

# Continuing Engineering Education : Why And How ?

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*Synopsis : The present paper to begin with attempts to explain the concept of continuing engineering education as applied to technical and professional manpower development. It then establishes the need for such an education in view of changing/emerging technologies. The different modes of delivery of continuing education programmes are then discussed emphasizing the need for this form of education for removal of obsolescence and staying upto date.*

## 1. INTRODUCTION :

Mr. Lindon E. Saline a staff executive with general electric company, Fairfield, Connecticut, USA in this paper on "Continuing Engineering Education : One element of life long learning for engineers" has very aptly described Continuing Engineering Education (CEE) as professional, technical or management education taken in relatively small doses throughout a career. These small doses are generally in the form of short courses, workshops, seminars or conferences. They tend to forego the niceties of deep theory and focus on what the employed engineer realistically "needs to know". The purpose is to maintain competence, keep upto date, and stretch the mind, so as to enable him to do his job more effectively and effi-

ciently.

In the broad spectrum of the definition of continuing engineering education however not only are the short courses, seminars, workshops included but long-term programmes ranging from a few months to few years are also envisaged.

Continuing engineering education thus helps the working professionals to keep themselves abreast of modern developments and increase their professional competence. Continuing education promotes a learning society and is in turn promoted by it. Each is both an input to and an output of the other as shown in figure. 1.

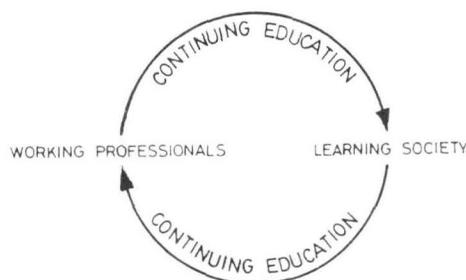


Fig. 1 INTERDEPENDENCE OF PROFESSIONALS AND SOCIETY

## **2. Why continuing engineering education :**

A young engineer can not be expected to assimilate all the knowledge and skills required for his future 'working life' during his normal diploma/degree programme. The duration of these programmes (3 to 4 years) is not sufficient to cater to all his probable needs that may arise in his future life as a practising engineer. The requirements may be diverse and of a varied nature ranging from updating in emerging technologies to exposure to newer areas of communication and management. The need for continuing engineering education therefore becomes imperative for the following four purposes :

- i) to update/upgrade his knowledge and skills gained in undergraduate studies.
- ii) to prepare him for wider responsibilities in management
- iii) to extend his knowledge and expertise into emerging and specialised technologies.
- iv) to enable him to appreciate the impact of engineering on society and to play his full role in his profession and in society at large.

With the knowledge explosion taking place, a person leaving the portals of a college/university after obtaining a diploma/degree will be deeply affected by the effect of obsolescence within a period of 4 & 5 years. Programmes of continuing education therefore need to be launched for all those who desire to keep themselves abreast of the modern developments in their subject areas. With the rapid rate at which technologies are changing and still faster rates at which new

technologies and disciplines are emerging, the inservice technical personnel as well as the employers, are however looking for systems which could assist them in periodically updating their knowledge and skills. Opportunities should be available for career growth and professional advancements and for acquiring relevant qualifications ranging from a certificate to P.G. degree with experience in the world of work. A sound system of continuing engineering education for the employed technical manpower therefore needs to be developed for providing an ample opportunity for 'life long learning'.

The various continuing engineering education programmes envisaged to meet these objectives are:

- i) face to face or contact programmes
- ii) distance or correspondance programmes
- iii) correspondance cum contact programmes

### **3) Contact Programmes :**

These programmes may be short-term or long-term programmes in the form of seminars, workshops/refresher courses, summer/winter schools, conferences, specialised courses etc. In all these programmes face-to-face delivery mode is used where the participants have to be physically present for interaction with the learning environment. While the short-term programmes of duration of a week or two are intended for updating the knowledge and skills of professionals, the long-term programmes stretching from a few months to a few years cater more to improvement of their formal qualifications by

way of awarding certificates/Diploma/Degree etc. Such continuing education programmes are offered widely by colleges, universities, industries, governmental bodies, professional societies and consultants in the private-sector.

Seminars/workshops etc. are conducted frequently by universities colleges and professional bodies. But in such gathering the number of participants is very large. Consequently these are not very effective. Besides the areas chosen are broad based and are directed to wider audience. It is essential that the topics to be covered be very specific and related to the objectives stated clearly. The participation to be effective, should be limited to a small and cohesive group having specialization and interest in that specific area.

#### **4. Correspondence Programmes :**

It may not be feasible many-a-times for a large number of employed professionals to attend face-to-face continuing engineering education programmes for personal, official, family, financial or psychological reasons. These persons should be approached by alternative means. Correspondence is one such convenient mode to reach employed professionals, geographically scattered. In the correspondence programmes there is a physical separation between the two viz. those at the giving end and the others at the receiving end. The correspondence programmes are undertaken where space and/or time dimensions intervene between the two. The teaching-learning process is carried out through correspondence using print and other electronic media like audio and video cassettes, radio and television,

floppy discs and personal computers etc.

A doubt may be the effectiveness of continuing education programmes using the correspondence or the distance mode. Dubbin and Taveggia (1968) examined over 70 studies related to continuing education programmes and concluded that the course format seemed to make little difference to learning, the factor of crucial importance was an eager learner. According to them.

"An eager learner will learn through correspondence via television or with an instruction and experience no difference in comprehension"

It can therefore be derived that a well-designed and well-organised correspondence programme can be as effective or sometimes even more effective than a programme run on a face-to-face basis.

Dr. Banthiya N.K. in his paper on "Continuing Engineering Education By Distance Mode" (1988) has suggested three models for delivery of distance education programmes. These are -

##### **a) Conventional Institutions :**

Institutions like ITIs, Polytechnics, Engineering Colleges, Industrial Training Centres can be considered as conventional institutions. These institutions may start/have correspondence cells to cater to continuing education needs of that area. Government Polytechnic for Distance Learning Pune is one such institution which has been offering diploma courses in engineering by distance mode for the last several years. These institutions however their limitations because of the constraints of human and financial resources

and distance education is normally given a back seat in such institutions.

#### **b) Collaborative Model :**

In this model, a number of institutions and organisations can collaborate by pooling their resources to offer continuing education programmes by distance mode. The model can be very successful if there is a willingness to collaborate and cooperate. An interesting success story which can be quoted under this model is that of Coventry Consortium in U.K. where a collaboration exists between a University, a Polytechnic and three colleges of further education. This collaboration has been able to create a high profit in meeting the continuing education and retraining needs of the employees of the surrounding industries. In India also such can be successful if willing partners join the common cause.

#### **c) Autonomous Institutions :**

In this model autonomous institutions backed by sufficient finance and academic & administrative autonomy need to be statutorily established to cater for the needs of a particular region or for that matter the whole country. These institutions will enjoy freedom to design and develop their own courses and evaluation methodology to cater to different levels of working professionals/vocationals. Academics and other staff employed in these institutions will be fully committed to the promotion of engineering education by correspondence.

These institutions may not award formal degree/diplomas like open universities but concentrate on continuing education needs of the industry and individuals for updating and retraining. This can be done by conducting

courses having short shelf-life to meet the needs of a particular area and/or particular industry.

#### **5. Correspondence cum Contact Programmes :**

One of the major limitations of the distance education programme is its inability to impart practical skills through hands-on-experience. Engineering education and training in particular have a large component of skill based courses which have to be learnt by practice and drilled under supervised conditions. Also correspondence mode alone can not provide for tutorial, guidance and counselling and laboratory sessions. 'Resident sessions' therefore have to be incorporated in the correspondence programmes to meet the above requirements. In these sessions participants meet at predecided date(s), time and place as per schedule to carry out activities which otherwise can not be done by correspondence only. These places popularly known as 'study centres' may be located in the existing institutions such as polytechnics, engineering colleges, training organisations, industries etc. Study centres will provide tutorial support, guidance and counselling and facilities for workshop/laboratory work. These centres may also have electronic media, latest books/journals and other resources like personal computers for self/guided learning. The local participants can take additional benefit of the study centre by using the strategy of 'learning by appointment'.

#### **6. CONCLUSION :**

At the pace with which new technologies are emerging and explosion of knowledge is taking place, we are left with no alternative but to prepare ourselves to meet the challan-

ges of changing needs. Multipronged strategies utilising different modes of communication available have to be adopted to impart continuing engineering education and retraining to our work-force. In a developing country like ours, it is of paramount importance to have well-planned continuing education programmes for our serving engineers/technical manpower so that we are not bogged down in this competitive world. Let us hope that continuing engineering education programmes properly planned and implemented will usher in a new era in the history of this country-an era of increasing productivity, sustained growth, progress and prosperity.

#### **Acknowledgement**

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#### **QUALITY**

Quality is never an accident; it is always the result of determined and directed activity, sincere effort, intelligent direction and skillful execution; it represents the wise choice amongst many and varied alternatives.