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INTEGRATING EMPLOYABILITY SKILLS INTO ENGINEERING CURRICULUM: SOME INSIGHTS

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Abstract

Engineering education has expanded to enormous dimensions and the statistics are scary to look at. The number of engineering institutes in India and the number of students graduating from these institutes are the highest in the world. But in recent times the placement records are on the contrary. Industries are complaining about spending huge sums on training these graduates who are not industry ready. How can this complaint be solved? Integrating employability skills into the existing engineering curriculum and introducing work integrated learning can pave the way in enhancing the required skills in engineering graduates. In the era of rapid globalization it is high time that these initiatives are taken up by the engineering institutes. To achieve this it is necessary to understand the nature of engineering employability skills framework, teaching and how to integrate them into the curriculum.

Introduction

The unprecedented expansion of the higher education system in India has arisen partly because of the substantial growth of engineering education. The number of engineering institutions doubled in merely five years, from 1,510 in 2006 to 3,390 in 2011. Accordingly, the total number of students enrolled in engineering education increased from 795,120 in 2004–05 to more than 1.5 million in 2009–10 (UGC 2004, 2011a). The main component in the significant expansion in engineering education is private institutions, which accounted for about 94 percent of engineering institutions in 2011. (NASSCOM) survey of 2011 showcased that over 75% of IT graduates are not ready for jobs and further brought into notice how India's $60 billion outsourcing industry is spending almost $1 billion a year training them to be fit for jobs.

Our engineers are not unemployable; they just don't have industry-ready talent. In other words, they lack the skills required for the jobs that are available to them. The12thFive YearPlanworkinggroupreport ontechnicaleducationemphasizes the importance of three areas:expansion,equity,andexcellence(orquality)(MHRD2011a).Engineering Institutions have to develop teaching strategies in their courses and programmes to meet the needs of the industry and ensure that students acquire employability skills. Research studies in this field suggest that use of learner centered methods like problem-based learning can help students apply theory to practice.Lecturers also need to have thinking, assessing and facilitation skills. There are many challenges in this task like lack of equipment, lack of time, unconducive teaching- learning environment, lack of sufficient teaching staff and student dynamics. Despite these constraints institutions areexpected to take initiatives to integrate employability skills into their curriculum. This involves getting familiar with the concepts of integrated curriculum , framework of employability skills , teaching strategies and looking at the necessary personality traits.

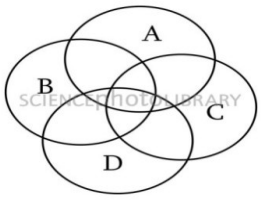
Integrated Curriculum

Curriculum integration can be described as an approach to teaching and learning that is based on both philosophy and practicality. It can generally be defined as a curriculum approach that purposefully draws together knowledge, skills, attitudes and values from within or across subject areas to develop a more powerful understanding of key ideas. Curriculum integration occurs when components of the curriculum are connected and related in meaningful ways by boththe students and teachers.Instruction here centers on a concept, issue, problem, topic, or experience in a career-themed context.Teaching ideas holistically, rather than in fragmented pieces, better reflects how students' brains process information

According to Constructivism, when teachers and students work together to build an education based on students' experiences andtheir previous knowledge, then learning becomes meaningful. 'Gestalt' theory states that "the whole is greater than the sum of the parts." So, when we talk about integrating a curriculum, we are talking about helping students to gain comprehensive understandings within and across various disciplines. The focus should be on designing a curriculum that is relevant, standards based and meaningful for students. At the same time, the curriculum should challenge students to solve real world problems. Integrated curriculum is an educational approach that prepares students for lifelong learning. Any integrated curriculum includes

- A combination of subjects
- An emphasis on projects

- Sources that go beyond textbooks
- Relationships among concepts
- Thematic units as organizing principles
- Flexible schedules
- Flexible student groupings.



Integrated curriculum

This diagram shows that in integrated curriculum looks at priorities thatoverlap multiple disciplines for common skills, concepts and attitudes. This curriculum encourages students to see interconnectedness and inter relationships among the disciplines. But it requires interdepartmental teams with common planning and teaching time. Curriculum integration can be carried out by three different models. In the inter-disciplinary model subjects and teachers are grouped and a team of students are allotted to them. In the problem-based model technology education is placed at the core and disciplines lend their support in solving problems. In the theme-based model syllabus from different subjects is connected through atheme and helps the students to apply concepts and skills to new situations.

Employability Skills

Employability skills are defined as skills required not only to gain employment, but also to progress with in an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions.' (DEST2002a).The eight employability skills suggested by the Australian Chamber of Commerce and Industry and the Business Council of Australia and published in Employability skills for the future (DEST2002a), provide an excellent starting pointfor any course in higher education.

- Communication skills that contribute to productive and harmonious relations between employees and customers
- Teamwork skillsthat contribute to productiveworking relationshipsand outcomes
- Problem solving skills that contribute to productive outcomes
- Self-management skills that contributeto employee satisfaction and growth
- Planning andorganizing skillsthat contributeto long-term and short-term strategic planning
- Technologyskills that contribute to effective execution of tasks

- Life-long learning skills that contribute to ongoing improvement and expansion in Employee and company operations andoutcomes

- Initiative and enterprise skillsthat contributeto innovative outcomes.

Graduate Employability Skills are the minimum requirement for the new graduates to know their role in building the organization they work for and have the practical skills to work effectively in their roles. These were earlier referred to as Graduate attributes or Generic skills.

How can we do this?

One of the preliminary steps in integration of Skills into a curriculum is to map a curriculum in use.Curriculum mapping analyses existing curriculum to identify where particular skills are covered in the curriculum. Some universities are mapping graduate attributes, or generic skills , against existing curriculum to identify where specific skills are addressed and where there are gaps in the curriculum and to further identify and develop skills ,Holistic approaches to learning, Problem-based learning,Lifelong learning skills, Learner reflection, Evaluation and articulation, Activity based and learner-centered approaches etc. Teacher assuming multiple roles, such as mentor, coach, facilitator, evaluator. After understanding the nature of skills ,we also have to concentrate on the expectations of the employers, personal qualities that the graduates need to possess, teaching strategies which facilitate this as per the Malaysian Engineering Employability Skills Framework as a reference.

What are Employers looking for?

Communication and interpersonal skills	The ability to explain what you mean in a clear and concise way through written and spoken means To listen and relate to other people, and to act upon key information/instructions.
Problem solving skills	The ability to understand a problem by breaking it down into smaller parts, and identifying the key issues, implications and identifying solutions. To apply your knowledge from many different areas to solving a task.
Using your initiative and Being self-motivated	Having new ideas of your own which can be made into a reality. Showing a strong personal drive and not waiting to be told to do things.
Working under pressure and to meet deadlines	Handling stress that comes with deadlines and ensuring that you meet them.
Organizational skills	Being organized and methodical. Able to plan work to meet deadlines and targets. Monitoring progress of work to ensure you are on track to meeting a deadline.
Team working	Working well with other people from different disciplines, backgrounds, and expertise to accomplish a task or goal.

Ability to learn and adapt	To be enthusiastic about your work, and to identify ways to learn from your mistakes for the benefit of both you and your employer.
Numeracy	The ability to use data and mathematics to support evidence or demonstrate a point.
Valuing diversity and difference	Knowing the value of diversity and what it can bring. Understanding and being considerate of the different needs of different individuals.
Negotiation skills	To take onboard other people's feelings and express your own requirements in an unemotional clear fashion to achieve a win-win outcome.

Employable Personal Qualities

Personal Skills	Attitudes	Traits
Communication Skills	Responsibility	Initiative
Personal Presentation Skills	Optimism	Sensitivity
IT//Computer Skills	Curiosity	Flexibility
Problem-Solving Skills	Ambition	Individuality
Leadership Skills	Desire for Challenge	Sincerity
Visioning Skills	Cooperation	Creativity

(Source: Japan Accreditation Board for Engineering Education)

Malaysian Engineering Employability Skills Framework:

Skills	Description
Communication Skills	Ability to Speak in clear sentences, Present ideas with confidence, Listen and ask questions
Teamwork	Ability to work effectively as an individual or in a group as effective team member, Accept and provide feedback in a constructive manner.
Life-long learning	Commitment to social , cultural, environmental, professional and ethical responsibilities
Problem solving and decision making skills	Ability to be creative and innovative ,to see different points of view in solving problems by identifying the root cause
Competence in Application and Practice	Ability to use modern Engineering tools and software, work towards quality standards and specifications
Knowledge of science and Engineering Principles	Ability to access, analyze and apply skills & knowledge of science & Engineering in designing process
Knowledge of contemporary issues	Use of Information and Communication Technology and General Knowledge
Engineering Systems Approach	Knowledge of engineering system for management and business practices

Employability Skills Framework-Suggested teaching Strategies

Employability Skill	Teaching Strategies
Communication	Writing and presenting written and verbal reports Role plays Demonstrations Working in groups
Teamwork	Team or group projects, Group Discussions
Problem solving	Case studies Simulations Investigative projects and research Using various problem solving tools and techniques Developing or designing models Problem solving in teams and networks Decision making activities
Initiative and enterprise	Brainstorming activities Designing innovative and creative practices and solutions Initiating change / designing change processes Simulation activities
Planning and organizing	Research and data collection Developing action plans Planning and organizing events Time management activities Goal setting activities and scheduling tasks Collecting and analyzing information
Self-management	Development of portfolios Work plans Using log books to record time management skills and monitor own performance
Learning	Reflective journals log books, diaries Mentoring and coaching activities Self-evaluation tools
Technology	Using the Internet, Intranets Using ICT skills to complete activities Industry relevant software, technology and equipment

Source: adapted from *Employability Skills from framework to practice*: (DEST2006)

Developing employability skills is a continuum; students learn them through their academic work, paid employment, community and social connections on- and off-campus, and life experience. Developing students' employability skills requires teaching staff with suitable skills, resources and awareness of current industry practices. Students' employability skills will also be strengthened where students have access to relevant work experience through quality work-integrated learning programs, cooperative learning or mentoring programs.

Employers play an important part in developing undergraduates' employability skills through their participation in work integrated learning programs, offering mentors, providing scholarships and

cadetships, and engaging with universities' careers services and academic programs. Practical examples of how employability Skills can be embedded in curriculum Work-based/work-related learning, e.g. bringing employers/practitioners into the classroom. Developing career management skills in partnership with Career Consultants. Allowing time in the classroom at regular intervals for skills reflective activity Conducting Student Development Weeks. Teaching employability and enterprise skills (e.g. through presentations, seminars, projects, group work, case studies, peer assessment, problem-based learning). Inviting guest speakers and use of alumni Preparing portfolios for students to record their self development Accreditation of co-curricular activities .Portfolio Reflection

Work Integrated Learning (WIL)

It is the generic term used to describe a range of programs which provide students with a combination of workplace experience and formal learning which are integrated as part of a course of study in higher education. Other terminology for WIL includes: industry based learning, cooperative education, student placement and work practicum. Fieldwork, industry-based learning, sandwich years, cooperative education, work placements and internships have been used to equip students with knowledge of current workplace practices.

Conclusion

Fresh Engineering graduates need a set of skills to prepare them for employment. Any Employability framework if followed and implemented can make anew Engineer a valuable asset to any organization. So technical and employability skills should be equally emphasized in the Engineering education curriculum. The future success of Indian industry depends on the growth of quality engineering education in India, especially since Indian industry is competing globally. TEQIP initiative by AICTE is a step forward in this direction.

References

Access3, (2006), Skills for Work: Practical Experiences in Construction and Engineering : Course Guidance and Employability Skills, Scottish Further Education Unit,

Azami Zaharim, Yuzainee MdYusoff, Mohd. Zaidi Omar, Hasan Basri, (2006) Proceedings of the 8th WSEAS International conference on Education and Education technology, ISSN: 1790-5109

Martin BMgangira (2003), Integrating the Development of Employability skills into acivil Engineering core subject through a Problem-Based learning Approach, International Jounal of Engineering Education, Vol19, no.5, Tempus Publications, UK

Mitch Cleary, Rosalio Flynn, Seth Thomasson. (2006), Employability Skills-From Framework to Practice, Precision Consultancy, Melbourne, Australia.

Primary Programs Framework- Curriculum Integration: making Connections(2007), Alberta Education, Alberta, Canada.

Report No. 57, (April 2013) South Asia Human Development Sector, International Comparative Study: Engineering Education in India.

Zaliza Hanapi, Mohd. Safarin Nordin, Arasinah Khammis (2005) , Challenges faced by Engineering Lecturers in Integrating Technical and Employability skills in the Curriculum: A case-study in Community College, Malaysia. International Journal of Social Science and Humanity, Vol no.5. May 2005.