

Learning algorithmic logic and basic programming by playing

Previous compulsory steps / Prior students' knowledge	None
Learning objectives	Familiarizing students with algorithmic logic Learning to use basic control flow statements: IF, IF-else in puzzles.
Subjects	Programming
Recommended Age	10-14
Material needed	PCs that can run the game "Robots: create AI"
Sequence duration	90 minutes
Individual or group activity	Single Game Player in group activities
Skills developed	Collaboration & teamwork, communication, creativity, learning to learn, problem solving, planning
Price range of the game	0.99
Similar games to use with the approach of the sequence	Scratch, EXAPUNKS, 7 billion humans

Step by step: how to implement the sequence

In this pedagogical sequence, students are going to use a programming puzzler game called: "Robots: create AI". Programming is the real gameplay in this game. The commands given make a simple figure (of a robot) to move in a certain path of squares, avoiding the empty squares. The game starts from the very simple steps of algorithmic logic and continues with IF, IF – else statements. The IF-else statement is

the most basic of all the control flow statements. It controls a program so as to execute a specific code only if a particular statement is proven to be true.

We consider it a quite simple and good game for one player in a team of two pupils, in the classroom and for personal practice as homework. The procedure could also teach teamwork and communication, as it is easier for students to be creative when they are thinking together, as is required to explain the solutions sought.

- **Step 1: The educator explains the basic procedure to students (10 minutes)**

The educator explains the aim of the game to all students and explains the gaming process by starting to play the game in class. In the first steps, there is an in-game tutorial explaining the gameplay. The educator follows it and, at the same time, adds further explanation where needed.

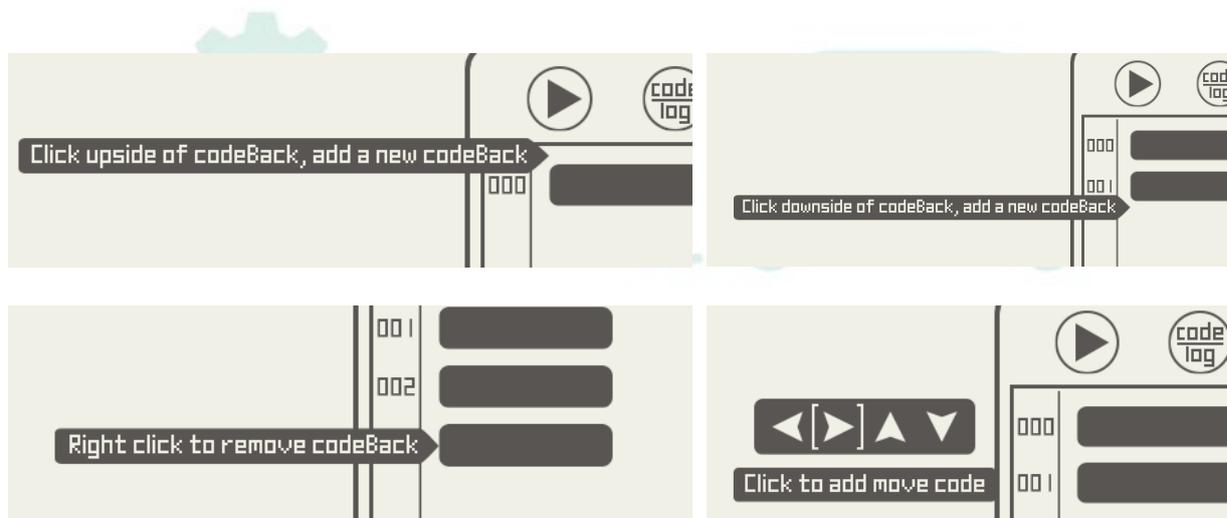


Figure 1. Snapshots of in-game tutorial ("Robots: create AI", Xuan, 2017)

- **Step 2: Discovering the game in groups (25 minutes)**

Students are divided into groups of two and try to solve the puzzles given at different levels of the game. One student plays the game while the other student watches and helps problem-solve.". During the first five levels, students will become familiar with the game and the basic algorithmic practice presented.

During the game, structured help is given with examples and hints, helping pupils in self-learning of the structure and in the use of control flow statements in new problems posed at each new level.

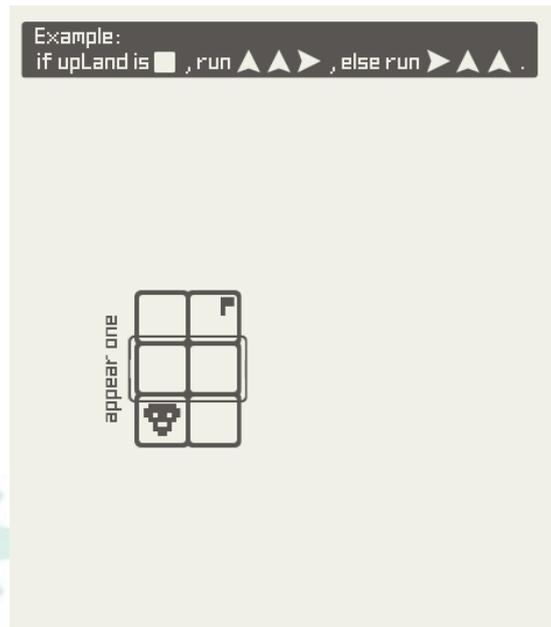


Figure 2. Snapshot of an example provided (“Robots: create AI”, Xuan, 2017)

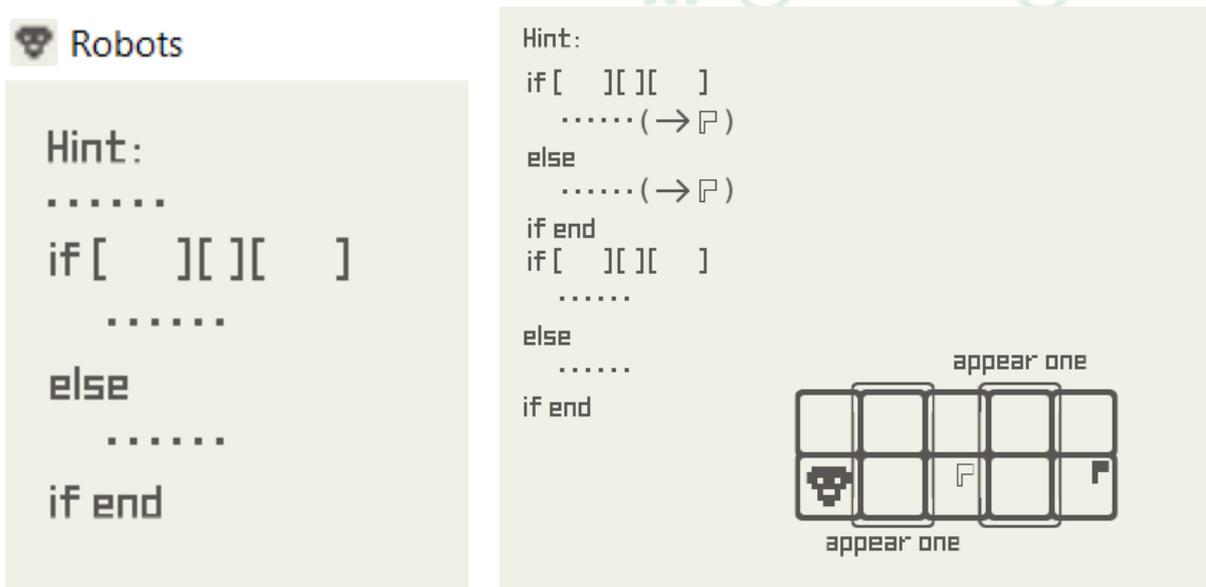


Figure 3. Snapshots of two hints for different levels provided (“Robots: create AI”, Xuan, 2017)

- **Step 3: Students progressing towards more levels (35 minutes)**

If one pupil of the team cannot solve the puzzle alone, the second person in the team will help. If they cannot solve the puzzle together, they can ask the educator for help. Each solution will be discussed within the group.

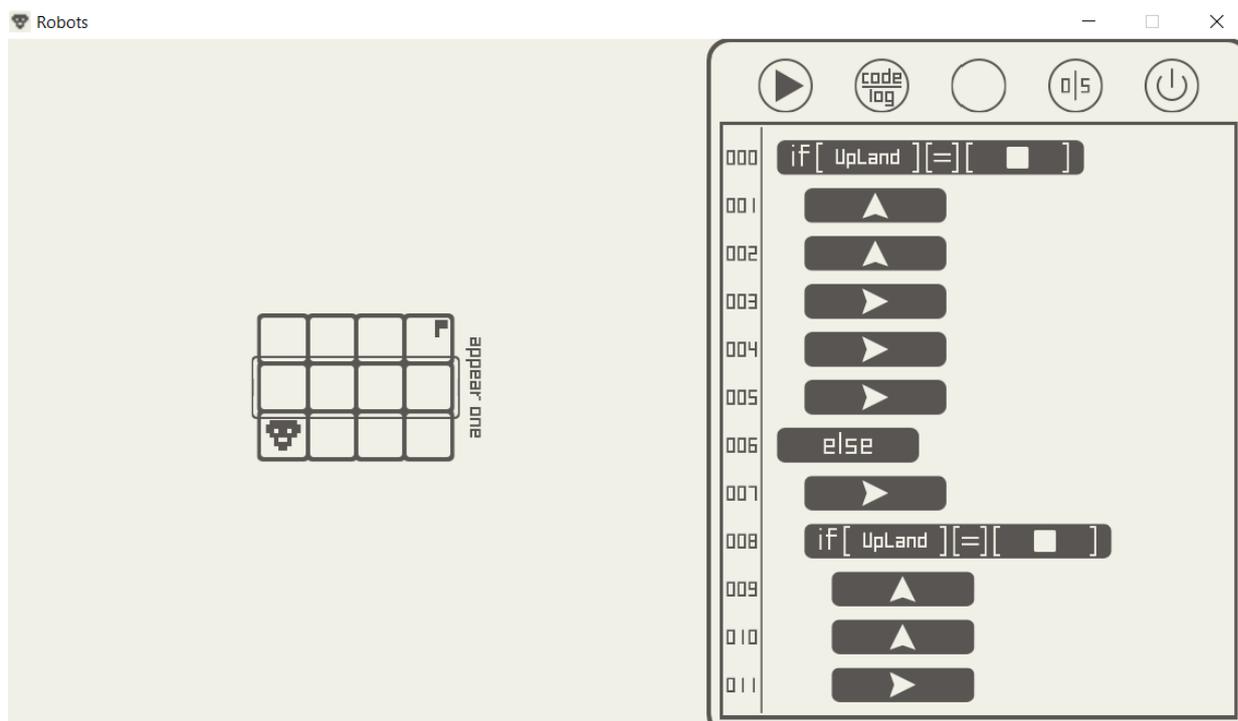


Figure 4. Snapshot with section of a code ("Robots: create AI", Xuan, 2017)

- **Step 4: The educator sums up (15 minutes)**

Educator sums up the structure of IF - else, else statements and uses the code/log button to explain the series of commands executed in the last level.

```

▶ code log
running line 000 if -no
running line 007 ▶
running line 008 if -yes
running line 009 ▲
running line 010 ▲
running line 011 ▶
running line 012 ▶
finish running
running line 000 if -no
running line 007 ▶
running line 008 if -no
running line 014 ▶
running line 015 if -no
running line 020 ▶
running line 021 if -yes
running line 022 ▲
running line 023 ▲
    
```

Figure 5. Snapshot of code/log feature (“Robots: create AI”, Xuan, 2017)

- **Step 5: The educator proposes next levels for homework (5 minutes)**

The educator assigns more levels as homework as a means of consolidating “IF-else” statements. The exact number of levels proposed depends on his/her point of view about students’ capabilities in the use of the statement in new problems.

Note: The steps 2 to 5 could be repeated for advanced levels with more loops breaking loops and more complex interactions.

Getting the game:

https://store.steampowered.com/app/676620/Robots_create_AI/

References:

O’Connor, A. (2017, September 11). Program robots to run mazes in Robots: Create AI. Rock Paper Shotgun. <https://www.rockpapershotgun.com/robots-create-ai-programming-game-released>