How to Teach Python to Beginners: A Guide for Python Experts👩🏽‍🏫🐍

By Dr. Marielle Dado

😸☕ Hi! I'm Marielle

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📗 “Learnable Programming” by Bret Victor

“ Two thoughts about learning:

- Programming is a way of thinking... Learning [how to code] is not learning to program, any more than learning about pencils is learning to draw.
- People understand what they can see.

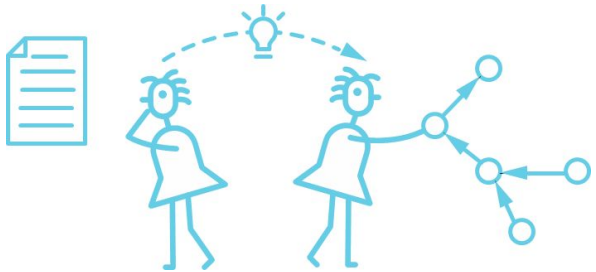
Thus, the goals of a programming system should be:

- to support and encourage powerful ways of thinking
- to enable programmers to see and understand the execution of their programs ”

http://worrydream.com/LearnableProgramming/

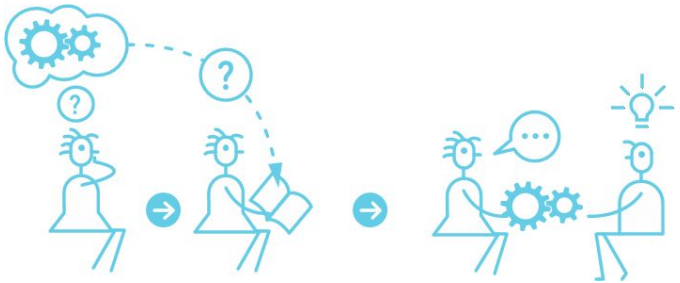
Let's Make Python Learnable!

Evidence-Based Instructional Strategies



Dual Coding

Combining
text (i.e., code) + images



Self-explanations

Encourage learners to explain
to themselves how their code
works

📰🖼️ Dual Coding

💡 We remember new info better when it is presented visually + verbally.

🧠 Our brains store (“encode”) verbal and visual information in different regions

👍🏿 When you have the same info in two formats, this gives you two ways of remembering that info.

📰🖼️ Dual Coding

▶️ Find different ways of presenting abstract concepts visually (not just with code)

▶️ Python Tutor: https://www.pythontutor.com

❓💭💬 Self-Explanations

💡 When you explain new info to yourself (or others), you are actively making sense of what you just learned

💡 Self-explanations strengthen the connection between what you're trying to learn and what you already know

💡 A great way to identify knowledge gaps when you're stuck

⚠️ Self-explanations must be done out loud/in writing!

▶️ Learners can do start alone, then with a partner

❓💭💬 Self-Explanations

⚠️ Beginners might not know where to start!

▶️ Help learners by prompting them to make accurate explanations

▶️ Encourage writing comments in code

▶️ Try explaining other people's code! PythonStdio Games: https://github.com/asweigart/PythonStdioGames

❓💭💬 Self-Explanation Prompts

```python
"""Tutorial: Guess the Number, by Al Sweigart al@inventwithpython.com
Part 6 of a tutorial to make a "Guess the Number" game, bit by bit."""

# Try copying the code in this program on your own and running the
# program before moving on to part 7. (You don't have to copy the
# comments.)


import random

secretNumber = random.randint(1, 20)


print('Hello! What is your name?')
playerName = input()
print('It is good to meet you, ' + playerName)

print('I am thinking of a number from 1 to 20.')
print('You get 6 guesses.')

for i in range(6):
    print('Take a guess.')
    guess = input()

    if int(guess) < secretNumber:
        print('Your guess was too low.')
    elif int(guess) > secretNumber:
        print('Your guess was too high.')
    elif int(guess) == secretNumber:
        break

print('My secret number was', secretNumber)
if guess == str(secretNumber):
    print('You guessed my number!')
else:
    print('You did not guess my number. Better luck next time.')
```

Ask yourself these questions:

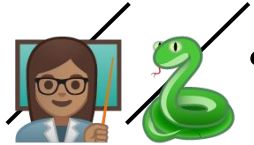
- What output am I expecting?
- How do I know?
- How does Line x affect Line y?
- What happens if I comment out this line?
- How would I code this program differently?

PythonStdioGames - https://github.com/asweigart/PythonStdioGames

🍕🐍 Final Words

👩🏿‍🏫 Develop pedagogical content knowledge - how can you make Python “learnable”?

🦉 ~~Learning by doing~~ → Learning by doing, with intention



I'd love to help!

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