

# Chapter 16

## An Example Application of an Artificial Intelligence– Supported Blended Learning Education Program in Computer Engineering

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### ABSTRACT

*Blended Learning is a learning model that is enriched with traditional learning methods and online education materials. Integration of face-to-face and online learning with blending learning can enhance the learning experience and optimize seat time. In this chapter, the authors present the teaching of an Algorithm and Programming course in Computer Engineering Education via an artificial intelligence-supported blended learning approach. Since 2011, Computer Engineering education in Suleyman Demirel University Computer Engineering Department is taught with a blended learning method. Blended learning is achieved through a Learning Management System (LMS) by using distance education technology. The LMS is comprised of course materials supported with flash animations, student records, user roles, and evaluation systems such as surveys and quizzes that meet SCORM standards. In this chapter, the related education process has been supported with an intelligent program, which is based on teaching C programming language. In this way, it has been aimed to improve educational processes within the related course and the education approach in the department. The blended learning approach has been evaluated by the authors, and the obtained results show that the introduced artificial intelligence-supported blended learning education program enables both teachers and students to experience better educational processes.*

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## **INTRODUCTION**

Blended learning has various definitions in literature. In a study by Finn *et al.* (2004), C. Procter *et al.* (2003), it is defined as the combination of best features of traditional learning and online learning. However, the definition has evolved to encompass combinations of various learning strategies such as blending offline and online learning, blending structured and unstructured learning etc. Singh *et al.* (2003), Lotrecchiano *et al.* (2013). The goal is to combine the best parts of face-to-face education and online education. Students engage in interactive experiences. Additionally, the online courses provide students with rich multimedia content at anytime, anywhere with Internet access from university or home. This increases the scheduling flexibility of students. There are many ways of applying blended learning. Therefore there are no certain rules to define what the ideal blend might be. The term “blended” has a broad meaning and it includes the integration of e-learning and traditional face-to-face learning. The blend of these learning models depends on the online materials, the needs of the students, and the instructor requirements.

In our study, we define the blended learning as the coherent integration of face-to-face and e-learning to address our educational goals. When blended learning is understood and applied carefully, it will offer great advantage for students and teachers, Geraldine *et al.* (2012). Some of these advantages are as follows:

- Blended learning supports effective and strong socializing environment through face-to-face learning.
- Students’ academic performance can be improved through blended learning.
- It allows reaping a profit by minimizing the cost of education, travel, and classroom.
- Blended learning can diagnose a student’s learning level.

- It provides an environment for students to work in a relaxed environment, instead of moving through school.
- It gives students full control of their education.

In our approach, face-to-face and e-learning models are combined. Main courses such as programming and hardware-based courses are taught face-to-face and the other courses are taught online. Online courses part into two sections as synchronized and asynchronous. Asynchronous courses are applied through Learning Management System (LMS). Students can access the past courses; submit their homework and projects through this system. Additionally, they are allowed to choose how they will access the necessary learning materials. In synchronized section of the online courses, students join the class in specific time determined by the department. Through this education model, the courses are followed interactively and independent of location in the same time zone. Owing to developing technology, students now have the opportunity to participate in education remotely and communicate online without meeting face-to-face as it is in traditional learning model. It is important that the related e-learning process has been supported with also an intelligent program, which is based on teaching C programming language. In this way, it has been aimed to improve educational processes within the related course and the education approach in the department. The blended learning approach has been evaluated by the authors and obtained results show that the introduced artificial intelligence supported blended learning education program enables both teachers and students to experience better educational processes.

The rest of the paper is organized as follows: In Section 2, we define the blended learning and its components, explain internet based, computer based and mobile learning that comprise the online learning section of blended learning. Section 3 presents the application of blended learning on

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