

FOSTERING ENGINEERING EDUCATION THROUGH INDUSTRY–INSTITUTE INTERACTION

G. V. Praveen¹, Pandu Kurre²

¹Professor in Civil Engineering, S. R. Engineering College, Warangal – 506 371

²Research Scholar, Osmania University College of engineering, Hyderabad – 500 004

ABSTRACT

Engineering education plays a vital role in the development of any nation. In India, more than 3000 engineering colleges have been functioning and offering under graduate and graduate programs in the field of technical education. These institutions are producing largest technical manpower every year. Graduating engineers are intended to acquire basic knowledge in the concerned field of engineering and skills from these institutions. But, compared to output of the students, there exists a skill gap with need of the industry. Hence, there is a dire need to establish Industry–Institute Interaction for probable employment opportunities for the graduating engineers during their course of the study and also for the national development and economic growth. Further, industry–institute interaction helps engineering graduates to undergo work–based learning style simultaneously with their regular curriculum. The present paper focuses and highlights about objectives, nature of interaction and benefits and also some of the constraints.

Keywords— *Engineering Education; Skill gap; Industry–Institute Interaction; Employability.*

I. INTRODUCTION

Characterization of the present era is done by phenomenal development in science and technology of any nation. In this connection, engineering colleges range from research intensive institutions to those that focus largely on undergraduate engineering education. It is estimated by many surveys in India that, only 10% of graduating engineers are readily employable in various private and public sectors which is not well received by engineering institutions. There arises a dire need for establishing linkage between industry, national laboratories, development sectors, professional bodies, certification programs to bring out networking among institutions. It is observed that, so far engineering institutions have concentrated only on getting industry participation in job placements or final year projects. However, this will encourage industry collaboration in other aspects like curriculum and governance. But, some of the gaps that generally identified include industry orientation as most of the current education system still following examination based assessments and lack of industrial orientated teaching. Hence, there is a growing realization amongst engineering institutions and the industry to serve this skill gap.

The engineering education is intended to serve the nation for economic growth and job development and as the technology is continuously changing, the engineering students should be ready for international economic competitiveness for their sustainability.

The primary purpose of technical institutions is to enhance the capabilities of engineering graduates by developing talent, creating knowledge by providing institutional solutions such as creating digital resources and creative technology solutions. Further, it is observed that majority of engineering graduates are lagging in practical skills. Some of the reasons could be their primary education, medium of instruction, rural background, financial status etc. To overcome this lacunae, presently, several methods and mechanisms are available to approach the desired target i.e., to inculcate various generic skills for making a professional student industry ready and to orient towards their nature of work to perform duties in the designed way and feel responsibility.

At present it is observed that, several challenges facing industry–institute interaction are awareness, identification, evaluation and commercialization of ideas (Gandhi, 2013). To impart sustainable real world training for the engineering students and polish their skills, appropriate interaction with industry is necessary. The industry–institute interaction is seen as the key parameter to bridge the gap between theory and reality. It is felt that, institutions are to be finalized their curriculum in consultation with industry experts and reviewed frequently.

After graduating, engineering students are supposed to work with significant independence and should be strong in leadership qualities. They should have flair to perform the designated duties in effective manner. They should be proactive and committed and also must be a team player and to have passion for learning at the work site. It is also needed to have capability to leverage the knowledge and promote cross functional learning.

III.QUALITY ENHANCEMENT OF ENGINEERING EDUCATION THROUGH INDUSTRY–INSTITUTE INTERACTION

It is interesting to note that, majority number of industries is willing to share their ideas in designing the curriculum. Further, large number of industries is ready to express their willingness to provide industrial infrastructure to faculty of academia to fill this gap.

- Initiatives for skill development are to be taken up to inculcate innovative thinking among graduating engineers to lead high quality research and innovative thinking.
- Introducing subjects/research studies/mini projects related to market driven products in curriculum certainly enriches the quality of education.
- Models relating interdisciplinary focus and develop abilities in problem solving.
- Analysis and exploration of economical solutions could be possible by networking with customers, suppliers and industrial organizations and also establishing incubation centers in institutions will foster the culture of entrepreneurial skills among students.
- Appropriate incentives and recognition have to be given to faculty with good research abilities confronting industry needs which in turn beneficial for students to take up projects.

Further, the following activities also foster the employability skills:



- Work place based approaches can be particularly useful for fresh graduates because of authentic context in which employability skills can be demonstrated and applied.
- Class room based approaches do not have access to the some opportunities at work place based approaches. Arranging of practical case studies, simulations and activities with Industry representatives can all help to address the lack of awareness at real work station.
- Working closely with industry contacts to design activities is even assistance in instructions can be useful ways of ensuring a high degree of relevance of activities.
- One must understand that being flexible and working in different assignments provides them a chance to learn, explore and innovate during their work and to evolve new techniques for better efficiency.
- Provides students lots of opportunities to get to know about successful people; nurturing relationships other than the programs staff is very important. They need to meet successful people of their peer group and social background.
- Meeting employers and alumni help students develop confidence in relative to people who will soon be part of their own work life.

IV.SOME BENEFITS OF INDUSTRY–INSTITUTE INTERACTION

It is evident that proper training of students during the course of the study will certainly enhances their employability skills. Further, it is also observed that the engineering institutions are implementing different training methods to inculcate the employability skills which are essential to achieve a suitable job in different industry sectors. Some benefits are:

- Better quality of life of society
- Financial planning
- Market driven studies
- Employee morale, motivation & productivity
- International perspectives
- Real life issues based research
- Positive transformation and development

V.SOFT SKILLS: INDUSTRY–INSTITUTE INTERACTION: EMPLOYABILITY

In recent times, it is observed that, the world is becoming more inter-connected, the technology is continuously altering our relationship to information. When soft skills is integrated with technical education during the course of the study, the teaching – learning process becomes easy and improves students’ learning process leading to effective technology transfer.

Soft skills are non–technical skills, abilities and traits that one needs to function in a specific employment environment. Generally, soft skills include work place competencies like problem solving, cognitive skills, oral communication skills, personal qualities, work ethics, interpersonal and team work. Soft skills are mainly used to convey information, expression, feelings and persuade (Praveen and Kathyayani, 2010). Hence, it changes as per the activity it is used for. In technical education, soft skills are mainly used to manage the people in

connection to convey the technical information in particular and the professional communication by engineers about the science and technology in general.

The most accepted and popular traditional methods used for soft skills are presentations, case studies, role plays, simulation activities, group building, on-job training, business games and behavior modeling. With the rapid development of ICT viz., internet and wireless communication systems and E-learning methods of soft skills training, it is observed that changing face of learning has been occurred in the training of students for their employability or industry readiness. In the present paper an attempt is made to elucidate the challenges involved in training of soft skills through E – learning (Sripala and Praveen, 2011).

The purpose of introduction of soft skills at various stages in technical education is not only for gainful employment but also a way to transfer a new perspectives and understanding of technology.

VI.FEW STRATEGIES FOR INDUSTRY –INSTITUTE INTERACTION

Usually, students have well-built inclination for analytical, logical, quantitative thinking, often coupled with very well thought-out and practical thinking; however it is very important that these conceptual, holistic, imaginative thinkers are most likely to be drawn into the shape of an entrepreneur.

Some of the objectives by the introduction of the industry oriented basic courses in engineering program could be:

- To provide an understanding of the principles and concepts of industry/entrepreneurship and making it as a tool for the efficient functioning of modern economy.
- To bring awareness for effective product development, steps and resources needed for business startup.
- To provide an understanding of the thinking and problem solving skills required for successful entrepreneurship and to be organized in the most effective sequence.
- To provide immediate hands-on application in a diverse team project to enhance learning, with the project topic to be selected by the teams and the outcome resulting in the ability to generate a viable business plan.

The courses can have different objectives, such as:

- Developing entrepreneurial drive among students (raising awareness and motivation) which is needed to set up a business and to manage its growth.
- Developing the entrepreneurial abilities needed to identify and explore business opportunities.

Integration of industry oriented courses into the curriculum needs to be the vision for a higher education institution as part of its wider mission and provision should be accessible for engineering students (Eagen et al., 2002; Monika and Edward, 1995). It is also essential for educators that they should be comfortable and skilled in addressing a diversity of student groups, from different cultural backgrounds, by providing examples and role models that relate to their contexts.

The following factors are important for effective learning, an effective academic program for expected outcome of engineering students:

- Sufficient time must be allocated for these courses apart from regular time table, a one-week intensive course is to be designed for undergraduates and provide time to assimilate the information and material. Learning the theory or principles without a practical application in an interesting project is more or less a waste of time.



- Engineering students need guidance in how to find or discover problems that have market potential, and they also need guidance in looking at their product or design from the customer's point of view. Many engineering professors are not used to look beyond finding a technical solution to a problem; thus students are not usually encouraged to look at marketability in their regular curriculum.
- To increase the perceived value of an industry oriented course and gauge a student's motivation, students could be interviewed before accepting them into such a class, just as if they would be hired into a company or a work team—in essence, the ultimate goal of such a course would be for student teams to launch their own enterprises, and students need an upfront reminder of this purpose (and the team effort that will be required).
- The teaching approach should initially be geared to the engineering culture for early comfort (Edward Lumsdaine, 2001), but then new thinking modes need to be introduced to make students adaptable to the thinking required for entrepreneurship.
- Support by the academic administration and faculty peers is needed—there must be a climate that makes innovation and creative thinking (and entrepreneurial research and multidisciplinary projects) not only acceptable but also recognized and rewarded (Saxena, 2005).
- The age and maturity of the graduating engineering student is not as important as adapting the material to their level, as long as it is presented interactively to their learning styles.

Employable Skill	Learning Activities
Communication	Preparing and Presenting Reports both Written and Oral and Role Play Demonstrations.
Team Work	Group Projects, Group Discussions, Role Plays and Interactive Activities.
Problem Solving	Case studies, Simulations, Investigative Projects and Research.
Initiative and Enterprise	Brain storming, Designing Innovative and Creative Activities and Initiating Change.
Planning and organizing	Research and Data Collection, Developing Action, Place Planning and Organizing Events and Goal Setting Activities.
Self Management	Development of Portfolios work plans, Usage of Log Books to Record, Time Management, Monitor Own Performance and Career Planning.
Learning	Use of Reflective Journals, Diaries, Observation and Survey.

The above illustrated skills mainly emphasizes on ones' abilities, such as better understanding, inter personal relationship and in turn helpful to analyze and interpretation of task assigned to the fresh graduate employee of a particular organization. Students should be given much more awareness of international economic competition and its impact on their personal careers and lives and they need encouragement to think in broader terms and look at global opportunities.

It is important to map some of key competencies in designing the employability of graduates and to serve better for the needs of the organization. Keeping in mind the existing and expected job opportunities, an intensive interface with respect to leading corporate sectors should be planned. The following table gives a set of carefully designed activities that help professional graduates in empowering various industry sectors.

The expected outcomes of a graduating engineer are

- Increased and improved learning resources leading to effective learning
- Effective knowledge transfer
- Ensured regularity and uniform implementation of syllabus in all the disciplines.
- Remarkable increase in student satisfaction
- Improved employability
- Attracting quality students
- Better understanding of latest technology

VIII.CONCLUSIONS

The training enables students to be ready to take up the real world problems and also empower them to adopt innovative solutions for the difficult challenges that are being faced by the present day industry. This interaction with industry in turn helps for the development of various technical fields and also country's economic growth. Further, training of students helps to bridge the gap between education system and industry and improves inter personal skills. Training also ensures the students more employable and makes them professionally ready for the work.

- The curriculum should be finalized in consultation with industry experts.
- Adequate focus must be put on personal development of students.
- Graduating engineers must enroll for membership in professional associations.
- Students should be encouraged for attending seminars and conferences.
- Faculty could be given training in respective field of engineering and they are supposed to attend short term training in industry.

It is quite common to professional graduates to enhance the generic skills other than technical skills, and make themselves aware of history, growth potential and jobs available in the present day industry sector. Hence, it is important to have a firsthand knowledge and experience of situations that are to be faced in the current industry. Viewing from percentage point of view, many professional students needs to understand emerging trends in the industrial world. The basic philosophy of training of young engineering graduates lies giving information about ground realities and making them the all-round performer.

IX. ACKNOWLEDGMENT

The author is thankful to Mr. A. Varadha Reddy, Chairman, S. R. Educational Society, Warangal and Mr. A. Madhukar Reddy, Secretary, S. R. Group of Engineering Institutions, Warangal for their constant support and encouragement.

REFERENCES

- [1]. Eagan, Robert J., Allen, Corbett D., Ronald A. Howard, J., and Stuart Hunter. (2002). "Approaches to Improve Engineering Design." 2002, National Academies Press, Washington, DC.



- [2]. Edward Lumsdaine (2001). "A Multidisciplinary Approach to Teaching Invention and Entrepreneurship," Session 1454, Proceedings of the 2001 ASEE Annual Conference.
- [3]. Gandhi, M. M., (2013). "Industry academia Collaboration in India: Recent Initiatives, issues, Challenges Opportunities and Strategies" University News, A Weekly Journal of Higher Education.
- [4]. Monika Lumsdaine and Edward Lumsdaine, (1995). "Thinking Preferences of Engineering Students: Implications for Curriculum Restructuring," Journal of Engineering Education, 1995, Vol. 84, No. 2, 193-204.
- [5]. Murugesan, R. (2013). "Industry- Institute Interaction" Journal of ISTE, New Delhi.
- [6]. Praveen, G.V., and Katyayani, S. (2010). "Role of Training and Placement in Engineering Education." Proceedings of International Conference on Reforms in Technical Education, Osmania University, Hyderabad.
- [7]. Saxena Anand. (2005). "Motivation, Performance, Rewards". , 2005 Deep and Deep Publications, New Delhi
- [8]. Sripala, B., and Praveen, G. V. (2011). "Soft Skills in Engineering Education: Industry Perspective" Language in India, Vol.11, Issue10.