PROGRAMMING CONCEPTS AND SKILLS SUPPORTED IN SOLUTION



Lifelong Kindergarten Group MIT Media Lab http://scratch.mit.edu

PROBLEM-SOLVING AND PROJECT-DESIGN SKILLS

- · logical reasoning
- debugging problems
- developing ideas from initial conception to completed project
- sustained focus and perseverance

FUNDAMENTAL IDEAS ABOUT COMPUTERS AND PROGRAMMING

- Computer programs tell the computer precisely what to do, step-by-step
- Writing computer programs doesn't require special expertise, just clear and careful thinking

SPECIFIC PROGRAMMING CONCEPTS

Concept	Explanation	Example
Sequence	To create a program in Scratch, you need to think systematically about the order of steps.	when space v key pressed go to x: -100 y: -100 glide 2 secs to x: 0 y: 0 say Let the show begin! for secs play sound fanfare v until done
Iteration (looping)	forever and repeat can be used for iteration (repeating a series of instructions)	play drum 54 7 for 0.2 secs move 10 steps turn 10 degrees
conditional statements	if and if-else check for a condition.	set x to -200 wait .01 secs
variables	The Variables category allows you to create a new variable and use it in a program. Scratch supports both global and object-specific variables.	when clicked set score to 0 forever move 10 steps if touching color change score by 1
	and oxyour operation (and account	
event handling	when key pressed and when sprite clicked are examples of event handling – responding to events triggered by the user or another part of the program.	when left arrow very key pressed point in direction -90 very move (10) steps

Concept	Explanation	Example
threads (parallel execution)	Launching two stacks at the same time creates two independent threads that execute in parallel.	when clicked glide 3 secs to x: -75 y: 82 glide 5 secs to x: 179 y: -130 when clicked forever next costume wait 1 secs
one-to-many communication	broadcast and when I receive can coordinate the actions of multiple sprites. (using "broadcast and wait" allows synchronization)	For example, Sprite1 sends the message winner when condition is met: wait until score > 100 broadcast winner This script in Sprite2 is triggered when the message is received: when I receive winner play sound cheer play sound cheer say You won the game!
random numbers	The pick random block selects random integers within a given range.	set x to pick random -100 to (100)
boolean logic	and, or, not are examples of boolean logic.	when space v key pressed If touching color ? and x position > 200 change score by 1 play sound music v until done
dynamic interaction	mouse_x, mouse_y, and loudness can be used as dynamic input for real-time interaction	forever set size to loudness * 4 % wait 0.01 secs
user interface design	You can design interactive user interfaces in Scratch – for example, using clickable sprites to create buttons.	when Sprite1 clicked change brightness effect by 25 play drum 48 for 0.25 secs change brightness effect by -25

PROGRAMMING CONCEPTS NOT CURRENTLY INTRODUCED IN SCRATCH:

- data structures (arrays, etc.)
- procedures and functions
- recursion
- inheritance
- defining classes of objects

- exception handling
- parameter passing and return values
- text input
- file input/output