

# CONTINUING EDUCATION OF PROFESSIONAL ENGINEERS IN THE CARIBBEAN - CURRENT ISSUES AND FUTURE STRATEGIES

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## ABSTRACT

This paper briefly reviews some of the recent developments in the provision of Continuing Education of Professional Engineers in the Caribbean over the past decade and discusses some of the current issues facing the Caribbean Engineering profession with particular reference to the cost effective use of the latest telecommunications technologies and other information technology (IT)-based educational methods for continuing engineering education (CEE) and the quality assurance of such CEE activities in light of the growing trend towards mandatory continuing education for annual relicensure in some of the developed countries. The paper concludes that the recently established Engineering Institute and the Continuing Education Centre of the Faculty of Engineering of The University of the West Indies (UWI) has a pivotal role to play in defining and implementing effective strategies for ensuring industry-university cooperation in the provision of quality CEE utilizing a wide range of IT-based delivery mechanisms such as multimedia distance learning and modular structures. Only in this way will practicing professional engineers in the Caribbean keep abreast of the rapid pace of technological changes such as environmental issues, new materials and biotechnology. Additionally, language and management skills will be required to cope with the proposed Association of Caribbean States (ACS).

## INTRODUCTION

In today's rapid changing working life, the need for continuing education of practicing professional engineers is now fully recognized in order that they may keep abreast of the ever-increasing technological advances being made in the engineering field today. Failure to pursue some form of continuing education or mid-career training or continuing professional development (CPD) as it is sometimes called, can well lead to an engineer's skills and knowledge becoming obsolescent within several years after graduation. Consequently, some professional societies now have mandatory continuing education for either license renewal or continued society membership. For example, since 1978, Iowa, USA mandated continuing professional competency (CPC) for engineers by requiring 30 professional development hours (PDHs) biennially to

maintain registration [1]. Since then, Alabama has mandated CPC in 1991 by requiring 15 PDHs annually and West Virginia has a phased-in requirement which will reach 15 PDHs annually in 1996. Both the National Society of Professional Engineers (NSPE) and the American Society of Civil Engineers (ASCE) came out in favour of mandatory CPC at their board meetings in January and April 1994 respectively. However, ASCE stopped short of requiring members to prove CPC before renewing their membership. In April 1984, Caribbean engineers agreed that a young graduate should have completed at least thirty hours of Continuing Engineering Education courses during his 4-year period of training before becoming a full member of his professional body [2]. Furthermore, in some countries such as France, there is now a legal obligation on the part of the employers to set aside a portion of their employees' wages to be used exclusively for continuing education [3].

In this paper, therefore, a brief review of some of the recent developments in the provision of continuing education for professional engineers in the Caribbean over the past decade is first presented and some of the current issues facing the Caribbean Engineering profession are discussed. The paper concludes that there is much scope for the greater use of electronic media and satellites in the conduct of such activities and underscores the pivotal role of the Faculty of Engineering of The University of the West Indies newly established Engineering Institute and its Continuing Education Centre in this regard.

## BRIEF REVIEW OF SOME RECENT DEVELOPMENTS IN CONTINUING ENGINEERING EDUCATION IN THE CARIBBEAN

### Establishment of a Full-Time Continuing Education Centre

A critical overview of Continuing Engineering Education in the West Indies was presented by the author at the 1986 World Conference on Continuing Engineering Education [4] in which he concluded that there was an urgent need to make greater use of electronic media and satellites in conducting Continuing Education courses for practicing engineers, and that the Faculty

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of Engineering, UWI had a crucial role to play, and recommended the establishment of a formal Continuing Education Division within the Faculty of Engineering to coordinate all such activities.

It is of interest to note that some of these recommendations have now been implemented. For example, the Faculty of Engineering of UWI on 17th March, 1988 agreed in principle to the proposal for the establishment of a full-time Continuing Education Centre in the Faculty, and a detailed proposal for external funding for establishing the unit was considered by the Faculty. In addition, the Faculty of Engineering of UWI on March 10, 1994 considered the proposal for the establishment of the Engineering Institute and agreed to the setting up of the Institute. As a good example of industry-university cooperation, the institute is being supported by a donation of TT\$100,000 per year for 3 years by the National Gas Corporation, as seed money to fund the post of Manager in its formative years.

It is also worthy of noting that the Continuing Education Centre activities have increased significantly from 12 courses in 1990 to 29 course/conferences in 1993 with a turnover of TT\$1 million.

#### **Video Conferences Via Satellites**

Whilst it is recognized that the need for face-to-face contact in the conduct of continuing education activities remains desirable, the use of teleconferencing via satellites will increase in the future and more state-of-the-art continuing engineering education programmes will be developed. However, research and experimentation will continue to determine the best ways to provide continuing education for professional engineers. It is in this connection that the Faculty of Engineering of The University of the West Indies has a catalytic role to play in the development of innovative approaches to the delivery of such activities. For example, continuing education in the future will utilize more computer-based training and greater use of television, correspondence texts, video, audio cassettes and practical kits. One such approach could be the integration of Knowledge Based Expert Systems (KBES) into the training of professional engineers. Initially KBES can be developed to interface with existing computer-based training programmes and later entire KBES-based training programmes could be created so that for a given topic a single programme can provide individualized tailored training for practicing professional engineers.

It is of interest to note that the Faculty of Engineering has already successfully conducted a number of video conferences via satellite since December 1986 and these have been described elsewhere [5].

#### **Portable Video Classroom**

The Faculty of Engineering in August 1993 built a portable video classroom for the production of low cost videotapes on appropriate engineering topics for CEE. Such a classroom was developed by Fred Rex of the University of Florida [6] and is currently being used for some graduate courses for distribution via the Florida Engineering Education Delivery System (FEEDS) [7] under GENESYS, the instructional television facilities of the College of Engineering, University of Florida [8]. It is significant to note that two regional workshops for Caribbean practicing professional engineers and allied professionals have already been conducted on the use of this classroom for the production of Low Cost Videos in October 1993 in Trinidad and in July 1994 in Jamaica. It is anticipated that some of the academic staff members in the Faculty of Engineering, UWI, will utilize the Portable Video Classroom for producing Low-Cost Videos of some of their courses which could be used for distance learning when UWI becomes a dual mode university.

#### **SOME EXAMPLES OF COST EFFECTIVE FORMS OF IT FOR CEE IN DEVELOPING COUNTRIES**

During the past decade, there has been a phenomenal growth in the availability of IT-based delivery systems for CEE in the developed world notably in North America and Europe. On the basis of a survey undertaken by the author, a representative sample of five such systems were selected for review in the context of their likely availability and suitability for use in developing countries such as the West Indies by the turn of the century and these have been described elsewhere [9].

Recent studies by Stone [10,11] have shown that off-campus graduate engineering students do not suffer from the inability to "talk back" to faculty in real time. Indeed, the results showed that distance students perform better where they control not only where but when learning occurs. It is therefore reasonable to suggest that one cost effective form of IT for CEE in the developing world would be the greater use of low cost video tapes produced by the portable video classroom described above.

The other cost effective form of IT for use in developing countries is the greater use of the computer in the areas of electronic mail, expert systems, computer aided design (CAD) and computer aided learning (CAL). Thus the University of Zimbabwe (UZ) CAL Project [12] can provide many more opportunities for independent learners to study. On the basis of the experiences of UZ it has been shown that CAL can reduce the number of lectures given in a course and at the same time enhance engineering education through self-study using CAL.

### **FUTURE DIRECTION OF IT IN CONTINUING ENGINEERING EDUCATION IN THE CARIBBEAN**

Whilst it is well recognized that any predictions about the future direction of IT are likely to be precarious it is relevant to note that the recently formed International Association for Continuing Engineering Education (IACEE) is currently developing a project for effective use of modern information technologies in the field of continuing engineering education.

The purpose of the project is to develop and strengthen continuing engineering education on a world-wide level using new possibilities given by modern information technologies. Project will also examine the possibilities and the use of e.g., teleconferencing in continuing engineering education on the International level mainly in developing countries.

The main aim of the project is to develop methods for using modern information technologies effectively in distance education, e.g., teleconferencing in its many forms will be used as a tool for reaching the students and as a support media for interaction between the tutors and students as well as among students themselves.

The means of training could be satellite transmissions, video conferences, audio conferences, audio-graphic conferences, computer conferences, training by electronic mail and electronic groupware as well as the use of audio and video cassettes, textbooks, etc. The guidelines for choosing the suitable media for the corresponding cases will be developed.

The Project will map the offerings of educational material suitable for the use in distance education combined with effective use of modern IT. The educational material (hard & software, e.g., audio and videotapes, interactive video) from existing distance education institutions will mainly be looked into. Figure 1 shows the various components of the Project.

As a result of this study, the IACEE will develop some programmes realized by distance education in where e.g., teleconferencing will be used together with the different material received from different respective Distance Education institutions.

The main providers of the material could be e.g., AMCEE - American Media-Based Continuing Education for Engineers, Applied Learning Inc., NTU - National Technological University, SITN - Stanford Instructional Television Network Ltd. Additionally, language and management skills will be required to cope with different countries such as those in the proposed Association of Caribbean States.

This project will be of tremendous potential benefit to the proposed upgraded University of the West Indies Distance Teaching Enterprise (UWIDITE) which links the three main campuses of UWI. In this connection, it is of interest to note that the Commonwealth of Learning (COL) plans to fund the establishment of video teleconferencing facilities on the three UWI campuses using two-way interactive compressed video technology.

### **QUALITY ASSURANCE OF CEE IN THE CARIBBEAN**

In recent times, there has been a number of initiatives around the world in respect of assuring the quality of continuing education notably in USA and Europe. In the UK for example, the Engineering Council has called for the development of partnerships between CEE provider, engineer, employer and the professional society and appropriate checklists of criteria for quality achievement. In Europe, there is a move towards the adoption of ISO 9000/EN29000 Quality Series as the basis for achieving provider quality in CEE. In the USA, the International Association for Continuing Education and Training (IACET) has as its mission statement the following:

"to promote and advance quality continuing education and training. This international membership organization is dedicated to the principles of lifelong learning through research, education, training and resource dissemination"

In addition to providing members with the Continuing Education Unit (CEU) Criteria and Guidelines, IACET has introduced a Certified Provider Programme which demonstrates the concept of accreditation for providers of continuing education and training by promulgating and policing a set of quality criteria to which providers must conform. One CEU is defined as 10 contact hours of participation in an organized continuing education experience, under responsible sponsorship, capable direction and under qualified instruction.

It is therefore recommended that the Continuing Education Centre of the Faculty of Engineering, UWI, should take immediate steps to obtain such accreditation and to be able to award CEUs.

### **CONCLUDING REMARKS**

It is appropriate to make the following concluding remarks in order to summarize the salient points of the paper:

1. IT-based methods of delivering continuing engineering education have proven to be as effective as traditional face-to-face techniques.

## IACEE Project: Developing Methods for Effective Use of Modern Information Technologies in the field of CEE

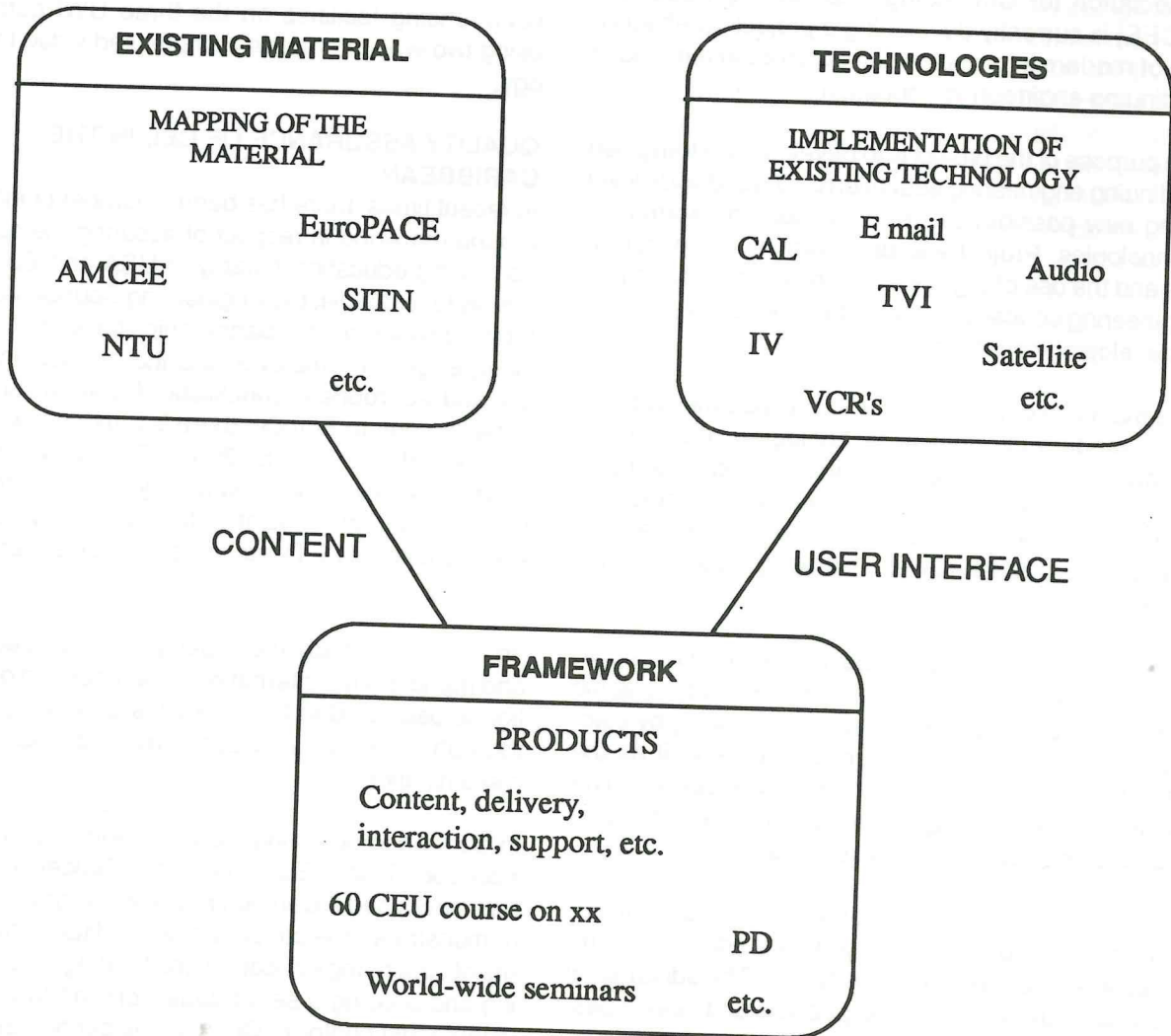


Figure 1 Components of IACEE Project

2. The likely scenario in the Caribbean in the future will be the greater use of low cost interactive videotapes and computer-aided learning (CAL) packages in a wide range of advanced engineering courses.

3. As a result, the students will become more independent learners and academic staff will become more professional in their approach to teaching concentrating on the deeper aspects of their subjects.

4. IT will provide many more opportunities for initial and continuing education of Caribbean engineers utilizing distance education methods.

5. The Engineering Institute and the Continuing Education Centre of the Faculty of Engineering, UWI, has a pivotal and catalytic role to play in implementing effective strategies for ensuring quality CEE in the Caribbean and in fostering closer industry-university cooperation in this regard.

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