A FLIPPED LEARNING EXPERIENCE: COMBINING THE ONLINE WITH THE BEST OF THE FACE-TO-FACE TEACHING

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We show how combining the online didactic material of a **Massive Online Open Course (MOOC)** with in-class teaching, interacting directly with students, can substantially improve academic results, as well as student motivation.

We propose a methodology based on the use of **flipped learning technics** in an introductory course of ICT bachelor's degree. The reason to apply this methodology was that the academic results obtained were very deficient, so in 2013 only 48.92% of students passed.

In the proposed program, students acquire the theoretical knowledges at home through a **MOOC platform**, where they watch video-lectures, do self-evaluation tests and use other academic online resources. Furthermore, they have to assist **to in-class teaching** where they do other activities in order to interact with teachers and the rest of students (discussion of the videos, resolution of doubts, solving practical exercises, etc.), trying to overcome the disadvantages of self-learning.

The experimental results of this research illustrate an **important improvement of the academic results** (82.22% passed in 2016) and the students enjoy the new method. The research concludes with a discussion based on the personal experience of authors regarding to the advantages of this methodology as well as some suggestions to solve some observed inconveniences

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The methodology described was carried out in the following subjects:

- **Fundamentals of Computer Science:** first year of the Telecommunications Technologies Engineering degree (110 students in 2015-16)
- **Fundamentals of Computer Science:** first year of the Industrial Electronic Engineering degree (69 students in 2015-16)

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Organization of the course:

1. Presentations of the theoretical contens
- **Objective:** Acquisition of theoretical knowledge associated with content
- **Abilities to develop:** remembering and understanding
- **Media:** MOOC materials (video-lectures, etc.)

2. Face-to-face classes
- **Objectives:** (1) consolidate content presentations, (2) discuss questions, (3) in-situ exercises and group discussions, and (4) complement the know-how.
- **Abilities to develop:** apply, analyze, evaluate, and create.
- **Media:** direct interaction between teacher and students, and among students

3. On line exercises
- **Objectives:** To consolidate the concepts presented in the content presentations
- **Abilities to develop:** remembering and understanding
- **Media:** Proposed exercises in the MOOC platform, with self-assessment and feedback on-line

4. Laboratory
- **Objectives:** depth on specific issues by performing works of direct application of the concepts discussed in the lectures
- **Abilities to develop:** apply, analyze, evaluate and create
- **Media:** On-classes (face-to-face)

5. Tutorship
- **Objective:** To help students in solving specific problems.
- **Abilities to develop:** apply, analyze, evaluate and create.
- **Means:** (1) forum in the MOOC platform, (2) on-campus sessions; (3) e-mail, (4) personal interview in the teacher's office

6. Assessment
- **Objective:** To evaluate the knowledge acquired by the student in terms of the competences to achieve in the subject
- **Media:** exercises in the MOOC platform and conventional on-site exams.

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The **technological tools and platforms** used are:

- PowerPoint and Camtasia Studio software tools were used to prepare the videos.
- The Learning Management System (LMS) was MOODLE, version 2.6, and the application was on the MOOC platform of this university (abiertaUGR).

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Results

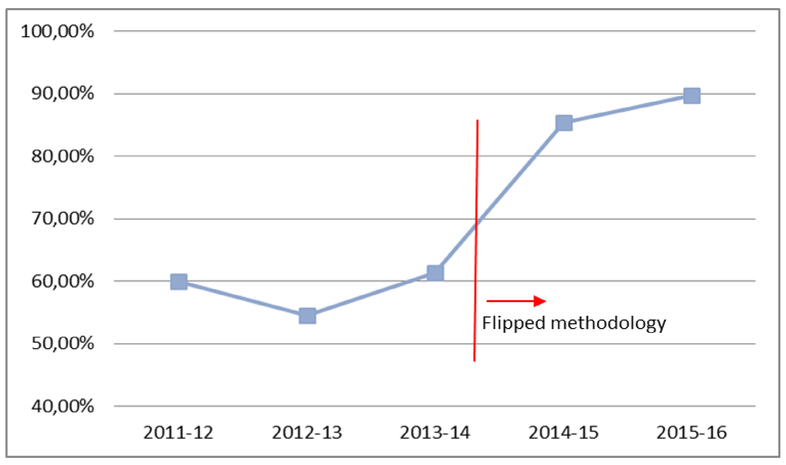

Figure 1. Evolution of the percentage of students passing with respect to the students who took the course between 2011-12 and 2015-16.

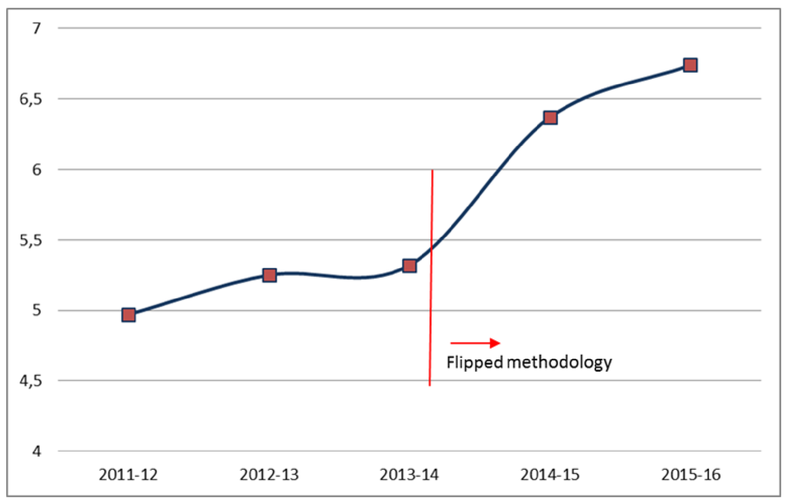

Figure 2. Development of average final grades on a scale of 0 to 10 between 2011-12 and 2015-16.

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Conclusions

The highly satisfactory results in the tests on the methodology used in the course, as well as the improvement in academic results from the first year in which the experiment was performed, confirmed the huge potential of combining MOOCs in formal undergraduate studies with on-campus learning activities.

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