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LCCS NW2 Session 3

PRIMM Curriculum planning







By the end of this session...

Participants will be enabled to...

- deepen their understanding of the Investigate, Modify and Make stage of the PRIMM pedagogy by working together through a group activity
- engage collaboratively to develop a curriculum plan for the coming weeks/months guided by the LCCS specification

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Successful Strategies and Pedagogies





Example: Fix the syntax



Run the program to see what happens
Can you fix the syntax error?
PRINT("Hello World")

Now continue with the remaining 4 print statements ... # You will need to uncomment each line and run the program to reveal each syntax error #print(Hello World) #print('Hello World") #print "Hello World" #print("Hello", World)

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Example: Find the bug (semantic error)

```
# Find and fix the 'bug' in the program below
# The intention is to add a and b and display the answer
a = 3
b = 4
sum = a + 3
print(a, "+", b, "=", sum)
```

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Example: Insert comments



Insert comments to explain each line of code below
(the first one has been done to get you started)

```
x = 23 # Assign the value 23 to the variable x
y = 17
print("The value of x is", x)
print("The value of y is", y)
x = x + y
print("The value of x is", x)
x = y
print("The value of x is", x)
```

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Example: Fill in the blanks







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Example 1: Parson's Problem



Arrange the blocks of code below into the correct order



The final program should generates a random number, prompts the user to enter a guess and display a message telling the user if the guess was correct, too low or too high.

The program should always display the string *Goodbye* at the end.

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Example 2: Parson's Problem



Rearrange the jumbled-up lines shown below so that the program prompts the end-user to enter two integers and then computes and displays their sum.

number2 = int(number2)

```
number1 = int(input("Enter first number: "))
```

sum = sum + number1

number1 = int(number1)

```
print(number1, "+", number2, "=", sum)
```

```
number2 = input("Enter second number: ")
```

```
print("The answer is sum")
```

```
sum = number1 + number2
```

Warning! There are three extra lines that you won't need.

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Peer Instruction

Well-evidenced pedagogical strategy Combination of:

- Flipped learning
- Collaborative working
- Well-chosen MCQs



Most effective where there are close distractors and known misconceptions



For more information on peer instruction see http://peerinstruction4cs.org

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PRIMM





PRIMM



A way of structuring programming lessons that focuses on:

- Reading before Writing
- Student Collaboration
- Reducing Cognitive Load
- Well-chosen starter programs
- Ownership Transfer



Sources:

- 1. https://blogs.kcl.ac.uk/cser/2017/02/20/exploring-pedagogies-for-teaching-programming-in-school/ (Sue Sentence)
- 2. <u>https://blogs.kcl.ac.uk/cser/2017/09/01/primm-a-structured-approach-to-teaching-programming/</u> (Sue Sentence)
- 3. Sue Sentance, Jane Waite & Maria Kallia (2019) Teaching computer programming with PRIMM: a sociocultural perspective, Computer Science Education, 29:2-3, 136-176, DOI: 10.1080/08993408.2019.1608781

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- **Predict:** given a working program, what do you think it will do? (at a high level of abstraction)
- Run: run it and test your prediction
- **Investigate:** What does each line of code mean? (get into the nitty gritty low level of abstraction trace/annotate/explain/talk about parts)
- **Modify:** edit the program to make it do different things (high and low levels of abstraction)
- Make: design a new program that uses the same nitty gritty but that solves a new problem

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PRIMM – Example (1 of 2)



import random 2. number = random.randint(1, 10) 3. #print(number) 4. 5. guess = int(input("Enter a number between 1 and 10:")) 7. 8. if guess == number: 9. print("Your quess was correct") print("Goodbye") 10. 11.else: 12. print("Incorrect guess") 13. print("Goodbye")

Predict: Discuss in pairs. What do you think the above program will do? Be precise. Be succinct.

Run: Download the program / Key it in. Execute the program. Test your prediction. Were you correct?

Breakout Activity:

Investigate: Devise some questions to elicit student learning and curiosity. What if ... Try ... Explain ... P7

Modify: Suggest some simple extensions / modifications for students to make in pairs. Same program.

Make: Formulate new problems that are conceptually similar. New context. New program (copy+paste)

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PRIMM – Example (2 of 2)



 import random 2. 	Investigate:
<pre>3. number = random.randint(1, 10)</pre>	1. Uncomment line 4. What happens?
4. #print(number)	2. What is the purpose of line 4?
5. 6. guess = int(input("Enter a number between 1 and 10: "))	3. What would happen if you removed int from line 6?
7. 8. if guess == number:	5. What if $==$ was changed to $=$?
9. print("Your guess was correct")	6. What would happen if you don't enter an integer?
10. print("Goodbye") 11. else:	7. Try removing a bracket (anywhere). What happens?
12. print("Incorrect guess")	8. Annotate each line of the program.
13. print("Goodbye")	

Modify:

- 1. Change the program so that it generates a number between 1 and 100? Can you be sure?
- 2. Change the program so that there is only one print ("Goodbye") statement (without altering the logic)
- 3. Extend the program so that it tells the user if the number entered was too high or too low
- 4. Design an algorithm based on the program that would give the user 3 guesses
- 5. Get the computer to generate 4 numbers (lotto) OR ask the user how many numbers to generate?

Make:

Write a program that generates two numbers and prompts the user to enter their product



Group activity

Instructions:

In your groups, fill in the *Investigate*, *Modify* and *Make* sections in your workbook for the code snippet assigned to you.

You may use the examples from the previous pages to help you.





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- 1. from turtle import *
- 2.
- 3. color("red")
- 4. pensize(5)
- 5. forward(100)
- 6.left(90)
- 7. forward(100)
- 8.left(90)
- 9. forward(100)
- 10.left(90)
- 11.forward(100)



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```
runningTotal = 0
2.
3.
   price1 = 10
4.
    runningTotal = runningTotal + price1
5.
  price2 = 14
6.
    runningTotal = runningTotal + price2
7.
  price3 = 6
8.
   runningTotal = runningTotal + price3
9.
10. print("Total amount is", runningTotal)
```

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```
print("Average height calculator")
2.
   3.
4.
   h1 = int(input("Enter first height (cm): "))
5.
   h2 = int(input("Enter second height (cm): "))
   h3 = int(input("Enter third height (cm): "))
6.
   h4 = int(input("Enter fourth height (cm): "))
7.
   h5 = int(input("Enter fifth height (cm): "))
8.
9.
10. avgHeigth = (h1+h2+h3+h4+h5)/5
11.
12. print("The average height is ", avgHeigth, "cm")
```

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Curriculum planning

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"Learning outcomes can best be defined as statements of what a learner knows, understands and is able to do after completion of learning." CEDEFOP (2009)

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How might you work with the learning outcomes?





How might students demonstrate they have achieved the learning outcomes?

What content or resources might you need?

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Group activity





In your groups, consider: Timeframe / Topics / LOs / Resources / Assessment / Build up to ALTs / ALTs / Equipment etc.

Nominate:

A **notetaker** to summarise your group's work A **spokesperson** to provide feedback



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