Enhancing Early Childhood Education With Computer Science Curriculum

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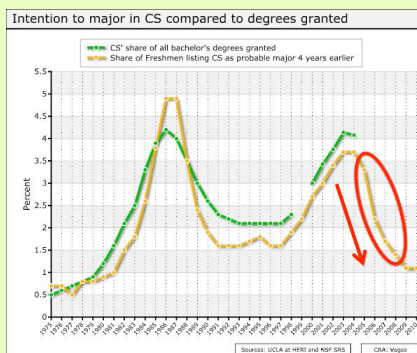
SyNeRG
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Motivation

Decrease in Students interested in majoring in Computer Science & other technical fields

1. Interest in CS as a major dropped by a whopping 70% between 2000 and 2005 and has since flattened to a point where just over 1% of incoming freshmen indicate CS as a probable major[1]

2. Students write off science and engineering as probable majors in middle school because it's not associated with what is "cool," aiding this decrease[1]

Intention to major in CS compared to degrees granted in the US[2]

Intention to major in CS compared to degrees granted

- CS' share of all bachelor's degrees granted
- Share of Freshmen listing CS as probable major 4 years earlier

Percent

Sources: UCLA at HERI and NSF SRS   CRA: Vegso

Why is this so important?

1. Computer scientists are in demand, rated #4 of college degrees in demand[3]

2. U.S. Bureau of Labor & Statistics projects that 71% of all science & engineering jobs will be for computer scientists & engineers[1]

Best way to find more Computer Scientists:

Start them young!

Approach

Developing a Storytelling Alice curriculum that:

1. **Teaches** Computer Science concepts
2. **Caters** to K–8 students with easily understood and simple in language
3. **Informs** by teaching one main concept per lesson
4. **Easily executed** using a self-contained LiveCD or MyVICE: My Virtual Instances of Computing Environments, hosted at Virginia Tech
5. **Engages** and **entertains** students by creating 3D animated short

Lessons filled with FUN:

1. Playing With Storytelling Alice
2. Parallelism
3. Running Around in Loops
4. Method to Making Methods
5. What If?
6. Did You Hear That, Alice?
7. Making Movies
8. Variables
9. Creating Classes
10. Recursion

Lesson 1: Playing With Storytelling Alice

Goals
- Do the ice skater tutorial.
- Learn how to use *Storytelling Alice* through the tutorial.
- Recreate the ice skater world from scratch.

Now that we have *Storytelling Alice* installed, let's play with *Storytelling Alice* to learn how to use it.

We will begin with the ice skater tutorial in order to figure out *where everything is* and *what everything means* in *Storytelling Alice*. We will then re-create the ice skater world from scratch.

The Tutorial
1. Start-up Alice.exe by double-clicking on the icon that looks like this: Alice.exe
2. The **"Welcome to Alice!"** window, shown in Figure 1 below, should appear.
   - If the window does not appear, go to the top left corner of the screen and click on Help. In the drop-down menu, click on Tutorial, and the window should appear.

Figure 1. Starting the Ice Skater Tutorial.

3. Click on **Tutorial**, the first tab in the window, as shown in Figure 1.
4. Click on **Tutorial1**, i.e., the tutorial with a picture of an ice skater, and click **Open**.

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Ongoing Outreach

Successful deployments of the current curriculum at New River Valley elementary schools & VT programs:

- Margaret Beeks Elementary School (Spring 2010)
- Harding Avenue Elementary School (Spring 2010)
- Blacksburg New School (Spring 2010)
- West End Center (Spring 2010)
- Kids' Tech University (February 27, 2010 & April 10, 2010)

Based on the feedback from the Spring deployments, the curriculum is currently being updated to enhance:

- Content
- Clarity
- Visual Appeal

For future deployments & increased interest in CS ☺

References

[1] M. Gardner and W. Feng, *Broadening Accessibility to Computer Science for K–12 Education*, 2010.
[2] B. Webster, *The Decline in Computer Science Students (Part 2)*, 2008.
[3] CNBC, *10 College Degrees in Most Demand*, 2008.

Acknowledgements