

Growing Algorithmic Thinking Through Interactive Problems to Encourage Learning Programming

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Context

- **Attracting** pupils to informatics
- Teaching pupils **programming**
- Offering teachers support to teach **algorithmic thinking**

Online platforms

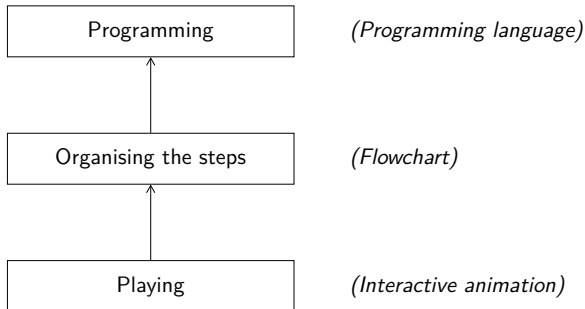
- Existing online platforms are focused on **direct teaching** of programming
 - Pupils and even teachers do not know what is **programming** nor **algorithm design**
- ✓ **Self-contained activities help teachers to support taught courses**

Interactive Learning of Programming and Algorithm Design Skills

- A website to support the learning of **algorithm design and programming** skills through **interactive** problems
- Proposes a set of activities related to an algorithmic problem

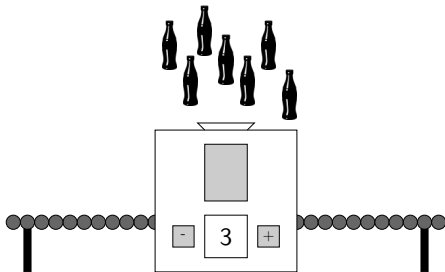
Activities

- Activities are split into **three stages**



Interactive animation

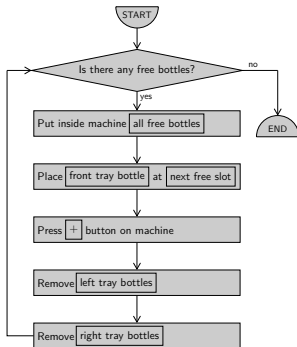
- Play with an instance of the problem



- ✓ Discover the algorithm and build it in their mind

Executable flowchart

- Execute and run a flowchart on an instance of the problem



✓ Concretise and take the algorithm out of their mind

Program

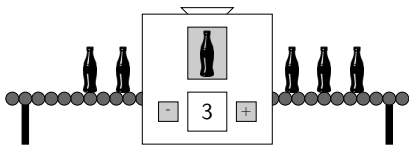
- Write a Python program corresponding to the flowchart

```
while isAnyBottlesFree():  
    putInMachine (ALL_FREE_BOTTLES)  
    place (FRONT_TRAY_BOTTLE, NEXT_FREE_SLOT)  
    press (PLUS_BUTTON)  
    remove (LEFT_TRAY_BOTTLES)  
    remove (RIGHT_TRAY_BOTTLES)
```

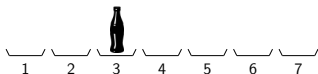
- ✓ Communicate the algorithm to the computer

Interactive aspect and feedback

- Interactive animation working like a **comic strip**
- **Feedback textual messages** to help the learner

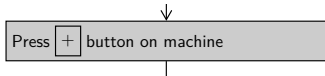


You placed a bottle weighing 3 ounce on position 2 but there are two lighter bottles. Are you sure it is a correct position?



Coherence between stages

- Elements of flowcharts correspond to action by the learner
- Python functions correspond to flowchart elements



`press (PLUS_BUTTON)`

Conclusion

- Helping pupils learn new skills with **active learning** and **feedbacks**
- From algorithmic thinking to programming
- Need to be tested and evaluated for quality