

Developing Coding Skills technology for a flipped classroom

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Abstract

Nowadays, knowing how to code is critical, and coding skills are treasured in a growing range of diversified areas. This led to the emergence of several learning platforms that allow students to develop their coding skills. These platforms provide active and fun ways to learn how to code, using technology to create controlled, practical learning and teaching experiences both for students and teachers.

The whole idea of this work is to depict a teaching and learning strategy based on the assumption that the use of technology leads students to a greater engagement in learning activities and promotes student–teacher interaction, as well as on the advantages of using an innovative approach to learning, i.e. flipped classrooms.

Keywords: programming skills, learning motivation, game-based learning, flipped classroom

Introduction

Problems:

In the **initial programming curricular units**, it is very common for the students' knowledge level to be very different, specially due to their diverse learning background. This leads to some **pedagogical problems**:

- students with less knowledge have to put a greater effort into following the topics taught in class;
- students with greater difficulties quickly demotivate and have a higher dropout rate;
- teachers find it difficult to manage the students' heterogeneity.

Goals:

Put forward a **teaching/learning strategy**, based on a **flipped classroom methodology** [1], to be used on introductory programming curricular units.

Code learning platform

Codeavengers – learning platform that aims at providing an **active and effective way** for students to learn/deepen their coding skills by building their own apps in a **gamified learning environment** [2] (see Fig. 1).

Pedagogical features:

- structured sequential modules;
- different complexity levels;
- easy to understand instructions;
- minimal reading required;
- interesting & relevant examples;
- instant feedback;
- learning at a self-paced rhythm;
- teachers' remote monitoring.

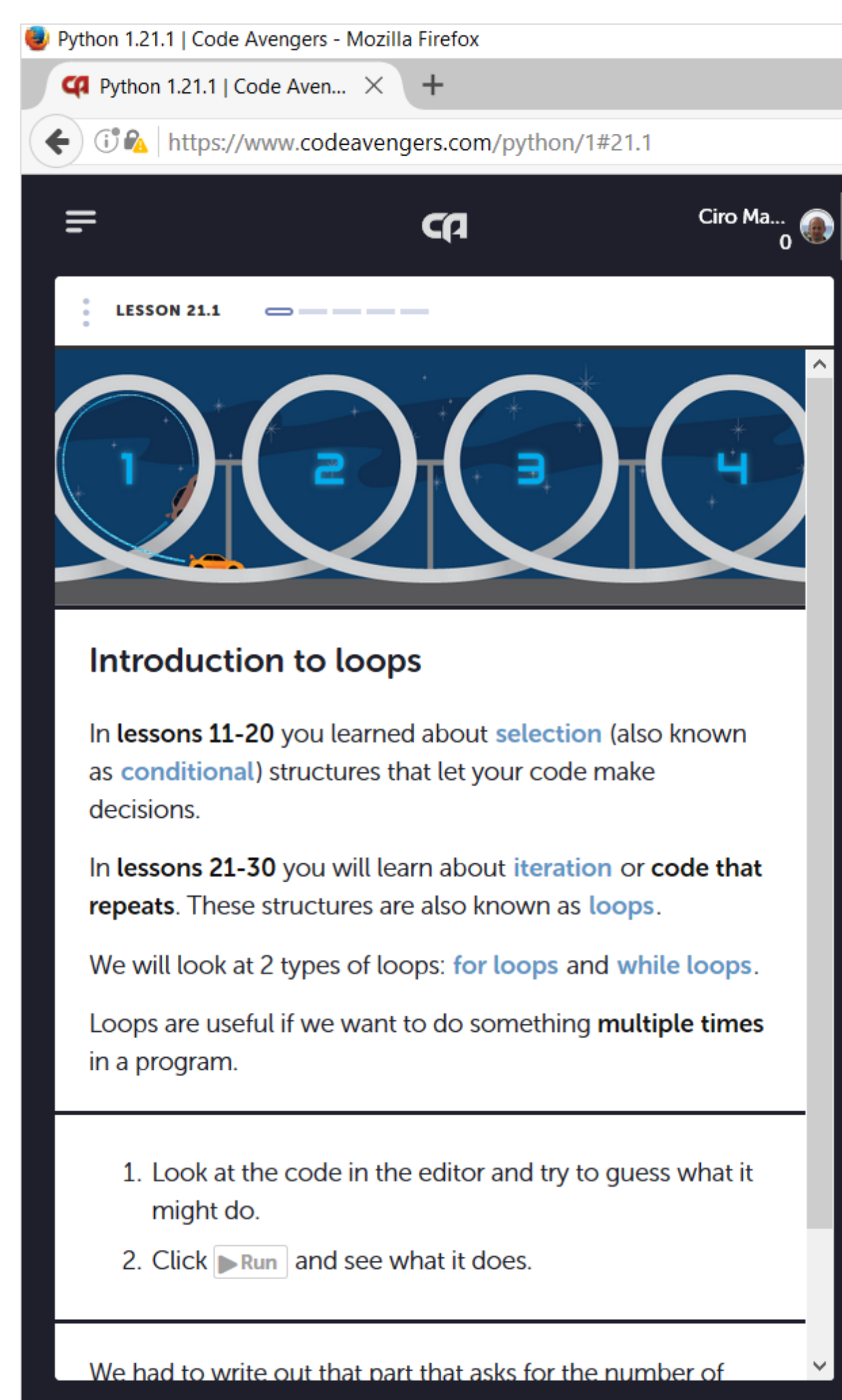


Fig.1 Codeavengers – an online code learning platform

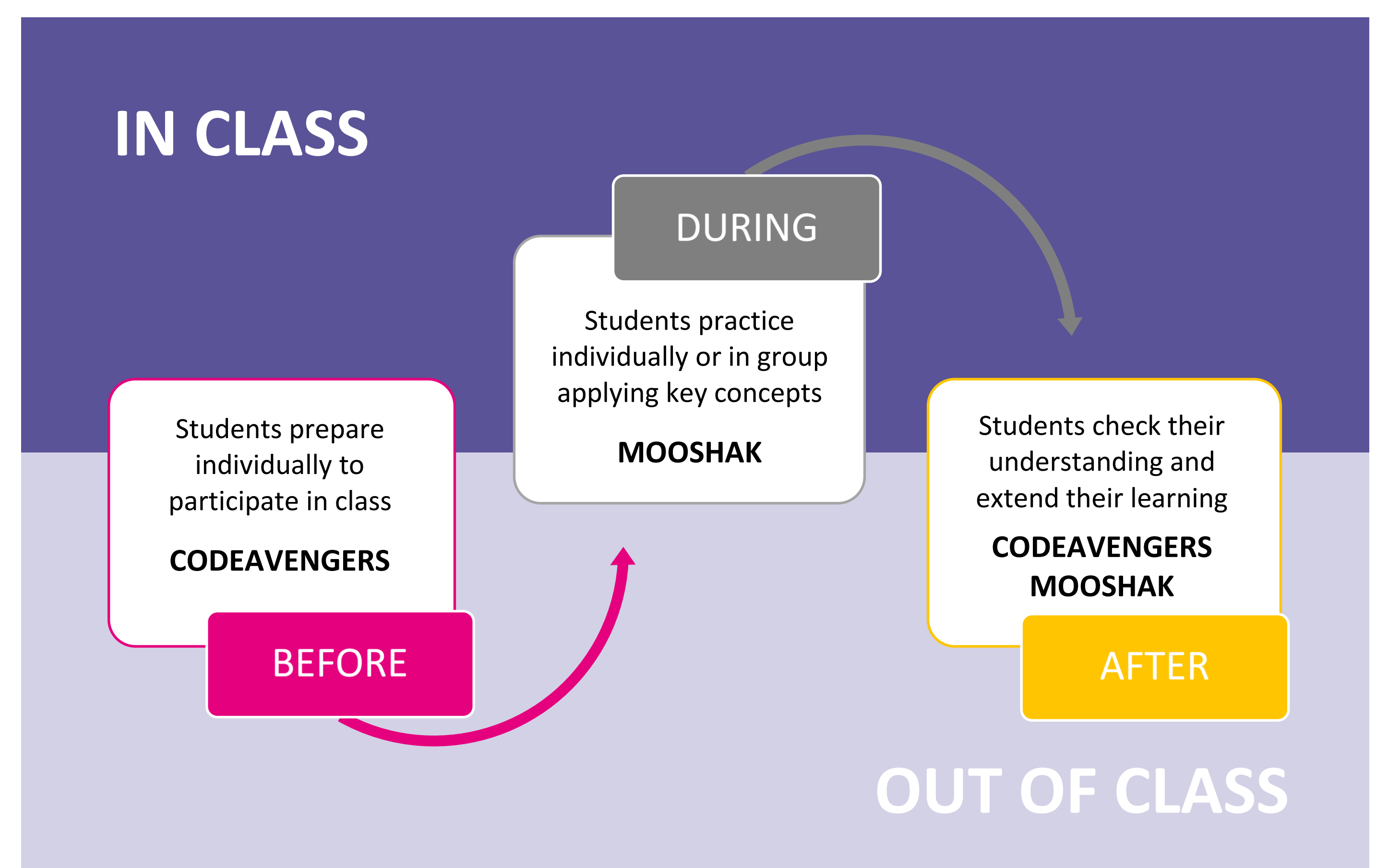


Fig.2 A flipped classroom for introductory programming (adapted from <https://facultyinnovate.utexas.edu/teaching/strategies/flipping>)

Evaluation and assessment platform

Mooshak – online tool to manage programming contests [3]. From the several features provided by this tool, the most relevant to this work are:

- **Automatic judging** of submitted solutions;
- **Online answering** of questions about the proposed exercises.

Proposed teaching/learning strategy

The idea of the proposed strategy is to **use CodeAvengers platform**:

1. to level off the students' knowledge, grounded on their autonomous work;
2. to assign programming tasks as homework, so that the work developed afterwards (in class) can generate more in-depth and complex learning.

This teaching approach is called **“flipped classroom”** and as Gilboy, Heinerichs and Pazzaglia [1:110] explain “In the flipped classroom, what is traditionally done in class and as homework are switched or flipped”.

In fact, the main goal is to lead students to first develop their learning outside the classroom – autonomous work – and only then improve it in class (see Fig. 2). Since the platform allows for the teachers' remote monitoring, they can follow the students' progress, provide feedback and clarify any doubts.

Moreover, **Mooshak tool will be used** as a tool for the automatic validation of the student's exercises and assessment outcomes.

Expected outcomes

With this strategy we expect:

- more motivated students, since they will **learn at their own pace**;
- a **more homogeneous knowledge level** in the classroom;
- more **in-depth and complex learning** generated in class.

Upcoming work

Apply and evaluate the proposed learning strategy on the academic years of **2017-2018** and **2018-2019** in three **different levels of teaching**:

- Higher professional training courses;
- First cycle degree courses;
- Master degree courses.

Acknowledgments

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