

## 50. Enhancing Learning and Teaching Techniques with Hands on Experience

Deepak Madhukar Gawali

Mumbai University

[\\*deepak2647@gmail.com](mailto:*deepak2647@gmail.com)

‘Engineering’ is the word which acquired from Latin “ingenium”, meaning something like a brilliant idea and innovative creations [1]. In modern civilization, engineers put their mind to apply knowledge of physics principles to create practical applications and to comfort human lives. Even though different concepts were elaborated in different books by exceptional authors, one has to confirm that teaching ways of engineering concepts should be well defined. In order to create skilled engineers, effective teaching techniques need to employ to empower the brains of students to create a sustainable future.

According to a poll conducted by the IBM company, 1500 CEO’s votes for creativity is the main constituent of leadership and proficient in solving problems [2]. As per Bloom's taxonomy, evaluative and creative minds are the higher level of learning outcomes. However, different educational innovations are needed to improve engineering teaching practices and teaching outcomes. Response to that, Massive Open Online Courses (MOOC) platform created from top IIT colleges of India is currently trending topic in regard to the effective implementation of teaching practices. A number of courses can

be helpful for teaching faculties of India under the Faculty Development Programs (FDP) conducted through the MOOC platform.

In order to evaluate the effective utilization of engineering concepts, examinations need to be taken from a practical point of view. Theoretical exams and its related effects were seen in the increasing rate of the unemployed sector of unskilled engineers.

Implementation of faculties having industrial experience in the practical domain must have to be included in examination organizing committee for the present education industry. Examinations oriented to practical workshops, mini projects, innovative ideas creation, and its implementation are some of the tasks which are possible to include in the exam credits of the Indian education system.

Present industry 4.0 revolution focused on Cyber-physical systems, it is the conversion of normal working approaches to smart working environments. Any smart factory comprises of the following three sectors i.e., smart services, smart machines, and smart production. To acquire skills of those levels, students must expose to industrial working environments at a much higher extent to familiarize with it. In order to achieve such exposure to industrial methods, equipment and techniques along with curriculum activities should be modified according to it with hands-on experience. Curriculum activities can be made in accordance with the strategy followed up by engaging practical examples with group discussions and power point presentations i.e., ensuring active learning throughout theoretical lectures.

Once the theoretical concepts are familiarized with the students, evaluation of students learning and classroom teaching is checked with the proper feedback system. Once the desired results are achieved with theoretical concepts, hands-on experience of an instrument (for mechanical, electrical, civil branches etc) relating to the applicable subject is appreciable or hands-on task on programming in C or C++ for Information Technology field (for IT & computer branch) is essential. During this process of hands-on tasks, proper guidance from respective teachers needs to be given. Useful material like reference books with specific sections, video material to perform practical or manufacturing actions need to be made available for the students. Hands on experience could be progressed with the task of the mini project by providing incentives of credit or point system to students can conclude as a motivational factor to enhance student's involvement in the appointed work. Mini projects must be given to students by providing them with a set of problem statements to find out multiple ways of solutions. Such a technique can enhance their creative problem-solving skills and results should be discussed irrespective of the feasibility of solutions. Failure in getting results will help students create evaluating skills within them and can create a path of enhancing their analyzing skills. With multiple solutions, teachers must discuss every solution with their students. By keeping aside thought of failed solutions, appreciation of work towards students will open up the doors of a higher level of thinking. Solutions from different angles and perspective can create opportunities for active participations in creative problem-

solving strategies. Creative and innovative environment relative to teaching and learning technique will help improve efficiency and effectiveness of skilled students.

## References

1. "About IAENG". [iaeng.org](http://iaeng.org). International Association of Engineers. Retrieved 17 December 2016.
2. IBM, Capitalizing on complexity. Insights from the Global Chief Executive Officer Study, IBM, 2010.