

# Parson's Field Studies

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# Background

- SAGE Development Guidance
- Research Gap in Parson's efficiency

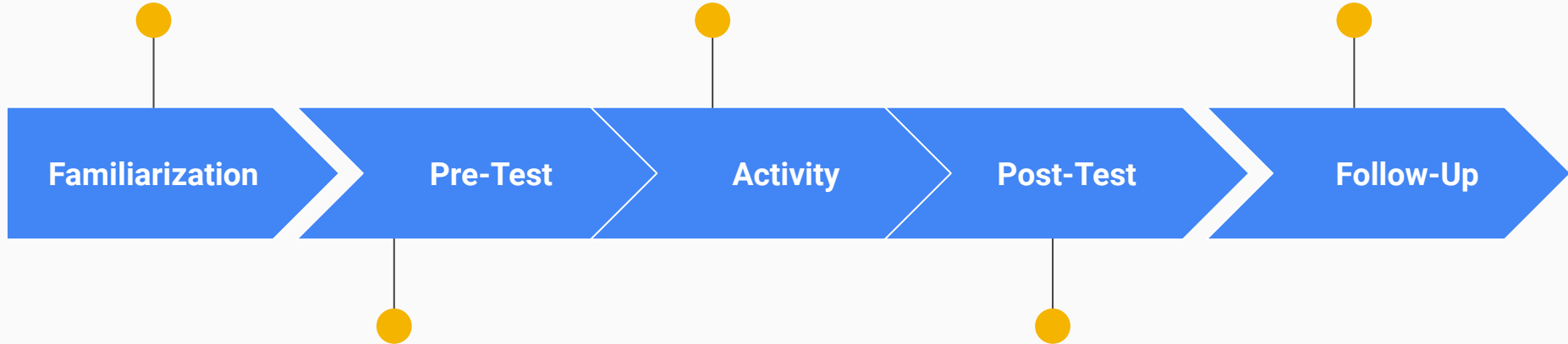
*Harms, Chen & Kelleher (2016)*

*Ericson, Margulieux & Riack (2017)*

Background  
Survey, SAGE  
Introduction

**Conditions:** Scratch, Code  
Completion, Parsons

Delayed Post-Test,  
Pain Points  
Interview

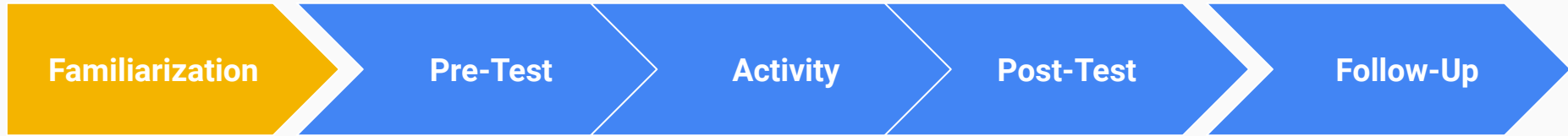


Palette Multiple  
Choice, Tracing,  
CC

Isomorphic Pre-Test

**Study Overview**

# Familiarization



*Set the stage for the study, collect participant information and introduce SAGE environment*



Student

Home

Metrics

Missions

Account

Hide / Show



SAGE

File Edit

Level

Proficient: 0  
Developing: 0  
Basic: 0

Hey! Let's start solving!

SAGE Play Mode

Points: 0

Scripts Backdrops Sounds

Motion

- Control
- Sensing
- Operators
- More Blocks
- Parsons

Looks

Sound

Pen

Data

Events

Stage selected:  
No motion blocks

Sprites

New sprite:

Stage  
1 backdrop

New backdrop:

Hint



Welcome to the  
Parson's Puzzles!

INSTRUCTION

QUESTION

HINT

Level Proficient

Score 0

07 53

MINUTES SECONDS

SUBMIT

This is the instruction  
button. Press on it to  
see game objectives  
and instruction!



Student

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Missions

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Hide / Show



SAGE

File Edit

Hey! Let's start solving!  
SAGE Play Mode

Points: 0

Scripts Backdrops Sounds

Motion

Looks

Sound

Pen

Control

Sensing

Operators

More Blocks

Instructions will be posted here on this pop-up! Refer back to it as many times as you need.

Sprites

New sprite:

Stage  
1 backdrop

New backdrop:

Hint



Welcome to the  
Parson's Puzzles!

INSTRUCTION

QUESTION

HINT

Level Proficient

Score 0

07 53

MINUTES SECONDS

SUBMIT

when clicked

repeat 10

if touching color ? then

if then

say Gray

when clicked

repeat 10

move 10 steps

if touching color ? then

say Green

if touching color ? then

say Gray

Scripts

Costumes

Sounds

Motion



Control



Looks



Sensing



Sound



Operators



Pen



More Blocks



Data



Parsons



Events



Question/Hint/Time

move 10 steps

say

repeat 10

if then

touching color ?

Set Proficiency Scores

Add feedback for wrong block

# Testing

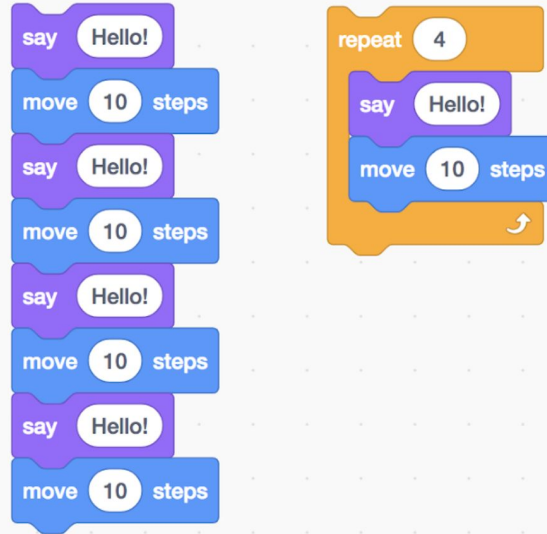


*Measure baseline knowledge, timed worked examples,  
measure (improved) knowledge levels*



# Pre/Post Test: Code Tracing

Do the code blocks on the left and right side do the same thing?

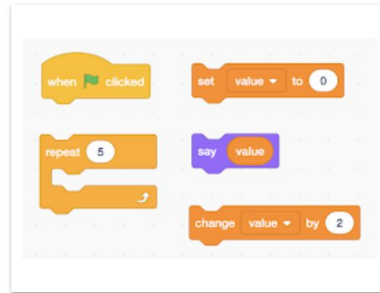


☐ Yes

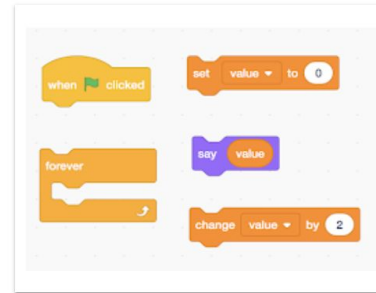
☐ No

# Pre/Post Test: Parson's Palette Multiple Choice

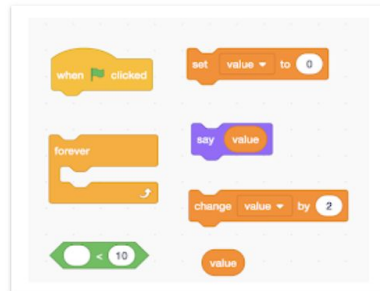
Which of the following palettes contains the necessary blocks to print "0,2,4,6,8,10"?



☐ Palette 1



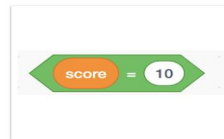
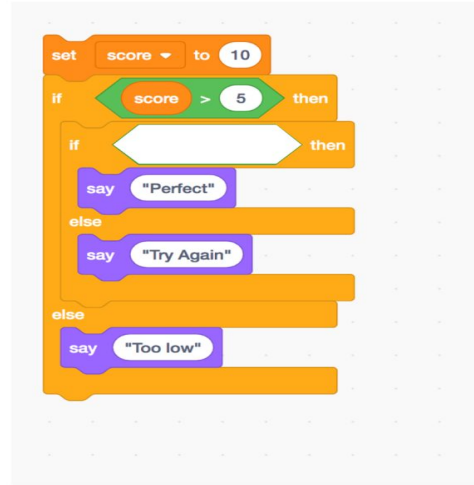
☐ Palette 2



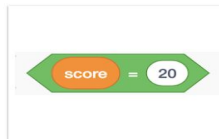
☐ Palette 3

# Pre/Post Test: Code Completion

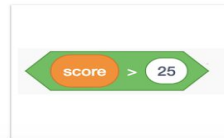
What block would result in the Sprite saying "Perfect"



☐ Block 1



☐ Block 2



☐ Block 3

# Activity - Parsons Puzzle

INSTRUCTION



Instructor

Account

Home

Classes

Mission Management

Libraries

Hide / Show

SAGE Design Mode

File Edit

Sprites Costumes Sounds

Motion Looks Sound Pen Data Events

Control Sensing Operators More Blocks Parsons

Question/Hint/Time

move 10 steps

say

repeat 10

if then

touching color 7

Set Proficiency Scores

x: 240 y: 159

Sprites

New sprite:

Stage 2 backdrops

New backdrop:

Sprite1


when clicked

x: -122 y: -42

Hint

- Testing iteration and control flow
- Mining theme

# Activity - Code Completion



**SOUTH BRONX** EARLY COLLEGE ACADEMY  
A Public Charter School

**Instructor**

- Account
- Home
- Classes
- Mission Management**
- Libraries
- Hide / Show

**INSTRUCTION**

File Edit

SAGE Design Mode

Scripts Costumes Sounds

Motion Looks Sound Pen Data Events Control Sensing Operators More Blocks Parsons

Question/Hint/Time

x: 240 y: -10

Sprites

New sprite:

Stage  
2 backdrops

New backdrop:

Sprite1

when clicked

repeat 10

if touching color ? then

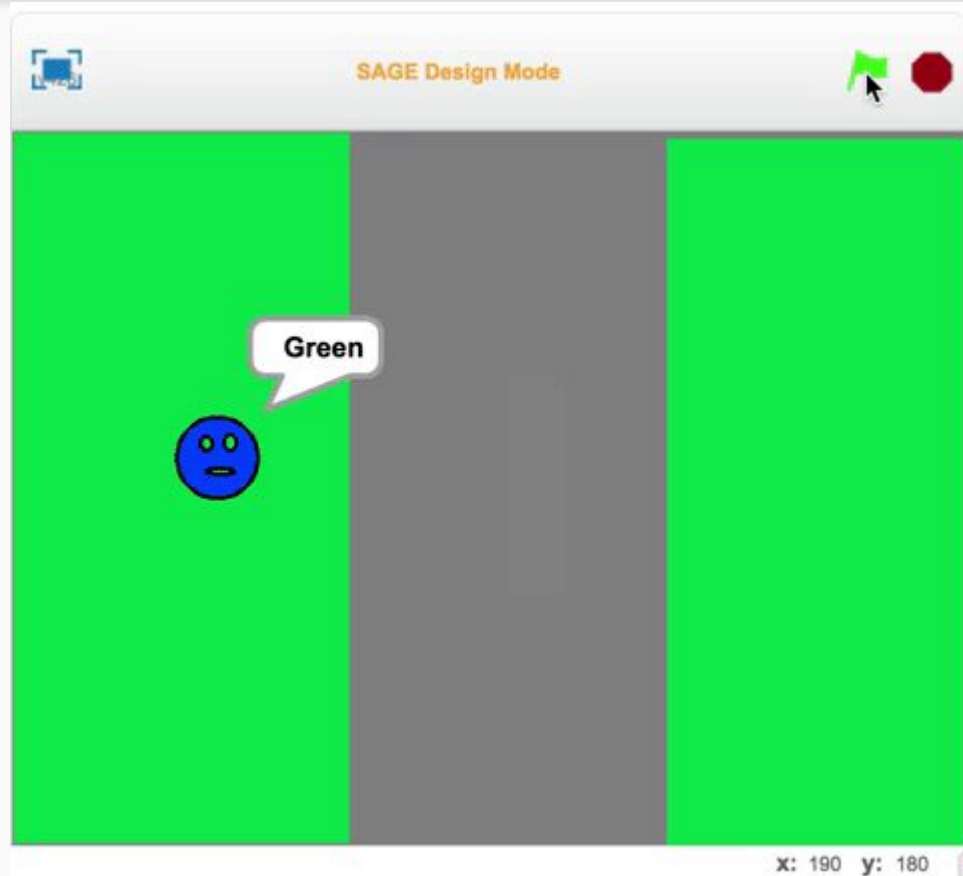
say Gray

if then

Hint

x: -140 y: -35

GIF will be placed into instruction to show desired behavior



# Activity - Identical Solution



Instructor

Account

Home

Classes

Mission Management

Libraries

Hide / Show

File Edit

SAGE Design Mode  
parsons\_puzzle\_control\_flow

Motion

Looks

Sound

Pen

Data

Events

☒ Control

☒ Sensing

☒ Operators

☒ More Blocks

☒ Parsons

Question/Hint/Time

move 10 steps

say 0

repeat 10 0

if then 0

touching color 7 0

Set Proficiency Scores

Add feedback for wrong block

Stage  
2 backdrops

New backdrop:

Sprites

New sprite:

Sprite1

when clicked 0

repeat 100 0

move 10 steps 0

if touching color 7 0 then 0

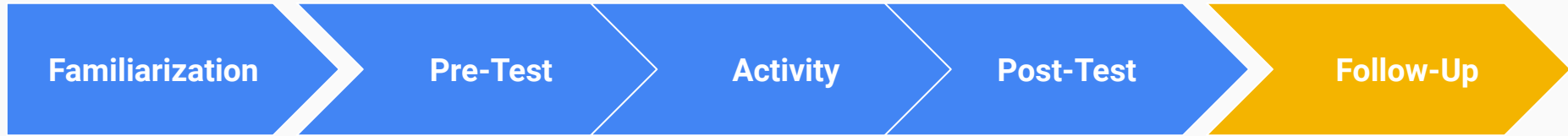
say Rock 0

if touching color 7 0 then 0

say Grass 0

x: 341  
y: -48

# Follow-Up



*Measure material retention, identify SAGE pain points*



# Feedback

## SAGE Engagement

For the following questions, rate how much you agree/disagree with the statements

I did not feel the urge to stop playing and see what was going on around me.

- ☐ Strong Disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly Agree

I enjoyed the graphics and imagery of the game.

- ☐ Strong Disagree

## Open-Ended Feedback

Let us know how we can make SAGE better!

What did you like the least about using SAGE? Please be specific as possible.

Your answer

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What did you like the most about using SAGE? Please be specific as possible.

Your answer

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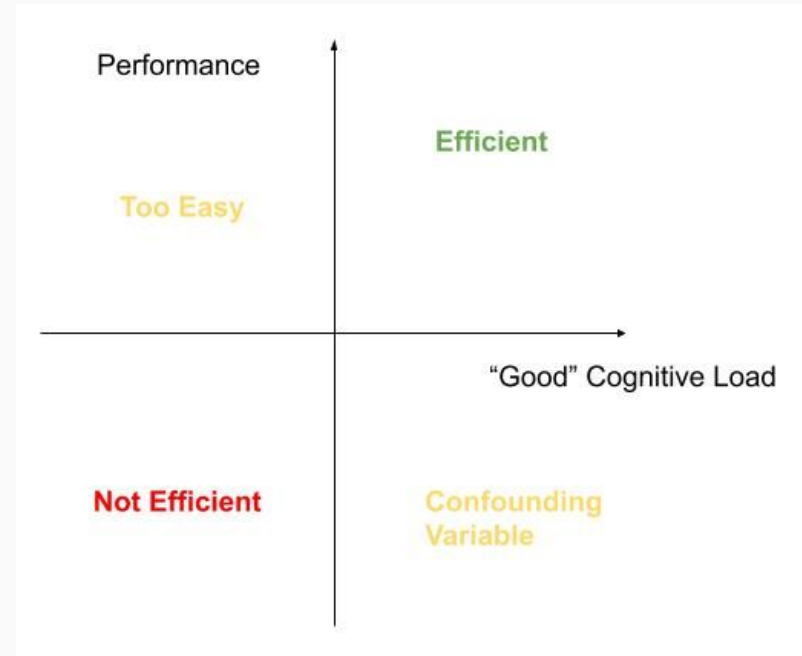
What would you change to the platform to make it better?

Your answer

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# Results & Analysis

Problem Type	Pretest (std dev)	Posttest (std dev)	Delayed PT (std dev)
Tracing	2.48 (1.45)	3.50 (1.50)	3.78 (1.17)
Code Completion	9.36 (2.01)	11.41 (1.23)	11.42 (1.34)
Parson's MC	8.50 (1.56)	10.18 (3.49)	8.63 (2.32)



# Future Work

- Problem Set (CT concepts)
- Code Completion Format
- Scoring System