

## SOME CONSIDERATIONS FOR ORGANISING CONTINUING ENGINEERING EDUCATION PROGRAMMES

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### 1. INTRODUCTION :

Indian Industry is passing through a phase which is full of challenges. For forty five years, Indian Industry remained, to a large extent, protected from both external as well as internal competition. But since 1991, on account of liberalisation of industrial policy, opening up of Indian Economy and increasing international competition, industry has started showing concern for quality. Because, without quality many of our industries will become sick and unprofitable ventures. The movement of total quality management must gain momentum, if industry has to survive international competition. The realization of total quality management is possibly only through proper human resource management (Reddy, 1993). The demand for knowledge workers will increase with automation of industry. In addition, the explosion of knowledge and ever widening boundaries of disciplines warrant organisation of continuing engineering education programmes. This will help in improving the functional capabilities of the trained techni-

cal manpower in the industry as well as meet their career and professional development needs.

Many of the technical institutions, at present hesitate to venture in offering continuing engineering education programmes, but these institutions have to take lead in this direction if they want to contribute positively and significantly to the country's industrial and economic development.

### 2. CONTINUING ENGINEERING EDUCATION :

Continuing education can be construed to encompass all activities which help people improve their abilities, skill and competence, professional as well as vocational, thus facilitating entry into specialized areas and / or allow personal development and satisfaction (Unesco, 1982).

Thus, it can be said that continuing engineering education will help the trained technical manpower in industry to :

- upgrade and update their knowledge and skills

- keep pace with the fast changing technology
- improve their professional / functional competencies
- meet their personal, professional and career development needs
- develop positive attitude towards change
- develop learning to learn skills.

### 3. TRADITIONAL VS CONTINUING ENGINEERING EDUCATION LEARNER :

The differences which exist among the traditional and continuing education learners will have to be taken into account while designing and organising continuing engineering education programmes. Some of these difference are w.r.t. (Freedman, 1987).

- Age
- Availability of time
- access to learning resources
- Experience
- Motivation
- Educational preparation
- Learning capacity.

**Age :** The learner for the continuing engineering education will be older than the traditional regular learner.

**Availability of time :** In comparison to traditional learner, the continuing engineering education learner will be able to devote less time because of the pressure of job, family, social commitments and order other such responsibilities. Many times, these learners will not be able to put in their best in studies and may drop-out or discontinue their studies.

**Access to learning resources :** The continuing engineering education learners will not have the same access to the library, learning resources, laboratory and workshop facilities, computer facility etc. available in the institutions as the traditional learners. These learners may fail to make optimum utilization of such facilities and resources due to paucity of time and pressures as mentioned above. It has also been observed that independent assignments involving use of computer, library resources, laboratory, workshop etc. cause problems for learners of continuing higher education (Freedom, 1987).

**Experience :** the continuing engineering education learners will be at an advantage as compared to traditional learners because of their reservoir of rich experiences which they bring to the learning situation. This will enable to participate more activity in the teaching-learning process, relate knowledge to the world of work and understand its applications in the field.

**Motivation :** According to Houle (1961) continuing education students attend course mainly (a) to advance their career prospects, (b) learning for its own sake or (c) to enjoy personal interaction and social contact. But these learners are ready to expend effort and have high expectation from continuing education programme.

**Educational Preparation :** In general, continuing engineering education learners will be better educationally prepared than traditional learners in terms of communication skills, analytical skills, and decision making skills. How-

ever, there may exist wide individual difference among learners.

**Learning Capacity :** Though the evidence suggests that, on average, adult learners perceive more slowly, think more slowly, and act more slowly than younger people (Cross, 1981), but according to Knox (1977) when they can control the pace, most adults in their forties and fifties have about the same ability to learn as they had in their twenties and thirties.

#### 4. CONSIDERATION FOR ORGANISING CONTINUING ENGINEERING EDUCATION PROGRAMME :

Both the technical institution and the industry have to be equal partners in offering continuing engineering education programme for the technically trained manpower of industry. Industry has to (a) play an active role in identifying continuing education needs of the work-force, (b) share its resources with technical institutions and (c) participate in curriculum and instructional processes.

Some of the points which need to be taken into account in order to improve the efficiency and effectiveness of continuing engineering education are discussed under the following heads :

- Identification of needs
- nature of courses
- Instruction
- Staff Development
- Networking
- Research and Development

**Identification of Needs :** The primary responsibility of identifying continuing education needs of the

workforce lies with the industry. Industry need to have systematic maintenance of profiles of their workers. On the basis of present and future job responsibilities, professional and career development prospects, technology mapping and environmental mapping, continuing education needs are to be identified. The technical institution should consolidate the continuing engineering education needs of the technically trained manpower of various industries and then in collaboration with industrial personnel should prioritize the areas to be covered under continuing engineering education programmes.

**Nature of Courses :** As the technical institution will be catering to the needs of a wide variety of industries it becomes essential that

- A wide range of courses is offered.
- Courses offered should be most advanced ones, say for example - micro electronics, CAD/CAM, industrial materials, biotechnology, production automation etc. (Gupta, 1993).
- Courses offered should attract students with strong educational background.
- Courses offered should be practical oriented and applied in nature.
- Courses are offered on flexible pattern. The courses should be modularized and credit based and the pace of learning will be decided by the learner (TTTTI, 1993).
- Courses offered should cover technically trained manpower of industries in both organized and unorganized sector.

- Industrial personnel are involved in revision and modification of courses.

**Instruction :** The selection of methods, media, materials and evaluation has to be made in accordance with the objectives of the course, nature of learner, nature of content matter, available resources and facilities. However, the following points when taken into account will increase the effectiveness of methods, media and materials.

- Instructional methods selected should be learner centred and greater emphasis are to be laid on independent / self study such as discussion, sensitivity training, independent assignment, project work, case study etc.
- Appropriate learning activities are to be integrated into the instructional methods to provide opportunities to learners to solve problems, apply knowledge and share their experiences.
- Use of media such as computer packages, video films, self-learning modules etc. has to be encouraged.
- A wide variety of methods, media and materials has to be used in order to cater to individual difference among learners.
- Instructions are to be imparted by both faculty of technical institution and personnel from industry.
- For developing skills, skill development programmes can be organized at the work place of the workers, where latest technology as well as skilled manpower is available.

- Both formative and summative evaluation has to be carried out for assessing learners performance in theory and practical work.

- For assessing learner's performance in practical work, industrial personnel can be involved especially when practical work is organised at the work place of the learner.
- The learning materials produced for the continuing engineering education should provide opportunities to learners to evaluate their own progress by including self assessment questions with appropriate feedback as well as developing pretest and post test.

**Staff Development :** Technical institution should formulate staff development plans and policy whereby faculty can be trained and retrained in order to equip them with the latest knowledge, skills and attitudes. Adequate provisions for industrial training have to be made. This would require :

- Identification of training needs of faculty.
- Identification of institutions/industry having facility for training.
- Formulation of staff development plans.
- Implementation of plans.
- Provision of leave reserves.
- Appropriate deployment after training.
- Provision of adequate support services.
- Monitoring and evaluation of performance of faculty.

**Networking :** Technical institution offering continuing engineering education has to build linkages with a large variety of institutions, industry and

other organisations in order to ensure optimum utilization of resources. Fig. 1 depicts some of the important linkages to be established by such institution :

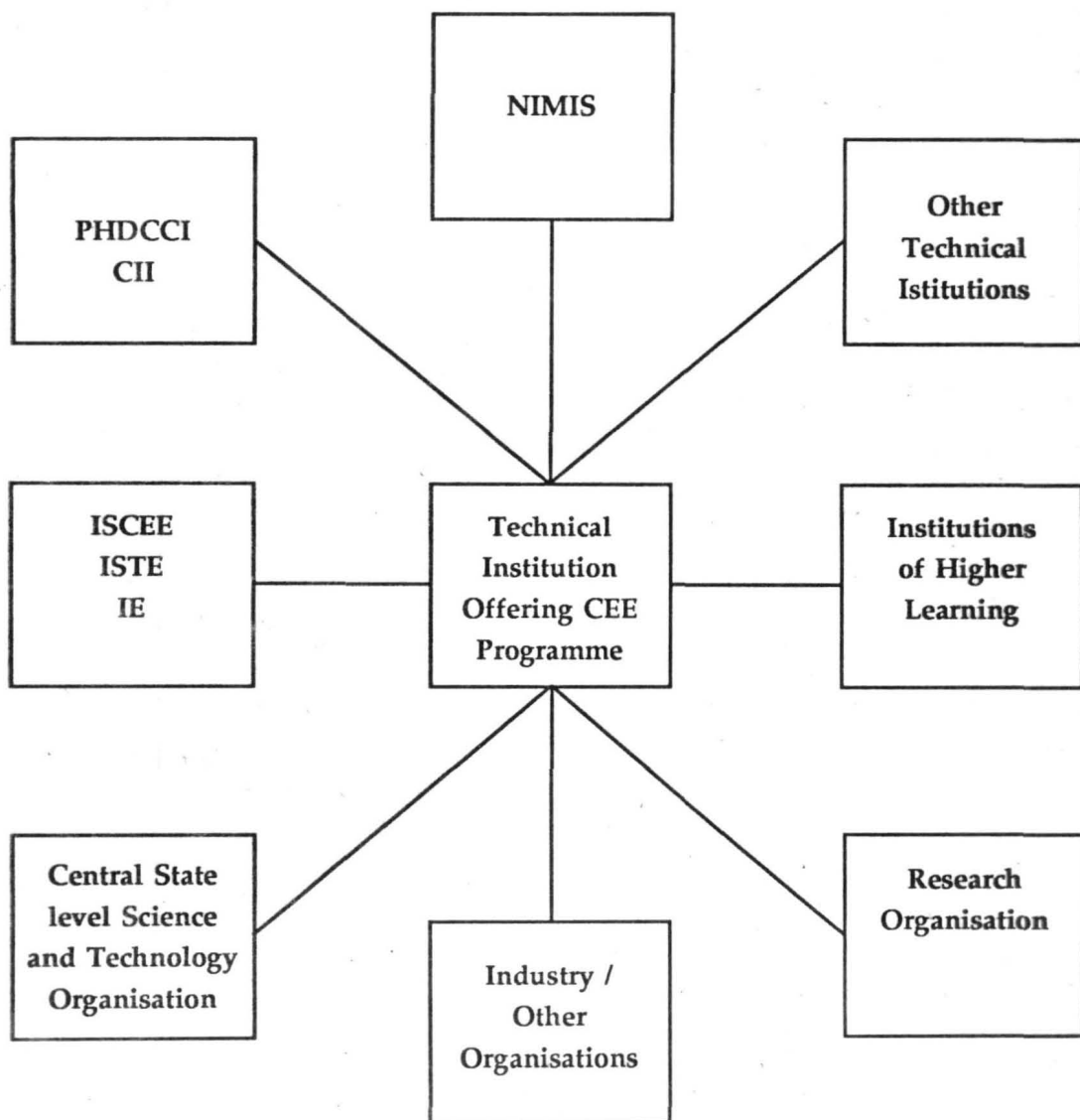


Fig. 1 : Linkages of Technical Institution for Offering CEE Programme

**Research and Development :** Research and development facilities have to be strengthened at the institute level to enable the learners to pursue their research work and faculty to undertake R & D activities related to improvement of production processes and product. This will also enable the institute to offer certain testing, quality control or consultancy services to the industry (TTTI, 1993).

By offering continuing engineering education programme, the technical institute's academic environment will improve. The faculty of the institute will be expending more and more effort to remain current and attain objective of the programme. This may also bring in more opportunities for consultancy work for the institute and thereby enable the institute to generate resources.

Technical institute has to evolve a mechanism for self renewal whereby it can assess its own performance and make necessary change in its structure, procedures and mechanisms to further enhance the effectiveness and efficiency of the system.

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