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## Educational Innovation: Interaction and Relationship Inside A Sub-Module

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### Abstract

In this paper authors will expose a work developed with the aim to submit an educational innovation project proposal to a competitive call for Educational Innovation Projects 2013-2015 of the Education Advisory Service of the Basque Country University (UPV/EHU, Spain). This project is being carried out in the Computer Structure and Computer Architecture sub-module of the Degree in Computer Management and Information Systems Engineering of the University College of Engineering of Vitoria-Gasteiz, University of the Basque Country (UPV/EHU). The project is based on the active learning, more specifically, on cooperative learning. In this paper we have given deeper insight the dependencies between all the subjects belonging to the analyzed sub-module, which is composed of two subjects named Computer Structure and Computer Architecture. We have included in such analysis a previous subject named Principles of Digital Systems Design, which does not belong to that sub-module, but plays an important role in the acquisition of the knowledge and competencies of the two previously referenced subjects.

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## 1. Introduction

Active Learning is a way to guide the process of learning/ teaching (Bonwell & Eison, 1991; Felder & Brent, 2009), in which the student is the main actor. A particular instance of this method of guiding the learning process is called Cooperative Learning. In this paradigm the learning activities are planned searching for positive interdependence of students (Felder & Brent, 1994; Felder & Brent, 2001).

This way to understand the educational process is a very good way for educational innovation initiatives, which have proliferated in the new curricula adapted to the European Higher Education Area (EHEA). One of these initiatives is being carried out working at the Basque Country University and is described below.

Within the competitive call for Educational Innovation Projects for the years 2013-2015, of the Educational Advisory Service (UPV / EHU), it was applied and obtained an Educational Innovation Project entitled " Intra and Intergroup Cooperative Learning in the Computer Structure and Architecture Sub-module".

Prior to this project, in the preparation process of the "M02 - Common to Computing Branch" module, specifically in the "Structure and Computer Architecture" sub-module from the Degree in Computer Management and Information Systems Engineering of the University College of Engineering of Vitoria-Gasteiz, University of the Basque Country (UPV/EHU), we worked closely in the programming of the subjects included in the above mentioned sub-module.

These subjects stress the hardware knowledge. The first one is "Computer Structure" (CS) (6 ECTS) scheduled in the second semester of the first year, and the second one subject is "Computer Architecture" (CA) (6 ECTS) planned on the first semester of the second year. This paper examines the relationship between both subjects, as well as other prior ones in which knowledge needed to face the competencies of the "Computer Structure and Architecture" sub-module are introduced.

To carry it out we begin by presenting the subject "Principles of Digital Systems Design" (PDSD) (6 ECTS) that is in the first semester of the first year, and it is aimed at explaining the necessary knowledge for the last of two courses in the sub-module (Computer Structure and Computer Architecture).

The paper is structured to analyze the schedules of the three subjects. This analysis is done individually for each subject but also reflects the interdependencies between them. The second section describes the objectives of this paper. The third, fourth and fifth sections perform a systematic analysis of competences and subject content of Principles of Digital Systems Design, Computer Structure and Computer Architecture respectively. Finally, the sixth section presents the conclusions of this paper.

## 2. Objectives

The Degree in Computer Management and Information Systems Engineering of the University College of Engineering of Vitoria-Gasteiz, University of the Basque Country (UPV/EHU) is divided into the following five modules:

- M01 - Basic Formation.
- M02 - Common to Computing Branch.
- M03 - Information Systems.
- M04 - Final Project.
- M05 - Optional module.

Focusing on in the "M02-Common to Computing Branch", there is the "Computer Structure and Architecture" sub-module, which consists of two compulsory subjects. The first one "Computer Structure" (CS), and it is located within the degree schedule in the second semester of the first year and has 6 ECTS credits divided into 45 hours of theory and 15 hours of laboratory practice. In the second year of the degree, it is programmed the subject "Computer Architecture" (CA). This course is also obligatory, and it has also assigned 6 ECTS credits divided into 45 hours of theory and 15 hours of laboratory practice.

The previous knowledge required for CS acquired is studied in the course "Principles of Digital Systems Design" (DPDS) of the module "M01- Basic Formation" of the degree.

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