

Computer Science Education Research (CS-ER) Awards



Historical awardees

Google's [Computer Science Education Research \(CS-ER\) Awards](#) provide funding for one-year proof-of-concept pilots and a year-long cohort experience among awardees. See below for a summary of research funded by award year.

2020 awardees

University of Delaware

Chrystall Mouza

Preparing Computationally Literate Pre-Service Teachers through Professional Development for Teacher Educators

This research develops, implements and evaluates a regional collaborative partnership for infusing computational thinking (CT) across multiple pre-service teacher education programs through a set of coherent and culturally-relevant strategies engaging teacher educators and computer science experts.

(Grant No. 93661917)

University of California, Los Angeles

Jane Margolis

Let's Hear It from the Students: Students' Identity, Agency, and Engagement in Introductory High School Computer Science Classrooms

This project is part of a large-scale effort that elevates the perspectives, experiences, and voices of historically underrepresented high school CS students (rural African American students in Mississippi and low-income Latinx students in Los Angeles) who enrolled in these classes with little to no prior experience with computing. Data collected will help determine what makes a critical difference in historically underrepresented students' learning, identity, agency, and engagement in introductory CS classes (such as Exploring Computer Science and Advanced Placement Computer Science Principles).

(Grant No. 93661916)

The University of Texas at Austin

Jayne R. Warner

CS Equity Deep Dive: Examining the Correlates and Consequences of Access to and Participation in K-12 Computer Science Education

This research will inform efforts aimed at broadening participation in computer science (CS) by expanding on the ways quantitative researchers examine issues of equity. The study will use multilevel modeling to analyze statewide data for approximately 3 million students to determine what factors predict (and to what extent they predict) access to and participation in CS in middle school, high school, and college. The study will tease apart some of the complexities inherent in CS education equity research by examining many factors previously unexplored in the field and accounting for the intersection of various aspects of student identity and circumstance.

(Grant No. 93661915)

Spelman College, Center of Excellence for Minority Women In STEM

Tamara Pearson

Disrupting Mathematics as a Barrier to Computer Science through Summer Learning Opportunities

Whether real or perceived, mathematics continues to be a barrier to diversifying the computer science pipeline, especially Black students. One method for disrupting this barrier is through summer learning experiences. There are multiple factors that must be taken into consideration when designing summer learning experiences for Black students from under-resourced communities including content deficits, stereotype threat and mathematics and computer science self-efficacy. This research project examines a model for uncovering and intervening in all three of these areas.

(Grant No. 93661914)

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University of Illinois, Urbana-Champaign

Colleen M. Lewis

Equitable Expansion of High School CS: Trends and Trade-offs Between and Within States

This project builds on research on, and evaluation of, state-level CS education initiatives and particularly on work focused on equity in HS CS expansion. Specifically, it looks within and across several states to understand: the extent to which secondary CS course taking has expanded (overall and for students of different gender identities and racial backgrounds), whether CS teacher credentials have suffered as CS course offerings have expanded; whether students have equitable access to teachers in terms of qualifications or congruence of race and gender; which other courses CS courses replace; and (v) whether coursework trade-offs have implications for student achievement on standardized tests. This research will use public and administrative state data on staffing and course-taking in high schools. It will explore many trends in HS CS and how they vary across contexts and for different populations of students. Additionally, it will analyze detailed demographic, course taking, and test score data within schools over time to provide credible estimates to date of the effects of HS CS.

(Grant No. 93661913)

CSEdResearch.org

Monica McGill

Exploring the Impact of Middle School Computer Science Teachers Developing Practice Briefs in Collaboration with Researchers

This project explores how does engaging middle school teachers in developing teacher practice briefs collaboratively with researchers and from previously published research in computing education affect their self-efficacy, classroom practices, and understanding and use of CS education research? To our knowledge, there is no literature on the impact of teachers when collaboratively writing practice briefs with researchers. Though there are few Research Practice Partnerships in the U.S. that address problems of practice teaching CS in middle schools, having teachers and researchers collaborate on creating practice briefs is a unique way to bring these two groups together. The effect of having teachers and researchers work together to create practice briefs may be similar to the benefits of bringing researchers and practitioners together to work on RPPs--raising teacher self-efficacy, increasing teacher understanding of scholarship, and a higher adoption rate of promising practices.

(Grant No. 93661912)

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2019 awardees

Elms College, University of Michigan,
College of St. Scholastica

Beryl Hoffman, Barbara Ericson, Jennifer
Rosato

*Transitioning from AP Computer Science
Principles (CSP) to AP CS-A Java:
Learning from CSP Successes*

This research project focused on broadening participation in the AP Computer Science courses, specifically how to better prepare and support teachers and students who are new to computer science as they transition from the AP Computer Science Principles course to the more advanced AP CS A course. The researchers built on previous work to create an interactive e-book for AP CS A. This project included professional development for 36 teachers and will reach approximately 720 students in one year.

(Grant No. 93661911)

Kean University

M. Bachrach, G. Verdi, P. Morreale

*Improving the Outcomes of Hispanics in
AP Computer Science*

This research aimed at improving the engagement and outcomes for Hispanic students in the AP Computer Science Principles and CSA courses. The researchers investigated whether teacher awareness of language acquisition concepts and strategies improves teaching in the classroom and also improve how well students perform in these classes. This research included professional development experiences and follow-up support for 36 teachers.

(Grant No. 936619210)

Macalester College

Lauren Milne

*Accessibility in Blockly: Touch Interaction
Research*

Block-based programming environments (such as Scratch or MIT App Inventor) are often used to introduce novices to programming but because they rely heavily on visual elements and drag and drop, they are generally not accessible for children with visual or motor impairments. This project focused on improving the accessibility of the touch-based interaction with the Blockly library through adding accessibility data to the visual renderings of the blocks themselves and creating a separate interface that is designed for navigation by touch. The goal of this research was to generate an application program interface to make it easy for developers to integrate touch accessibility in their own applications.

(Grant No. 93661909)

Oregon State University

Jennifer Parham-Mocell

*Integrating CS Education into Teacher
Education and K-12 Mathematics*

The goal of this research was to integrate CS education into the mathematics teacher education curriculum. The researchers worked with prospective teachers at two different stages and in two interrelated ways. First, they developed modules for undergraduate pre-service teachers (PSTs) who were enrolled in a capstone mathematics course for majors intending to be secondary teachers. These modules developed prospective teachers' knowledge of central CS concepts, and helped them understand opportunities for introducing CS concepts in their math teaching. Second, they developed modules to work with a group of master's level teacher candidates who are enrolled in a mathematics methods course. These modules helped build the teacher's CS knowledge and instructional skills and helped them design and teach CS lessons in their secondary

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classrooms. This research immediately impacted 50 teachers and 90 students.

(Grant No. 93661908)

Indiana University

Anne Leftwich

National Computer Science Education Preservice Case Studies

This research provided a national picture of how schools of education are preparing future teachers to teach CS in K-12 schools. The study interviewed K-12 CS education experts to develop a pathways framework, select and create multiple case studies of CS teacher education programs, and surveyed all 1,396 teacher education institutions offering traditional and/or alternative initial licensure programs. This research provided an overview of the CS education preparation landscape, examples of practices and policies being implemented in CS teaching preparation, and a publicrepository of the common pathways schools of education use to prepare preservice teachers to teach CS at the elementary and secondary levels.

(Grant No. 93661907)

CSforALL

Rafi Santo and Dr. Leigh Ann DeLyser
Achieving Equity in K12 Computer Science Implementations: Strategies, Obstacles and Opportunities at the District Level

To achieve the goal of making CS education truly accessible for all students requires school districts to undergo ambitious planning and institutional change. This research examined how leading school districts are addressing equity in their CS education efforts. Researchers conducted a study of eight school districts that developed comprehensive CS education initiatives to understand how different ideas about equity in CS education—from reaching all students, to creating inclusive classrooms, to teaching about equity issues in tech—make their way into district initiatives. The researchers identified challenges, promising approaches and emerging strategies from which other districts, policy-makers and the larger CSed community can learn.

(Grant No. 93661906)

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2018 awardees

Harvard University Graduate School of Education

Karen Brennan

How do K-12 Teachers Assess Creative Work in CS Classes?

Making CS accessible for all K-12 learners requires opportunities for young people to feel interested in and connected to computing. Creative programming activities foster interest and connection, but uncertainty about how to assess programming as creative work makes it difficult for K-12 teachers to incorporate creativity in the computing classroom. This one-year study investigated how CS teachers assessed the creative curriculum used to teach CS. This research informed teachers, instructional designers, and researchers about classroom-level decision-making and design.

(Grant No. 93661905)

Indiana University

Anne Leftwich

Examining the Impact of Socially Relevant Problem-based Learning Curriculum at the Elementary Level: Students' CS Interest/Knowledge and Teachers' Implementation Needs

This project piloted a 6th grade student-centered Problem-Based Learning (PBL) with social impact CS curriculum that investigated what support tools can be designed to decrease instances of bullying in schools. The researchers used a research practice partnership with local 6th grade teachers to improve their understanding of how PBL impacted students' CS interest and knowledge at the elementary level, and what supports teachers needed to facilitate PBL in the CS classroom.

(Grant No. 93661904)

University of Massachusetts Amherst

W. Richards Adrion

CSforAll in Springfield MA: An Elementary CS/CT Curriculum Integration Pilot

This pilot study integrated Massachusetts' Digital Learning and Computer Science standards with CS and computational thinking (CT) concepts, learning progressions, and practices in core curricula at the kindergarten and grade 3 levels in the highly diverse Springfield Public School (SPS) district in Massachusetts. The researchers created, assessed and revised 16-24 integrated CS/CT lessons in eight schools at each grade level. This project helped researchers better understand how to increase teacher knowledge and effectiveness for creating and teaching an integrated CS/CT K-5 curricula that reaches and engages diverse students.

(Grant No. 93661903)

University of Pennsylvania

Yasmin Kafai

MADE (Music ArtDesign with Etextiles)

This program introduced students in Career and Technical Education courses to more advanced computing concepts through electronic textile designs. Working together with Exploring Computer Science (ECS) high school teachers, the researchers collected evidence of student learning and teacher practices to address critical questions about student growth in their CS practices, knowledge, motivation, and future projections. This project provided curriculum prototypes for integrating arts into high school computing and helped researchers better understand student learning and teacher professional development in Career Technical Education courses.

(Grant No. 93661902)

University of Texas, Austin

Carol Fletcher

This project produced a framework for collecting and reporting outcome measures that accurately show access to and participation in K-12 CS

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Project ROCS (Rural Opportunities in CS)

education, especially for students in rural communities. This project developed viable solutions for measuring, scaling and sustaining equitable access to CS education within rural communities and other historically underserved populations.
(Grant No. 93661901)