

An Implementation Framework for Blended Learning in Engineering Education

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Short Abstract

As per the statistics on “Employability of Engineering students”, a considerable decline has been observed for the past few decades. This is reflected as a symptom of “skill deprivation and lack of essential practical knowledge”, which is an unwanted outcome of the present engineering pedagogy. Out of 97% of the graduating engineers, only 3% have the suitable skills to be employed in a software product market and only 7% can handle the core engineering jobs. (13th July 2016, indiatoday.in)

Blended Learning is a versatile and innovative pedagogical approach to render all types of learners with different learning styles (Visual, Auditory, Read-Write and Kinesthetic) and therefore associate strategies to address each. Engineering domain serves as a perfect client to demonstrate the effectiveness of the Blended approach. Further, AICTE through its notification published on 27th June '13 has stated the immense need for blended education by justifying the increased demands of technically skilled manpower and facilitating cost effective education to masses through increased utilization of infrastructure available at technical institutions.

Amity being pioneer in application of ICT in education has planned to implement LMS based Blended Learning in its engineering institution with an objective to skillfully distribute the practical and theoretical attributes of the course. Practical engineering applications are demonstrated through animations and simulations which enhance the learning experience of students. This paper has made an attempt to study the various critical factors involved in applying Blended Learning methodology in engineering education using various instances of practices in the world. The Authors were the key leads in developing a framework for the implementation of the model. It was constructed using a number of essential factors such as technical, content creation, content delivery, compatibility and training aspects. This study would result in an implementation framework for blended learning in engineering education.

Key Words: Blended Learning, LMS (Learning Management Systems), ICT, Engineering Education, VLE (Virtual Learning Environment), F2F (Face to Face)

Full length abstract

As per the statistics on “Employability of Engineering students”, a considerable decline has been observed for the past few decades. This is reflected as a symptom of “skill deprivation and lack of essential practical knowledge”, which is an unwanted outcome of the present engineering pedagogy. Out of 97% of the graduating engineers, only 3% have the suitable skills to be employed in a software product market and only 7% can handle the core engineering jobs. (13th July 2016, indiatoday.in)

The shortcomings of the existing system have forced the development and finding of new teaching-learning methods which focus on experience based learning. Blended Learning is a versatile and innovative pedagogical approach to render all types of learners with different learning styles (Visual, Auditory, Read-Write and Kinesthetic) and therefore associate strategies to address each. Engineering domain serves as a perfect client to demonstrate the effectiveness of the Blended approach. Further, AICTE through its notification published on 27th June’13 has stated the immense need for blended education by justifying the increased demands of technically skilled manpower and facilitating cost effective education to masses through increased utilization of infrastructure available at technical institutions. Conceptual knowledge is an important component for the application of engineering principles. It has been observed that the basic deliveries of theoretical concepts are done through the traditional Face-to-Face mode. Depending on the type of learner and their learning styles, it becomes impractical to deliver the exact same contents in the exact same manner to fulfill their learning. Therefore, a certain change in the delivery pattern needs to be addressed, which can focus on the variety of learners in a classroom. Moreover, since the class times are limited and generally non-interactive, the basic applications of the engineering principles are somewhat lost in the F2F mode. The students are supplied with theoretical information, which in due time is not being converted into useful practical information. The discussion component remains obsolete from these traditional mods of teaching, which has an immense impact on the overall learning outcome of the entire course. The conventional Rote techniques do not contribute towards increasing the skill factors and thereby reduces the employability of the students. As per a report published in Times of India, on July’14, out of 6 Lakh engineers that graduate annually, only 18.43% are employable. These statistics are growing at an alarming rate, as an article published on January 2015, in “indiatoday.in” claims a considerable 80% unemployability out of 1,60,000 graduates. Hence, there is a compelling need of a better education pedagogy which can be applicable to the engineering

domain. LMS based Blended Learning is an innovative approach which shall uplift the entire unemployment issues of engineering graduates by inculcating a sense of responsibility along with better delivery of information using the ICT techniques.

Blended Learning aims at increasing the options for greater quality and quantity of human interaction in a learning environment with the opportunity of “to be both together and apart” (aicte-india.org). In engineering education, Blended Learning skillfully distributes the practical and theoretical attributes of the course. Learners use the F2F classes to interact with peers and instructors, to perform practical/laboratories/workshops and to actively participate in discussions. On the flipside, e-learning attributes of Blended Learning provide the course knowledge through browser based Learning Management Systems (LMS) which can be accessed over wide variety of ICT platforms with no constraint to space or time. Practical engineering applications are demonstrated through animations and simulations which support the education structure in a massive way. All diagrams and representations can be converted into 3 Dimensional models with assembly and disassembly features being represented through animations. Simulations can be used to create a virtual learning environment (VLE) to focus on the “Kinesthetic” aspect of learning.

A strategically planned framework has been created for implementing the revolutionary Blended Learning Model. This framework focuses on various implementation areas which are of key importance for the entire model to function. The technical aspects are governed by content creation needs and content levels. For engineering education, Level Two and Level Three contents are taken into consideration. It also includes best in class soft wares and systems which can produce objective oriented interactive contents. The content delivery aspects are also taken into account which lays out a pathway for the students to access the developed interactive contents. The Learning Management System (LMS) plays a vital role under the content delivery aspect. The LMS acts as a virtual classroom which can be accessed over the internet without any restrictions to space and time. The enrolled students can study and access the learning materials at their choice of place without any restrictions to usage i.e. they can view, review, play and pause multiple times at their own convenience. This removes the impact of information overloading, where the students don't have enough time to process and convert it into useful applicable knowledge.

The LMS also allows the students to form discussion groups, which can be moderated by the concerned teacher. These facilities available over the LMS allow the teaching-learning

function to continue all day and all night. Students can post their queries even during odd hours and expect a reply to their questions. The Blended Learning Model will also contribute towards transparent and concrete assessment systems. The internal assessments, which are carried out throughout the term, can be easily conducted over the LMS with much less complexity and much increased efficiency. A concise proposed layout is shown in the figure1.

Amity University confidently approaches towards investing its abilities in transforming the engineering domain, by introducing the revolutionary concept of Blended Learning. This hybrid model will compile the traditional F2F brick and mortar learning with the freedom of e-learning facility. The deliveries of the courses are designed by distributing the topics into various ICT based e-learning modules, while keeping the socialization component of education alive through F2F tutorial classes, Laboratories and Workshops. Amity being pioneer in ICT approach has planned to implement LMS based Blended Learning in its engineering institutes. The Authors were the key leads in developing a framework for the implementation of the model. The implementation framework was constructed using a number of critical factors such as technical, content creation, content delivery, compatibility and training aspects. This paper would develop a framework for blended approach in engineering using various instances of practices in the world.

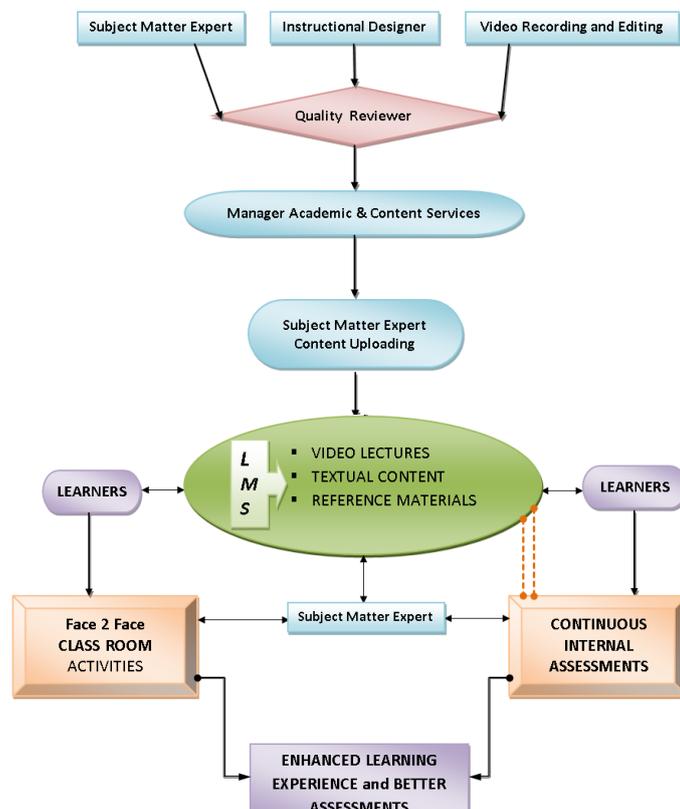


Figure 1: An approach to Blended Learning