources necessary to incorporate the international aspect into their existing classes. Universities must develop plans for integrating the international experience into a student's education. They should develop cooperative programs with universities in other countries to promote faculty and student exchanges, collaborative research, and education programs that develop international understanding. They should establish multidisciplinary and interdisciplinary structures, such as "centres of excellence" for research, education and policy development within the university. Universities can use such techniques as inviting international experts to speak, encouraging class discussions about world events and utilizing actual cases from around the world. Exchange programs offer another useful way to actually give students hands-on experience. Providing travel expenses to attend appropriate international meetings would represent a step in the right direction. Interested faculty should be given sabbatical leave to attend other universities for course work for research. They should also be supported by grant money for research on international issues. This will help them in understanding the work culture available to the teachers all over the world and plan reforms in their own universities to make it globally acceptable.

V) CONCLUSION :

Education is a process of human enlightenment and empowerment for the achievement of a better quality of life. A sound and effective system of education results in unfolding of the learner's potentialities and enlargement of his competencies. Teachers can act as trail blazers in the life of a learner. If teachers acquire professional competencies, a chain reaction begins for quality learning and professional growth. Quality teaching could contribute a lot in helping us to realise the lofty goal of excellence in education. No system of education, however perfect, could hope to succeed without meeting the challenge of effective teaching. Whatever policies may be formulated, ultimately these have to be interpreted and implemented

by teachers. In a nutshell, teacher's performance remains the most crucial input in the field of education.

The universities of the twenty first century will have to function under the all-pervading influence of the communication technology revolution, globalised knowledge, accelerated innovation and technical skills. Universities should contribute to productivity, ensure social relevance, accommodate individual differences, encourage diversity of cultures, encourage originality and play a proactive role. As a powerful agency of social change, they should produce adequately qualified and trained manpower to meet the requirements of growing economies; and second, it should produce enlightened citizens capable of effectively participating in the democratic processes.