TEACHING PROGRAMMING IN EARLY CHILDHOOD EDUCATION WITH STORIES

Diana Pérez Marín
ICERI 2019
diana.perez@urjc.es
INDEX

1. Introduction
2. Methodology
3. Results
4. Conclusions
INTRODUCTION (I)

Children in the 21st century are digital natives, are they really?

- Without guidance, children could limit their interaction just to use the technology as passive consumers.

In the last decades, there has been a great deal of research into how to teach coding skills or programming to preschoolers:

- Computational thinking
- Other skills (STEM)
INTRODUCTION (II)

It is not an easy task! Some questions are the following:

• Which type of device should be used?
• What happens if the school does not have robots, computers or tablets?
• How to integrate it in the curricula?
• Which is the appropriate age for the first coding experiences?
• Which language or coding blocks should be used?

The proposal of this paper is a methodology to teach Early Childhood teachers how to teach programming to 3-6 years old children by using stories and activities (no need of technology!)
METHODOLOGY: MECUE
SOME BACKGROUND

TangibleK program (Bers, 2010)  
https://www.helloruby.com/

MECOPROG (Pérez-Marín et al. 2018)
THE STORY

- **Concepts**
  - Sequence, loop, pattern, decomposition, conditionals.

- **Stage:**
  - Fun and even better with the help of the students.
  - E.g.: party, beach, forest, farm, the space...

- **Main character**
  - Avoiding stereotypes.

- **Friends of the main character**
  - Full description.

- **Actions**
  - To search, decorate, cook (MECOPROG),...
CONCEPTS

- **Sequence**
  - One line after another (introduction to the program concept).

- **Loop**
  - An action that is repeated several times (loop concept).

- **Pattern**
  - To identify regularities (abstraction)

- **Decomposition**
  - To identify the parts of a whole element (modularization).

- **Conditionals (optional)**
  - To choose between alternatives (conditional concept).
Some possibilities from Scratch Jr, there are many more!

*It is advisable to involve the students.*
Some possibilities from Scratch Jr, there are many more! It is advisable to avoid stereotypes and involve the students.
FULL DESCRIPTION OF THE CHARACTERS

Ruby

About me: I like learning new things and I hate giving up. I love to share my opinions. Want to hear a few? My dad is the best. I tell great jokes. And I have five special gemstones.

Birthday: February 24

Interests: Maps, secret codes, and small talk

Pet peeves: I hate confusion

Favorite expression: Why?

Secret superpower: I can imagine impossible things

Sample from https://www.helloruby.com/meetruby
ACTIONS

To search, decorate, cook and many more.
ACTIVITIES

- **Puzzle**
  - To create a puzzle that should be related to the story helps children with the decomposition concept.

- **Map**
  - To follow the instructions to plot a route from a point A to a point B. It is important to create the map with squares.

- **Dance**
  - To repeat instructions and work with the loop concept.
## RESULTS

<table>
<thead>
<tr>
<th>Group</th>
<th>Story score</th>
<th>Perform. score</th>
<th>Final score</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>9</td>
<td>10</td>
<td>9.5</td>
</tr>
<tr>
<td>Two</td>
<td>8</td>
<td>9.5</td>
<td>8.75</td>
</tr>
<tr>
<td>Three</td>
<td>9</td>
<td>9.5</td>
<td>9.25</td>
</tr>
<tr>
<td>Four</td>
<td>7.75</td>
<td>9.25</td>
<td>8.5</td>
</tr>
<tr>
<td>Five</td>
<td>8</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Six</td>
<td>7.25</td>
<td>9.75</td>
<td>8.5</td>
</tr>
<tr>
<td>Seven</td>
<td>9</td>
<td>9.5</td>
<td>9.25</td>
</tr>
<tr>
<td>Eight</td>
<td>5.25</td>
<td>7.25</td>
<td>6.25</td>
</tr>
<tr>
<td>Nine</td>
<td>8</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Ten</td>
<td>7.5</td>
<td>10</td>
<td>8.75</td>
</tr>
<tr>
<td>Eleven</td>
<td>9</td>
<td>10</td>
<td>9.5</td>
</tr>
<tr>
<td>Twelve</td>
<td>9</td>
<td>10</td>
<td>9.5</td>
</tr>
<tr>
<td>Thirteen</td>
<td>7.5</td>
<td>9.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Average</td>
<td>8</td>
<td>9.6</td>
<td>8.8</td>
</tr>
</tbody>
</table>
Once upon a time there was a 5 years-old little girl called Martina. She was really sad because it has rained and there has been sun, but she has not been able to see the rainbow. She told that to her grandmother, called Lupe. Lupe told Martina to look for the colours one by one (sequence) in the vegetable garden to create her own rainbow. Martina was very happy. Lupe gave Martina a map with clues to find each colour:

First, to find the red colour, Martina should get a tomato.
Second, to find the orange colour, Martina should get a carrot.
Third, to find the purple colour, Martina should get an eggplant.

The rest of the colours were in the lake, so Lupe told Martina to go to the lake following the red-blue-red-blue-red-blue-blue-blue (pattern) path:
First, to find the yellow colour, Martina should get a duck.
Second, to find the green colour, Martina should get a frog.
Third, to find the blue colour, Martina should get water.

When Martina have all colours, she composed the rainbow with the help of her grandmother (decomposition).
She was so happy that she started to turn around and around (loop) until her grandmother told her to stop. Lupe told Martina that if she did not stop turning around, she could get dizzy (conditional).
SAMPLE ACTIVITIES: PUZZLE, MAP AND DANCE
CONCLUSIONS AND FUTURE WORK

Teaching programming in Early Childhood Education seems to have many **benefits**, but there are **issues**:

- **Device**: it is proposed an unplugged approach with stories, crayons, toys, cards and eva foam.
- **Curriculum**: during the assembly.
- **Age**: from 3-4 years old.
- **Programming language**: the activities of the story.

- 100% of the 91 students, future Early Childhood Education teachers were able to create the stories and activities.
  - **Average score of 8.8**.

- As future work, it is necessary to go to the Early Childhood centres and get **results from the children**.
MANY THANKS!
diana.perez@urjc.es