

BJC in Action: Comparison of Student Perceptions of a Computer Science Principles Course

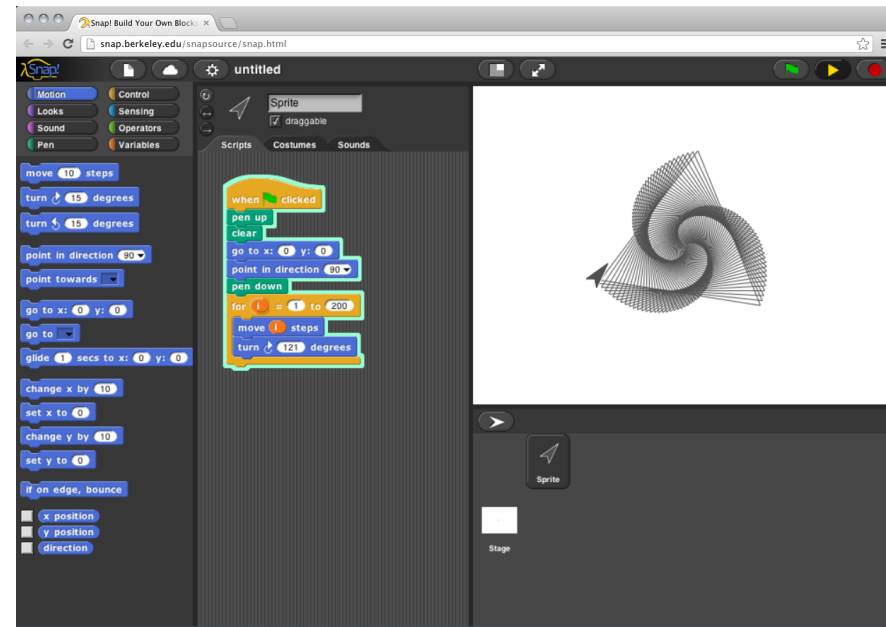
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RESPECT 2015

BJC Course Description

- BJC uses the Snap visual programming language to introduce students to programming concepts
- BJC is centered on 7 Big Ideas:
 - Creativity, Abstraction, Algorithms, Programming, Big Data, the Internet and Social Impacts
- Students build computing artifacts to show impacts of computing (web pages, apps, games, etc.)



Motivation

~300,000 students in AP Calculus AB in 2014

49% female; 24% minority students

<40,000 students in AP Computer Science in 2014

20% female; 22% minority students

Initiatives to broaden participation in computing include development of Exploring Computer Science course and AP CS Principles (CSP).

The Beauty and Joy of Computing (BJC) is a CSP curriculum

How well does this curriculum meet the needs of students from underrepresented groups?

Research Question

For high school students in a BJC course, do females or minority students:

- Have different backgrounds coming in?
- Have different experiences during the course?
- Have different outcomes from the course?

Sample

- 399 post-course surveys from BJC students
- 19 classrooms where teachers had undergone BJC PD the previous summer

	Current Sample	AP CS 2014	US 2010
White	45.1%	49.7%	75.1%
African American	9.5%	3.7%	12.6%
Asian	12.8%	28.2%	4.8%
Hispanic	12.5%	8.3%	16.3%
American Indian	1.5%	<0.01%	0.9%
Multi-racial/Other/Not Stated	18.5%	10.0%	2.9%
Total URM	32.1%	22.0%	–
Total non-URM	62.2%	77.9%	–
Male	72.9%	80.0%	49.1%
Female	23.3%	20.0%	51.9%
<i>Respondents</i>	<i>n = 399</i>	<i>n = 39,278</i>	

Prior Experience

- Fewer minority students had access to a computer at home (87.5% vs 96.8%; $p=0.001$)
 - No difference in smartphone or tablet access
- More female students had access to a tablet at home (60.2% vs 44.7%; $p=0.013$)
 - Both findings significant when controlling for classroom
- Minority students had taken more CS courses ($p=0.006$); females had taken fewer ($p=0.003$)
 - Not significant when asking *whether or not* a student had taken a CS course
 - Not significant when controlling for classroom

During the Course

- No significant difference in interest in specific BJC activities for either group:
 - Pair programming
 - Making mobile apps and games
 - Learning how CS has changed the world
- No significant difference in:
 - Willingness to recommend the course to a friend
 - Number of hours spent on BJC activities outside class
 - Perception of how well the class embraced diversity:
 - "The learning environment was free from discrimination."
 - "In this class, I felt out of place."
 - "In this class, I felt comfortable interacting with students with different characteristics."

After the Course

- Fewer minority students intended to take CS courses in the future (53.1% vs 69.4%; $p=0.002$)
 - Significant when controlling for classroom
 - No significant difference between males and females
- Fewer minority students intended to major/minor in CS (39.8% vs 53.2%; $p=0.019$)
 - Significant when controlling for classroom
 - Females were less likely (40.9% vs 52.6%; $p=0.082$)
- No significant difference in intention to major/minor in STEM fields generally
 - Females were less likely (43.0% vs 52.8%; $p=0.088$)

Takeaway

- High school students have diverse CS backgrounds
 - Females had taken fewer previous CS courses, while minority students had taken more
- Some effects are classroom-dependent
 - E.g. number of previous CS courses
- BJC was generally well received by diverse students
 - Emphasis on a relevant and engaging curriculum
- No gender effect on students' interest in CS topics?
- Still much work to be done
 - Minority students less likely to pursue CS in the future
 - This is not the case for STEM as a whole

Thank You!

Questions?