

# CONTINUING ENGINEERING EDUCATION - GLOBLE TRENDS

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The Fourth World Conference on Continuing Engineering Education was organised by UNESCO in collaboration with the peoples Republic of China at Beijing from May 17-19, 1989. More than 800 delegates from about 100 countries, participated. About two hundred papers on various aspects of "Continuing Engineering Education" (CEE) were presented. Based on the views expressed in the conference and papers presented by authors from various countries an attempt is made here to present the world trends and their relevance with Indian situation.

## **Introduction :**

Need and Importance of Continuing Engineering Education for competitiveness is well realised by the Indian Engineers and their employees. The Government is also aware that it is the Continuing Engineering which alone can help to modernise the various sectors of economy. Technologies employed in construction, Transportation, Chemical, Engineering Electronics sectors etc. are far too inferior by world standards. According to a recent study the productivity of Indian workmen is only 1/29 of his counter part in Japan, 1/8th in China, 1/10th of Korea. The contribution of India in world trade is consistently dropping down from 2.25% in 1947 to 0.4% in 1989. The performance of Indian Industry although improving is slower as compared to similar other countries. CEE is badly needed to improve upon the same.

The New Education Policy (1986), having recognised the need of Continuing Engineering Education has prescribed the need of establishing partnership between Industry and Institutes of Higher Education. It has recommended starting of Continuing Engineering Education centres in a selected few colleges. Formation of Advisory Committees for various sectors are also proposed. However, nothing worth while has taken place in the five year plan.

It is therefore essential, in the 8th five year plan, that a vigorous attempts be made to implement the Continuing Engineering Education Programmes. Initiatives especially from Higher Education Institutes and the Institution of Engineers (India) are expected.

In this task, it is hoped that the experiences of foreign countries leading in Continuing Engineering Education, which are presented below, in brief, would provide a good guide.

**Purpose of CEE :**

The policy paper of UNESCO has very ably projected the demands on competency of engineers of 21st century. The paper emphasised that "*Technology Change*" is taking place at a rapid rate and to cope up with the engineering need to assimilate and adopt the new technology so as to protect themselves and their employing organisations and countries from becoming incompetent and out dated.

With the increase in population of the world and the rising aspirations of people it is stated that "Science and Technology" needs to be respected, developed and applied in various vocations and professions on increasing scale. Innovations in Science and Technology have to be encouraged and incentives to Science and Technology personnel provided.

Some of the important objectives of Continuing Engineering Education are as under :

- To improve competence of working engineering.
- To accept challenges and make best use of available opportunities in the world.

- To respond to International competition.
- To avoid sickness of Industries.
- To use latest Science and Technology
- To increase National and World Productivity.
- To keep engineering talent up-to-date.
- To promote innovative capacity of engineers.
- To maintain life long competence of engineers.
- The responsibilities cast on engineers are more heavy than their capabilities, hence they need CEE.
- Greater job satisfaction.
- To facilitate change of job for betterment.
- Learning new technologies.
- Job growth and promotion.
- Filling gap between formal education and practical industrial needs.
- Avoiding obsolescence.

Budget is being earmarked by UNESCO for undertaking CEE programmes all over the world. Project proposals are being invited from various countries, which would be scrutinised and funded by UNESCO. An International Association of Continuing Engineering Education with the objective of providing Continuing Engineering Education world over has been constituted with the head quarter in Helsinki (Finland). Various countries have shared their experiences on Continuing Engineering Education, through articles. Latest trends in a few selected countries is given below :

### ***Experiences in Selected Countries :***

CEE IN UNITED STATES OF AMERICA :

In U.S.A. " Continuing Engineering Education" is offered by many

professional societies of engineers. It is also offered by Universities, most of whom have opened special departments exclusively for Continuing Engineering Education. About 30% students in Universities are participating engineers. Continuing Engineering Education is being further strengthened by Government with a view to maintain and develop superiority and competitiveness of U.S. industry.

The need of Continuing Engineering Education is perceived by U.S. engineers for their own growth, so also by their employing organisations. Universities find it a rewarding experience to run Continuing Engineering Education courses for they generate income besides obtaining interaction with industry for mutual benefits.

Based on the recommendations of a Committee appointed by Government to look into the subject of career long education, it has established accreditation Board to Control quality of Continuing Engineering Education being offered by various organisations. It is realised that Continuing Engineering Education is very useful to increase National Productivity and to develop intellectual capital resources.

University of Texas, Madison and several others have set-up CC TV, Uplink Antena, Networking, Interactive video disks, PCs, Computer Aided instructions, Cable Televisions, Microwave transmissions etc.. for Continuing Engineering Education, Role of Universities and academics in Continuing Engineering Education is dominant. Engineering Schools are widening their scope of working for professions besides teaching to students. They are now aiming at developing a continuously learning society, which is believed to be crucial for human welfare.

#### CEE IN JAPAN :

"Continuing Engineering Education" enjoys not only support from top management but also leadership and active participation in the conduct of programmes. They believe that employing people without further educating and training is a mistake on the part of the management. Employee education starts with the start of an organisation. They consciously attempt to develop self supporting and challenging individuals with the ability to cope with the changing environment and technology by self initiative and self learning. In Japan the basic philosophy is

*"A Company is only as good as its people."* The foundation for company development lies in development of its people, such that they work with joy and pride.

CEE consists of modules such as Administrative, Economic, Political and Technological systems. Emphasis is laid on hi-tech such as Computers, Microprocessors, Robotics. Universities and associations of industries take a leading role in imparting "Continuing Engineering Education".

It is a firm contention in Japan that "Continuing Engineering Education" is connected with research. An University or an engineering school can be effective in imparting "Continuing Engineering Education" only if it has a faculty group that keeps pace with the rate of technological development. "Continuing Engineering Education" is not an additional burden for colleges. It is instead an important source of income and a factor to bring about self development and reform in education. The interaction opens up new areas for research and raises the level of teaching and scientific research. "Continuing Engineering Education" facilitates teachers to convert their knowledge into productive forces, and raise their influence over the profession. From the society, and Nation point of view it provides a chance to combine theory with practice, which is so essential to advance the professional practices.

The most serious task in this is the development of R & D manpower. After its development it is likely to remain under utilised. So the next task is to create an environment and high quality work atmosphere where R & D personnel can contribute most.

#### CEE IN WEST GERMANY :

"Continuing Engineering Education" is considered to be an investment and insurance for better future. It is believed that the college or University education can only react to fundamental new developments with a time lag. Usually several years elapse between introduction of new technologies and their inclusion in curriculum of teaching institutes. The aim of engineering course is to produce graduate fit for employment. They are not necessarily fully trained. Introduction of advanced technologies in industry demand "Continuing Engineering

Education" for qualified employees. It is the contention that, at present the greatest barrier to the implementation of technological innovations is the lack of qualified employees. In other words, organisations do not find suitably qualified personnel on the labour market and pressure of time hardly allows to train them. In future, the updating of qualifications must be one of the factors taken into consideration when planning the introduction of new technologies.

Big companies in West Germany spend quite a lot on education of their employees, while with the small companies such measures go unrecognised or are undervalued. Their experience is that company run courses are more effective and have high standard. New technologies create new needs of "Continuing Engineering Education" is well recognised in West Germany. It is possible to learn in a course new things which would take perhaps years to learn from work in a Company. They teach to forget the traditional ways of thinking and promote new ways which are untried as yet.

#### CEE IN CHINE :

In China the concept "Continuing Engineering Education" is introduced from abroad. So far, it has played an important role in improving the performance of Industrial Enterprises, promoting product development, assimilation and adaptation of imported technologies etc. Experience has demonstrated that Continuing Engineering Education is the key to the growth of science and technology and economic development.

It has been the policy of Government to promote "Continuing Engineering Education" and have established many Institutes exclusively for the purpose. Every Ministry has formulated plans and programmes to train engineers. At the enterprise and institute level plans have also been made for identification of objectives, contents, requirements and adopting scientific implementing measures for "Continuing Engineering Education".

In 1981, Government made it a rule that each science and Technology person must receive minimum one month training in 12 months period. It has now become a pre-requisite for promotion of professionals. Continuing Engineering Education in china is both a right and obliga-

tion of Science and Technology personnel. It is a constituent part of development plan of the department, and expenses incurred are regarded as production cost.

Various professional associations and societies have also played promotional role e.g. China Association of Science and Technology (CAST), China Association of Continuing Engineering Education (CACEE). It arranges International level programmes for top executives especially in collaboration with UNESCO, and this conference was also a part of their activity.

They have prepared a grand master plan using satellite, TV, Audio Video, PCs, etc. for "Continuing Engineering Education".

The two major difficulties they experience are :

- a) Shortage of good professors.
- b) Education material.

China is considering to make a law on Continuing Engineering Education so that the large organisations pay for themselves and Government to pay for small organisations.

Quality teaching material constitute the basic guarantee for the success of Continuing Engineering Education is their experience.

#### CEE IN KOREA :

An observation in Korea is that 83% of Ph.D. are in Universities having access to only 10% of research resources and 17% of Ph.Ds. in industry having access to 90% resources. Academic and R & D manpower is grossly under utilised in Korea. Continuing Engineering Education has resulted in Korea from ambitious plans for industrialisation, and continuous dialogue between industry and institutes. Furthering of Continuing Engineering Education demands a passion on the part of teachers to teach and reward to those who receive Continuing Engineering Education. without incentives Continuing Engineering Education becomes difficult.

In Korea, satellite is found to have a large impact on education. It marks

beginning of a new era in education. Automation in education is the new trend in which Computer Aided Teaching (CAT) occupies a prominent place.

#### CEE IN WEST INDIES :

They lay more emphasis on use of satellite on Continuing Engineering Education. University of West Indies is using satellite from 1978 to cater to 14 territories. They regularly arrange interactive video conferences, symposia via satellite. Faculty of Engineering of the University has played a pivotal role in establishing the centre.

Traditional methods of Continuing Engineering Education have many limitations. the same are overcome in this method. However, there is an inherent danger in this method viz. of lack of quality control on education. By careful planning it can be kept to minimum if not eliminated. These methods are more cost effective. It requires a sound organisation and good faculty to prepare lessons.

Satellite has a large impact on education. With satellite telecommunicating, one will be able to attend International Conferences at one's own place. It is very inexpensive method and is marking a beginning of new era in education. Potential is being exploited on priority basis to extend it to wider areas.

#### **Conclusion :**

CEE is now the key to progress and prosperity of a nation.

Experience in the world suggests us that opening of Continuing Engineering Education Departments in institutes of Technical Education is the pressing need of time. Seminars for key persons in institutes and industry, sectorwise, need to be organised, without any loss of time. This will generate ideas for implementation of Continuing Engineering Education courses which are badly needed.

Continuing Engineering Education of engineering teachers stands foremost in a country like India. In the absence of competent teachers in the engineering colleges and polytechnics not only the students remain inadequately educated but the whole engineering society tends

to remain less competitive. Courses by Indian society for Technical Education need to be further supplemented by international courses possibly with the involvement of UNESCO.

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Mentoring holds out considerable benefits for both the mentor and the protege. It enables the protege to find his feet more quickly and to establish a clear sense of career direction and purpose. It rejuvenates the mentor and may advance his career too.

- David Clutterbuck  
in  
Everyday Needs a Mentor

Designing a team rests on a limited number of principles and concepts and involves various methods and techniques. But what turns team-building into an art is that the bricks, like legendary men, are made of different types of clay and not wholly predictable after firing.

- R Meredith Belbin  
in  
Management Teams