

AP CS PRINCIPLES PILOT: UC, SAN DIEGO

Beth Simon, Computer Science and Engineering

Why a new AP course?



- Need to define “general education” computing skills necessary for all college graduates to contribute in today’s society
- NOT (just) a course for CS/Math/Science majors
 - ▣ Something for everyone – closest perhaps AP Calculus
 - ▣ Does not replace the existing AP Computer Science Programming A course

How Did the Course Change Them?



- 1000+ Students
- 70%+ Freshmen
- 60%+ Women
- (General Education) **Required Course**

Increased Confidence



“It has given me confidence that I’m able to figure things out on a computer that I never would have thought that I could do.”

Change View of Technology



“Now, every time I find myself playing a video game, I actually understand what makes it work.

That these games are not magically produced, that it takes time, skill, and sufficient funds to create these games.

I appreciate these games more than before taking this class..”

Analysis Skills



“We learned in Alice that computers do exactly what you have them do.

Using this knowledge, we can understand how programs like Excel and Numbers work and learn that when we are using these programs, we need to specify and be exact with what we are doing in order for the programs to meet our needs and plans.”

Analysis Transferable Skills



“Programming allows a person to think more logically, thinking in order and debugging allows the user to gain valuable problem solving skills.

Aspiring to go to law school, thinking logically is extremely important and I think this has helped.”

Analysis Transferable Skills



“I feel that learning the language of computing definitely helps you understand dense reading a lot more efficiently.

I personally have noticed that my in-depth understanding of Computer Science wording has helped me understand my mathematical theorems and proofs more regularly than before.”

Communication Skills



“In today’s technologically-centered world, using a program like Alice gives us valuable exposure to discussing things technically with other people and explaining clearly what we are trying to do.”

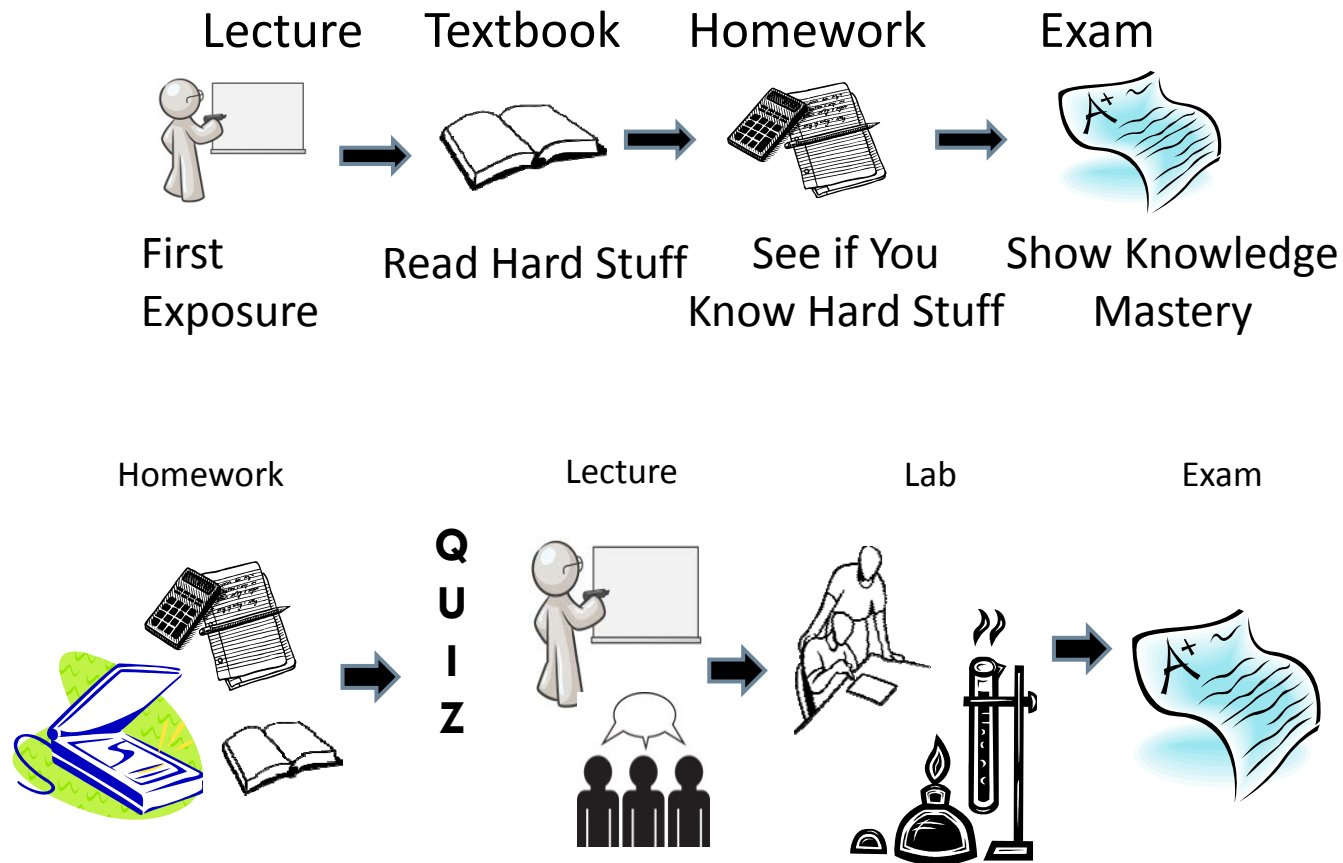
Organizational Skills



“Through Alice, I learned to stay organized and structured in anything I do, including studying for other classes. Although at first, thinking with several concepts at a time was very difficult, now I am more confident.”

How did we do it?

Peer Instruction: Students Engage in Analysis Through Discussion



What We Did: Alice + Excel


Wk	Tuesday	Thursday
1	Introduction	Sequential Execution
2	Static Methods, Parameters	Parameters and Methods
3	Methods	Interactive programs, events
4	Expressions, If statements	If statements
5	If statements, randomness	Counted loops
6	Conditional loops	Midterm
7	Lists/Arrays	Lists/Arrays
8	Excel: Formulas, Functions	Excel: Large Datasets
9	Excel: Explore / Visualize Data with Pivot Tables	Revisit Alice Lists and Searching
10	Material of Student Choice	Alice Project Show

Play Undo Redo

World
+ Camera
+ sunLight
+ island
+ Snowwoman
+ Snowman



Events create new event

When  is clicked on anything, do World.movie

When the world starts, do Camera.Screen set isShowing to true duration

World's details

properties methods functions

- movie edit
- fadeIn edit
- raiseEyeBrows edit
- heyBaby edit
- shelsCoy edit
- extendArms edit
- funnyTurnAnimation edit
- funnyWalk edit
- melt edit
- sigh edit
- hisReaction edit
- fadeOut edit

World.movie World.shelsCoy

World.shelsCoy No parameters create new parameter

No variables create new variable

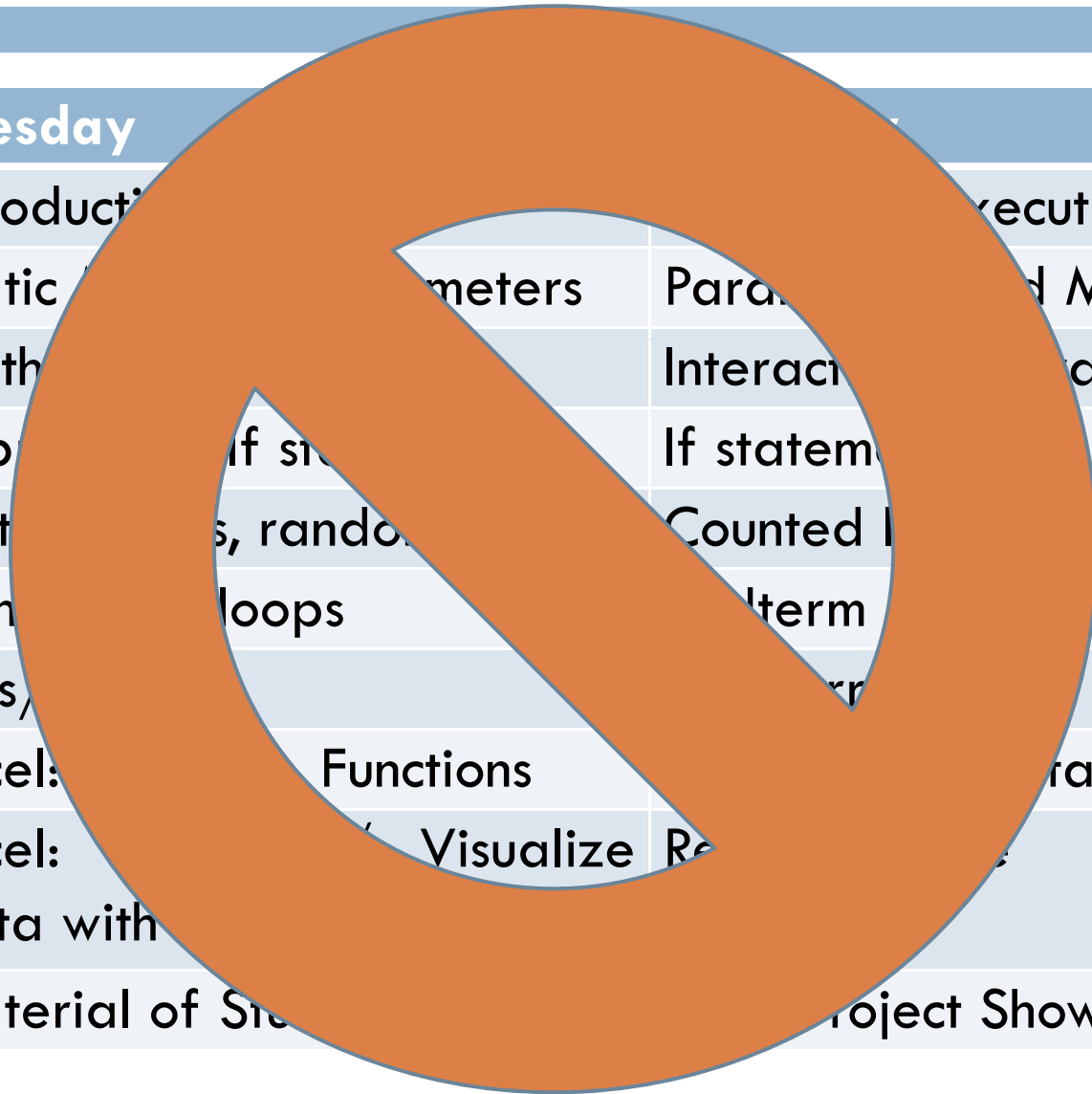
Do together

- Snowwoman.Head turn left 0.06 revolutions duration = 3/5 seconds more...
- Snowwoman.Head turn backward 0.06 revolutions duration = 3/5 seconds mor

Do in order Do together If/Else Loop While For all in order For all together Wait

print //

The EXACT Content Choice Isn't It



Wk	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	Introduction	Execution				
2	Static	Parameters	Parameters	Methods		
3	Method		Interactions	Streams, events		
4	Exp	If statements		If statements		
5	If statements	Random		Counted		
6	Con	Loops		Term		
7	Lists,					
8	Excel:	Functions		Assets		
9	Excel:	Visualize Re		Lists	and	
	Data with					
10	Material of Str			Project Show		

What We Do: Develop Skills in Analysis and Communication

□ Analysis and Communication Skills:

- ~40-50 minutes per 1:20 lecture “discussion” in teams
 - Guided by tutor
 - Reflected on/Modeled afterwards by instructor



How many of the underlined “items” result in values?

hare ▾ move forward ▾ hare ▾ distance to bee ▾ ▾

hare ▾ move forward ▾ hare ▾ distance to bee ▾ ▾

hare ▾ move forward ▾ ((subject = bee ▾ 's height ▾ / 2 ▾) ▾ - 1 ▾) ▾

hare ▾ move forward ▾ ((subject = bee ▾ 's height ▾ / 2 ▾) ▾ - 1 ▾) ▾

A) 1

B) 2

C) 3

D) 4

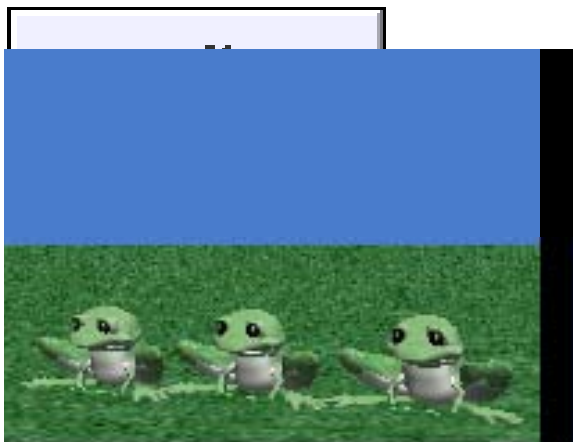
E) Don't Know

What does this code do?

item 0 = frog3 ▾

item 1 = frog2 ▾

item 2 = frog ▾



- A. The frogs talk in order left to right
- B. The frogs talk in backwards order (right to left)
- C. Each frog talks, but the order depends

```
≡ For all world.froggies ▾ , one [Obj] item_from_froggies at a time  
item_from_froggies ▾ say Hello ▾ more... ▾
```

Understanding, by Doing...



Analyzing
Effects of Computation

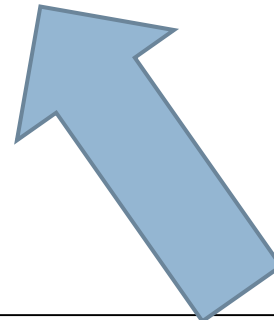
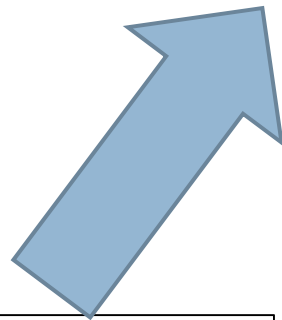
Communicating
Processes and Results

Analyzing
Problems and Artifacts

Working
Effectively In Teams

Creating
Computational Artifacts

Using
Abstractions and Models



Discuss Programming: Get So Much More



- Confidence
- Changed View of Technology
- Analysis (Transferable)
- Communication
- Organization

Very few students said:

**I learned to make a video game in Alice,
and that I can use in my future.**

Change Society: A New Norm



High School
Biology



CS Principles



Questions?

