NEWSLETTER

BITES

Guest Editorial

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IT Education – Desirable Transitions for IT to Reach the Next Level

Introduction

We as a country have achieved a commendable task in providing IT education to a large number of persons. But there is feeling that the quality of education needs to move by a couple of levels to make the students – at least a sizable number of them – to become employable, to achieve long term professional growth and to perform several engineering tasks: some important program objectives. Our system does nothing to distinction and first class students. They get credit to their institutions and universities, but get nothing. Many bright students can definitely increase their workloads by 10 to 20% to pursue courses of their interest.

Let us see how we take advantage of these to improve the quality within a university environment. It is much easier for autonomous institutions.

Current scenario in IT education

The current focus is more towards a few languages and programming.   Emphasis in engineering – design, large systems, engineering practices and use of tools, metrics etc. – is very low. This leads to a question of how to do the transition from the existing state to a desirable engineering state.

This is essential because of frequent changes in technologies leading to technological obsolescence with a cycle of about five years now.so we need to provide not only an engineering education but also provide for long term learning – analytical and conceptual. These two may have some conflicts – like current employment wants a strong skill set in languages and tools and the long term requirements need a good foundation in systems, theory, fundamentals and design procedures. This necessitates a good balancing of our curriculum.

Curriculum does not mean only courses- including laboratories.it should include activities to promote human interactions, leadership, teamwork and independent problem solving capabilities. These are required to provide a person a lifetime professionalism and growth in their jobs. Let us see how we can balance our curriculum and provide the requisite activities in an autonomous and university-based environments

What is engineering?

Engineering has to deal with new products, processes and systems which can be precisely designed and built based on a given set of specifications and which will work with reliability, meet the user needs and at an affordable cost. Measurements and metrics are the first set of principles followed by materials, energy at the next step. Design, detailing, modeling, analysis, diagnostics, usability and reliability are other components of engineering.

What is balancing in education?

The time available for a student is limited. Within the given time frame we will not be able to deal with all aspects of engineering- mathematics, theoretical foundations, languages, design, experiments, modeling, performance studies, diagnostics, etc. hence we need to create a flexible curriculum – a curriculum which allows a large number of electives to students so that a student get in depth knowledge in some basic areas and a good knowledge in some areas of interest to him/ her. This Also Means that he or she learns some topics to a good depth and some to a desirable level of knowledge. This kind of curriculum is called core and elective based one.

Many universities in several countries and some in India allow a great degree of flexibility. Interested and motivated students register for more number of courses than required for the degree. For example, if it is required to get 200 credits for a bachelors degree, it is not uncommon for students to register for 220 credits – 10% more than the requirement. This does not violate our university norms. So institutions should encourage

their first class and distinction students to learn more. This will be useful in their future growth and employability aspects; this is a simple and easily implementable approach.

As a second step, institutions can plan and run several relevant and useful one-credit courses to be conducted by industry experts as part of the institution but outside the university curriculum. Autonomous institutions can do a part of their curriculum. This is not to be compulsory for all but to a sizable population of students who are interested. This is also based on an assumption that students can spend up to 10% extra time easily in areas of their interest. It may motivate them into an area of specialization.

What are the components of a balanced curriculum?

It is flexible with some courses, which are compulsory to all and many which are electives. Sufficient number of electives is to be announced to give a good choice to students
The courses should cover various engineering requisites like theory, modeling, measures, design, problem solving, analysis, synthesis, quality, professional practices etc.
Lab work has become a meaningless ritual. The students should have freedom to design and conduct experiments, and innovate in the labs as well as satisfy their curiosity. Hard problems may be experimented. This will enthuse more students to take up experiments with interest and may come up with interesting and new outcomes. Actually, many project works are basically lab activities..

How to inculcate professional approach?

Some important expectations in a profession are:

1. Independent problem solving – end to end – capabilities
2. Team work
3. Leadership
4. Proper planning and detailing- test plans, SRS, estimation etc.
5. Documentation at every stage
6. Analysis of results
7. Time concerns – success depends on timely execution
8. Good project management skills
9. Skills on programming, and tools

    How do we implement the above desirable requirements?

We need a mixed approach – with theory done in class rooms and self study , experiments done in labs and most importantly practices established in the institution.

Some examples are

        Students should be encouraged to conduct seminars and conferences, present papers.

        Students are taught communication skills in the first year and made to practice them in their classes.

        Students should do documentation in their course work.

        Make them digital savvy.

One of the major activities which forms a major part of our degree curriculum is the project work. This needs a complete restructuring . This helps them to do team work on end to end engineering. This can be restructured to include project management principles like – important milestones, efforts, time lines, estimations of time and costs, roles of student members, . There should be periodic reviews say every month (we did this in the Motorola scholar program even though we have no control over the students or their institutions or universities). A total documentation revamp is also required. The documentations should include problem definition, constraints,

estimates of time and effort, SRS, designs, diagrams, data structures and models, dictionary, structure charts, metrics , test plans, actual experimentations, results and analysis etc in addition to the final report.

Conclusions

Let us hope that some of the approaches are taken up by our institutions to move towards higher quality and world class.

Prof D K Subramanian

From Chairman's Desk

Emerging Significance of Global Competencies and Attributes

Several things have happened, in terms of the environment and context of engineering to make it different from how it was a generation ago. Parkinson identifies a confluence of trends and events which have taken place over the past two decades. These include "advances in telecommunications and other enabling technologies (made possible by engineers), political events which have opened up many formerly closed societies, the adoption of economic

policies which have promoted free trade, and the expansion of multi-national corporations". "Advances in communications and computers have been a powerful driving force for globalization".

Yating Chang et al point out that "Increasing economic globalization is transforming the very nature of the engineering profession". They point out that "The profession now routinely deals with globally distributed manufacturing and multinational design and marketing teams. To flourish in this environment, future engineers need not only be proficient in the technical subjects, but also be informed about international technological trends and business practices and familiar with languages and cultures".

The National Academy of Engineering in its Report entitled *Educating the Engineer of 2020: Adapting Engineering Education to the New Century* concludes that "U.S. engineers must become global engineers .... The engineer of 2020 and beyond will need skills to be globally competitive over the length of her or his career."

Alan Parkinson provides the following three quotes to stress the importance of preparing Global Engineers:

- William Wulf, former President of NAE: *…* "Engineering is now practiced in a global, holistic business context, and engineers must design under constraints that reflect that context. In the future, understanding other cultures, speaking other languages, and communicating with people from marketing and finance will be just as fundamental to the practice of engineering as physics and calculus".
- Duane Abata, Former President of ASEE: "Outsourcing is affecting engineering and all the facets that encompass engineering, including research, design, marketing and service…This is a major revolution in engineering education. We must internationalize our curriculum, to include not only the study of mathematics and the sciences but intercultural
  interaction as well. We must mold our students to be entrepreneurs, and spirited international adventurers as well".
- Ken Kohrs, former vice president of Ford Motor Company: "What's the relevance of globalization to you personally, and to your future in engineering? I can answer that in one word: Everything. No matter what area of engineering you enter, your ability to remain on the leading edge, and to progress in our organization, will depend largely on your capacity to connect and communicate globally".

Patricia Galloway, former President of the American Society of Civil Engineers, addresses globalization issues in her book, *The 21st-CenturyEngineer, A Proposal for Engineering Reform: "*Globalization involves the ability to understand that the world economy has become tightly linked with much of the change triggered by Technology".

Prof R Natarajan

Workshop on Knowledge and Networking Solutions by Classle Knowledge

Date: 4th February 2012
Venue: PESIT, Bangalore
Resource: Mr. Vaidyanathan, Founder & CEO, Classle Knowledge Pvt. Ltd.

Classle and BITES along with thirty member institutions signed an MOU on 4th February aimed at creating a shared learning environment to facilitate collaboration and knowledge sharing among faculty members and students. Classle has pioneered the creation of a social learning network, which has more than 100 thousand members from over 800 colleges, learning from each other and creating a common pool of knowledge for everyone to benefit from.

Through this MOU, BITES member institutions get immediate access to this Learning Network and its resources. The partnership also provides BITES member institutions an option to get their own social learning environment and to extend it into the virtual world; their very own, private *"Cloud Campus"*, to enable their students, faculty, partners and alumni, connect with each other on a 24x7 basis. This Cloud Campus also connects to the global learning network of Classle, bringing all the power of its resources and partnerships for the benefit of BITES member institutions. The signing of MOU was followed by three technical sessions indicated below.

Session 1	Increasing effectiveness of institutes and Quality of students through Classle
Session 2	Benefits that Colleges get through this partnership
Session 3	Reinventing Placements

Following topics were covered in these sessions

- Registering into *Classle.net*
- Joining a Learning Circle, the virtual 24x7 classroom and using the benefits within
- *Ask!*, whenever you have doubt in that subject
- Finding and using NPTEL videos
- Engaging and interacting with the content
- Adding, sharing, bookmarking content into Classle and Learning Circles
- Offline review of audio and video learning material through *Kyyil*
- Creation, answering and sharing with Classle Quiz
- Mobile engagement with Classle through *JaSS* and *Ask!*
- Revisiting the campus placement via Classle Placement module
- Creation of Private Campus clouds