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Computational Thinking for Teacher Education

Joao Orvalho

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10th International Scratch conference, Bordeaux, 18 – 21st
July 2017

For more than 10 years I have been teaching ICT to future elementary teachers using Scratch. Every year it is necessary to deconstruct the idea of “using and making”. In our elementary teacher-education program, at Polytechnic of Coimbra, we engage future teachers early in their preparation to formulate ways to integrate computational thinking into their practice. I discuss this issue in the first year, which’s the ideal moment and place for students (future teachers) be exposed to the computational thinking concept. So, in this poster I will present some work that I’ve done with the students in the first year of elementary teachers-education and their results at the end of the semester.

- What Is Computational Thinking? ^[1]

"... breaking down a difficult problem into more familiar ones that we can solve (problem decomposition), using a set of rules to find solutions (algorithms), and using abstractions to generalize those solutions to similar problems." ^[2]

Algorithms are central to computational thinking and we introduce it by using examples from students, at first year of elementary teachers-education, daily lives.

- Computational Thinking and Teacher Education

Our students are exposed to the computational thinking concept of abstraction by creating models of physics entities.

Our work follows the methodology of “Teacher educators need to first develop pre-service teachers' knowledge and skills on how to think computationally and then how to teach their students to think computationally” ^[1]

- Weakness of our system

Polytechnic of Coimbra teacher educators program only have one ICT course (2 ECTS), in a 4 year program, to prepare teachers, empowering them to teach and to integrate computational thinking into their practice.

This is a transversal problem in Portugal.

This weakness does not allow us to apply, strategically and in a curricular way, a great enthusiasm that we have, as in other countries, and launch a national computer science curriculum for primary schools, as is the case with U.K., where "Every child should have the opportunity to learn concepts and principles from computing, including computer science and information technology, from the beginning of primary education onward, and by age 14 should be able to choose to study toward a recognized qualification in these areas.“ [3]

- TIC EB 2016-2017 teste em 30/5/2017

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Recriar (adaptar) o seguinte conto infantil em Scratch:

Era uma vez o Eu, o Tu e o Ele

A partir daí, o Eu, o Tu e o Ele, passaram a ser Nós, um grupo de amigos muito unidos e feliz!

Autor: T. Santos (?)

Enunciado (componente teórica) – 50%

Escreva (nesta folha) a planificação/ guião / passos do algoritmo do projecto a desenvolver.

Componente prática - 50%

Desenvolva o programa em Scratch. Enviar email para joaovalho@gmail.com, com o assunto "TIC-EB 30-5-2017 + o seu primeiro e último nome", com o ficheiro do projecto em anexo.

Przebieg do Projektu:

1.º Passo: Apresentação de História. O palco tem uma ilustração e o título.

2º Passo: Não pule a vida com os seus. O Narrador,
me Duende diz:
- Era uma vez o Eu, o Tu e o Ele que moravam

na meszecz raz, miesiąc pełen z ciędego 20 mecz.
Ciebie w życiu swoich miesiąc ciędego...


3º Passo: O censo mostra o interior de uma
nêutriz. O Eu diz:
— Olé, eu sou o Eu. Tenho tudo dentro de
belz e criatiz, mas ... não sou feliz! Porquê?

h.º Pedro: O cenário mostra o interior de outra habitaco. O Tu diz:
- Ol', eu sou o Tu. Tenho tudo dentro desta bela casa, mas ... no sou feliz! Porqu?

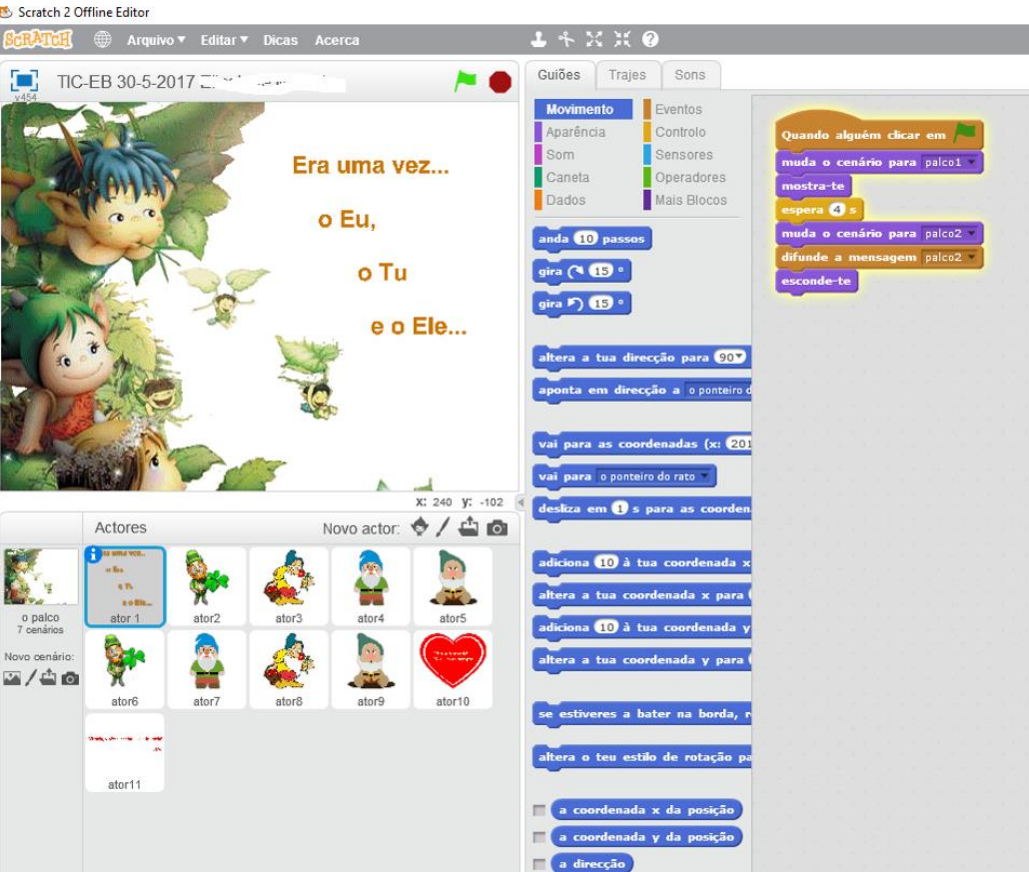
5º Passo: O cenário mostra ainda a felicidade habitada por dentro. O Ele diz:

— Olé, eu sou o Ele. Tenho tudo dentro deste belo casulho, mas ... não sou feliz! Porquê?

6º Passo: O Duende vai ajudá-los. Diz uma palavra mágica "Amizade"... E eles vêm para a vez. De início, ficam estantados... mas logo começam a conversar zinzinando. Ficam tão amigos que resolvem fazer um juramento "Nós" com o lema "Um por todos e todos por um". Fintar-se e...

7º. Pssso: Aparece um enorme coração maravilhoso com a frase "Viva a Amizade! Não, paz sempre.
Vê-se a frase Luz! "Vitória, vitória, rezhou-se a história" e "Fim", claro! :)

- Example: Code - Scratch project



Bibliography

- [1] Computational Thinking for Teacher Education, By Aman Yadav, Chris Stephenson, Hai Hong, Communications of the ACM, Vol. 60 No. 4, Pages 55-62, 10.1145/2994591 (<https://cacm.acm.org/magazines/2017/4/215031-computational-thinking-for-teacher-education/fulltext>);
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