# A Model for Statewide Deployment of CS Principles Courses

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http://csprinciples.cs.ua.edu



OUTCOMES

A+ COLLEGE READY

A Division of the A+ Education Partnership



LONG-TERM<sup>1</sup>

\*Large cohort of trained CS

teachers teaching CS:

(starting 2016)

for females/URMs \*Increased student

2016)

preparation for STEM

\*High success rates for

\*Persistent deployment

\*Stable set of core materials

\*Adoption by A+CR when CS:

Principles becomes AP course

\*Scale-up to 20 add'l schools

& 320 NMSI schools in 6

\*Additional scale-up

(e.g., scope and sequence)

females/URM students in CS:

Principles AP course (starting

Principles as AP course

\*Sustainable school-level

support for computer science

\*Increased participation in CS

### **MOTIVATION AND PROJECT GOALS**

### **Motivation and Background**

- Alabama participation in AP CS A traditionally low (<100 students per year over past 5 years)</li>
- Yet, clusters of national tech leadership (Huntsville #4 in USA, per capita, in STEM workers)
- Successful AP Training and Incentive Program across Alabama high schools, as implemented by A+ College Ready as part of the National Math and Science Initiative:
  - Alabama's success in improving AP math, science and English scores from 2008-2011 for both all students and minority students leads the nation (% increase in qualifying scores).
- University of Alabama participation as an NSF/College Board CS Principles Pilot Site (Pilot II-IV); sharing of results with southeast teachers through Google CS4HS support

### **Project Goals and Scope**

- Train 50 high school teachers through extended Professional Development (beyond 1-week APSI) over a three-year period, while introducing 2,500 students to CS Principles content
- Sustainability and scalability through leverage and continued adoption by A+ College Ready
- Broadening participation through open access to AP courses using the NMSI model
- Dissemination of curricular materials and results of evaluation assessments to support PD

# **ACTIVITIES AND IMPLEMENTATION DETAILS**

The project is driven by the following core activities: 1) Master Teacher mentoring and vertical teaming using face-to-face and online collaboration; 2) Open enrollment to increase diversity of participation; 3) Rigorous course content for year-long professional development; 4) Student mentoring and skills development; 5) Incentives for teachers and students.

- Year 1: Ten Master Teachers with CS AP experience assist in developing CS Principles curricula resources and Piloting a course
- Years 2 and 3: Twenty teachers each year collaborate with an assigned Master Teacher for professional development year-round mentoring while introducing a new Pilot
- Undergraduate students in both CS and Education pre-service teachers, and a CS PhD student, assist Pls in training and curriculum development



**CS4Alabama Master Teachers** Summer 2013 PD Workshop

## **CS4ALABAMA LOGIC MODEL**

### STRATEGIES **INPUTS** Develop a growing network of Computer

\*Master teacher mentoring \*Open enrollment

Rigorous, content-focused PD \*Master teacher approach Student mentoring \*Non-profits administer (A+CR)

- \*Student/Teacher incentives
  - + Saturday study sessions + College student support
  - \*Distance learning / open on-line course
  - \*Training videos (Y2 & Y3)
  - \*Google workshop (3 day intro)
- Statewide PD Infrastructure \*Network through A+ College Ready \*Distance learning network
- Existing Partnerships/
- Education (ALSDE) \* with Alabama State Superintendents
- (e.g., Career Tech division) \*Statewide competitions (e.g., App Contest) \* with College Board
- Scale-Up Model \*Scale & sustain CS: Principles

Input Evaluation: Monitor grantand non-grant based resources

Teacher Prep Model from NMSI

National Support/Resources

\*CE21-supported community of

\*Part of CSP pilot (College Board)

\* with Alabama State Department of

\*Corporate partnerships (e.g., Google)

\*NSF CS 10K grant

\*New CSTA chapter

practice web portal

Collaborations

(refined for CS)

#### Science Educators in Alabama Conduct Teacher PD (125-140 hrs/year) \*Content knowledge and pedagogy focus \*Yearlong experiences (~9 days training)

- + Summer training, curriculum (~4 days) + Bi-weekly webinars (e.g., Google hangout)

- \*Cohorts of teachers: Y1 (10 teacher leaders), Y2 (20 new teachers), Y3 (20 new)
- Implement CS: Principles in 50 classrooms \*Addition of new HS course (administrative)
- \*Student recruitment (50% female/high %URM)
- \*Video sharing of classroom implementations
- \*Classroom equipment funds
- Student Opportunities
- \*Weekend study sessions
- \*Summer camps (e.g., Java camp)
- \*Student mentoring in research (e.g., science fair)
- Pre-Service Development
- \*CS: Principles at University of Alabama (Y2/Y3) \*Prepared to teach CS: Principles in HS settings

Process Evaluation: Fidelity & quality of implementation

in rural areas \*Learning gains in CS content/skills \*Increased interest in CS \*Increased confidence in CS \*Mentoring relationships

\*Increased access to CS for

females, URM's, and students

SHORT-TERM

Teachers / Instructors (N=50)

\*Teacher cohorts trained

\*Increased CS content

knowledge

\*Increased PCK

\*Increased teacher

Students (N=1350)

engagement in CS field

\*Mentoring relationships

\*Course added for high schools

Share Resources / Disseminate \*Scalable model

- \*Web portal (syllabi, videos, activities, pedagogical resources)
- \*Published articles \*Conferences, newsletters \*Evaluation results

Product Evaluation: Impact on teachers, and students; CS resources and scale-up

Long-term outcomes extend beyond the life of this project

### INITIAL EVALUATION RESULTS

- Course enrollment for the 9 pilots in Fall 2013 ranged from 9 to 57 students (median=20).
- 46% of students were female or underrepresented minority.
- Implementation successes included: student engagement in activities, use of App Inventor, Scratch, & Alice, development of Apps & games, from industry experts & video presentations; student creativity evident.
- Implementation challenges included: student writing, helping students locate good data sources, fostering equal participation in collaborations, helping students learn to sequence steps in a program and explain their program.

