PROGRAMMING CONCEPTS AND SKILLS SUPPORTED IN 是强强短调

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 E	xample
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)	repeat 36 play drum 54 ▼ for 0.2 beats 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 variable blocks allow you to create variables and use them in a program. The variables can store numbers or strings. 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
lists (arrays)	The list blocks allow for storing and accessing a list of numbers and strings. This kind of data structure can be considered a "dynamic array."	add bread to food w add red apples to food w set counter w to 1 repeat length of food w say item counter of food w for 2 secs change counter w by 1

Concept	Explanation	Example
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 v key pressed point in direction -90 v move 10 steps
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
coordination and synchronization	broadcast and when I received can coordinate the actions of multiple sprites. Using broadcast and wait allows synchronization.	For example, Sprite1 sends the message winner when this 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 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 key pressed if touching color ? and x position > 200 change score by 1 play sound music 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 v effect by 25 play drum (48 v for (0.2 beats change brightness v effect by -25

PROGRAMMING CONCEPTS NOT CURRENTLY INTRODUCED IN SCRATCH:

- procedures and functions
- parameter passing and return values
- $\bullet\, recursion$
- defining classes of objects
- inheritance

- exception handling
- text input
- file input/output