Chapter 1
Designing of E-Learning for Engineering Education in Developing Countries:
Key Issues and Success Factors

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ABSTRACT

Traditional education for engineers has shifted towards new methods of teaching and learning through the proliferation of Information and Communication Technologies (ICT). The continuous advances in technology enable the realization of a more distributed structure of knowledge transfer. This becomes critically important for developing countries that lack the resources and infrastructure for implementing engineering education practices. The two main themes of technology in designing e-Learning for engineering education in developing countries focus either on aspects of technological support for traditional methods and localized processes, or on the investigation of how such technologies may assist distance learning. Commonly such efforts are threefold, relating to content delivery, assessment and provision of feedback. This chapter is based on the authors '10 years' experience in e-Learning, and reviews themost important key issues and success factors regarding the design of e-Learning for engineering education in developing countries.
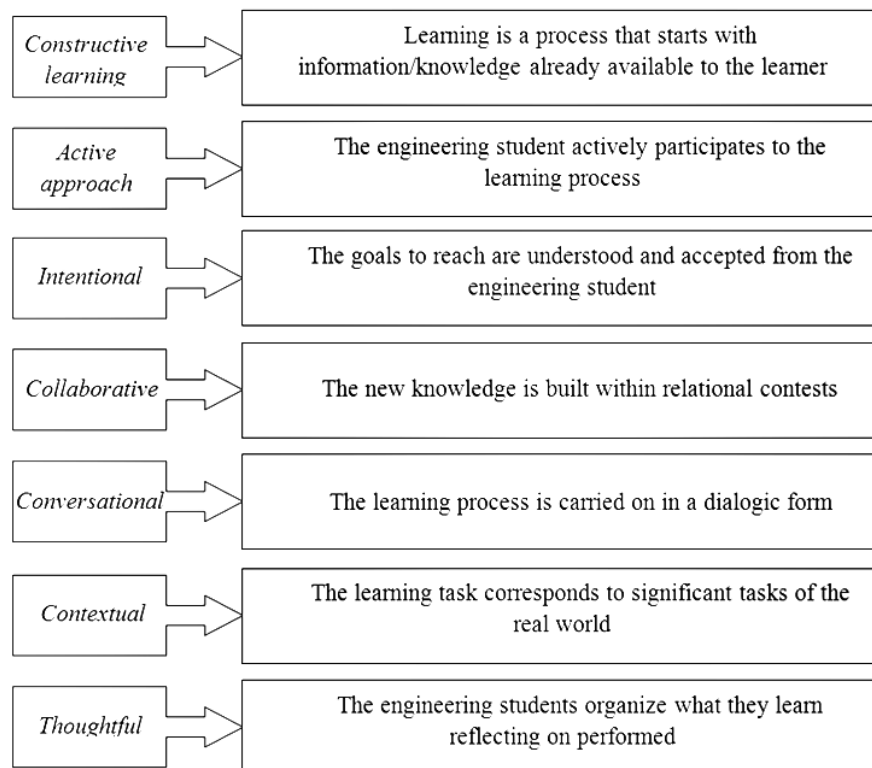
1. INTRODUCTION AND BACKGROUND

Recent years have seen dramatic changes in engineering education in terms of increased access to lifelong learning, increased choice in areas of study and the personalization of learning. To advance across all domains seems to necessitate incompatible changes to the learning process, as practitioners offer individualized learning to a larger, more diverse engineering student base. To achieve this cost effectively and without overwhelming practitioners requires new approaches to teaching and learning coupled with access to a wide range of resources: practitioners need to be able to source and share engineering materials, adapt and contextualize them to suit individual needs, and use them across a variety of engineering educational models (Littlejohn et al, 2008).

Hence a great deal of effort has focused on the integration of new technologies such as multimedia video, audio, animation, and computers, with associated software, to achieve the improvement of traditional engineering education. The internet technologies have also been popularly applied to web-based learning (Hung et al, 2007). The growth of the information society provides a way for fast data access and information exchange all over the world. Computer technologies have been significantly changing the content and practice of engineering education (Gladun et al, 2008). Information and communication technologies (ICT) are rightly recognized as tools that are radically transforming the process of learning. Universities, institutions and industries are investing increasing resources to advance researches for providing better and more effective learning solutions (Campanella et al, 2007).

Figure 1. The most important and meaningful characteristics for engineering instruction

Constructive learning	Learning is a process that starts with information/knowledge already available to the learner
Active approach	The engineering student actively participates to the learning process
Intentional	The goals to reach are understood and accepted from the engineering student
Collaborative	The new knowledge is built within relational contests
Conversational	The learning process is carried on in a dialogic form
Contextual	The learning task corresponds to significant tasks of the real world
Thoughtful	The engineering students organize what they learn reflecting on performed

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