Department of Computer Sciences

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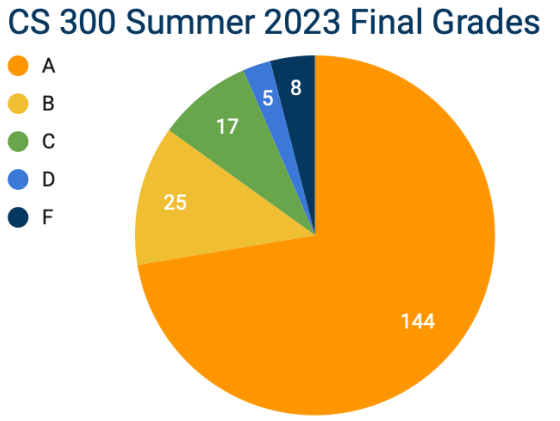
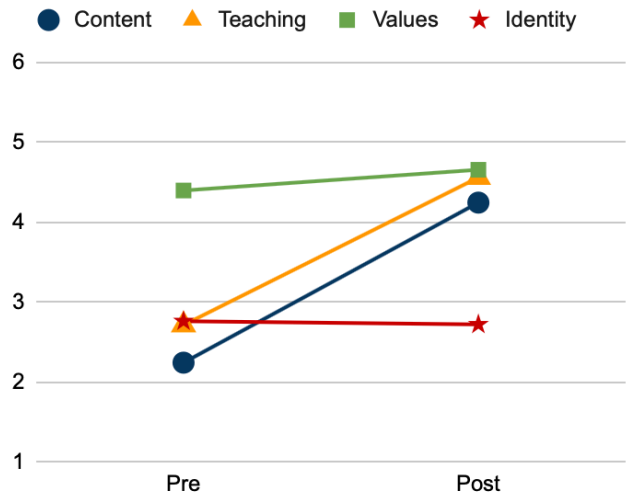
199 candidates participated in the first cohort of CS 300 in Summer 2023.

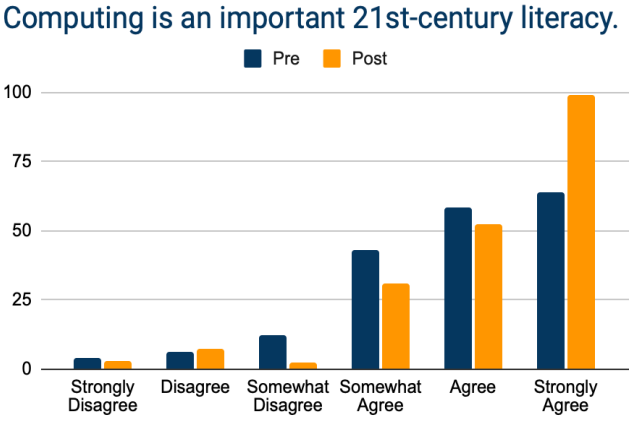
93% of candidates met or exceeded the mastery goals aligned to state CS standards.

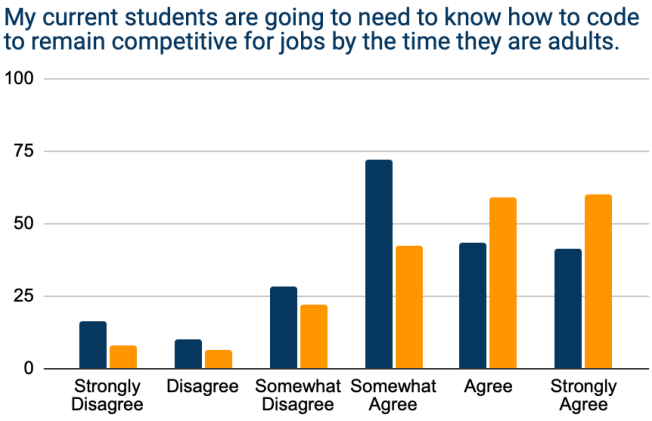




Candidates were surveyed about their self-efficacy in content, teaching, values and identity at the beginning and end of the course.

Overall confidence in CS content and teaching improved by nearly two points each.





Core beliefs around the value of CS were changed considerably.

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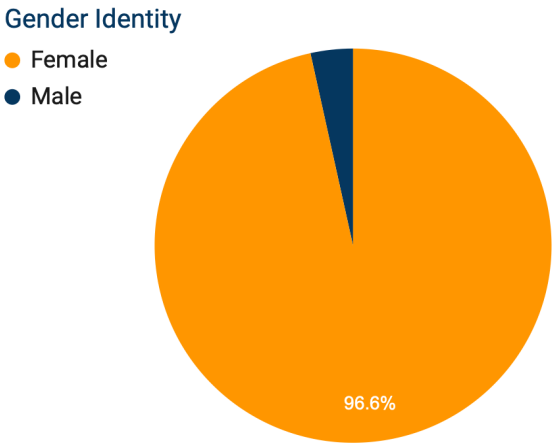
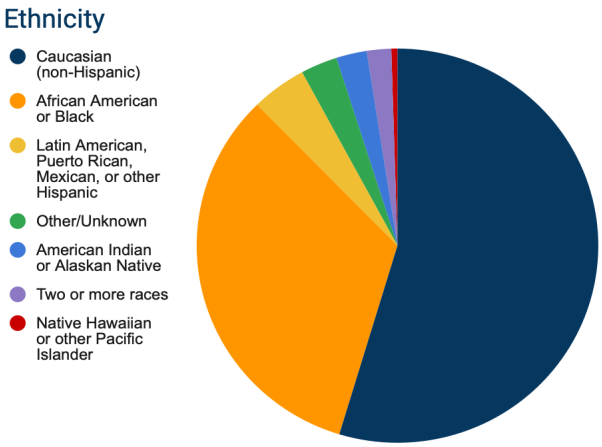
CS 300 candidates represented five states.

97% were women.



45% were people of color.



Candidates say…

"The class is about CS and so much more, it will **make you a better teacher** in many ways." - Christel Young

"I really enjoyed the class and learned a lot from it. I am **now ready to teach my students** about some coding games that we learned in class!" - Amelie Attey

"Thank you for teaching me that coding can be fun and essential for the betterment of our CS students. With a little patience and endurance anyone can learn to code." - Erma Dorsey

"Mistakes are ok and can be fun too! Using our own creativity was the best part!" - Kailan Thomas

"Computer Science is all around us and as we move into the future it is **essential to incorporate this into our classroom** to better equip our students." - Cati Davis

"By **teaching our students how to problem solve**, and use their creativity we are helping them not only in the future in school but their possible future in their careers." - Mollie Hood

Courses

Summer 2023

CS 300: Computer Science

This course introduces candidates to core concepts and practices common to state and national standards for computer science. It aims to build teacher self-efficacy and pedagogical content knowledge through hands-on investigations of Computing Systems, Data and Analysis, Networks and the Internet, Algorithms and Programming, and Impacts of Computing. It fulfills the Computer Science Competencies for Elementary Teachers, Grades K-6, required by the Arkansas Teaching Standards.

Elementary for Computing (E4C) Year 2

- Summer of CS: Nine thematic modules for in-service teachers with some CS experience, aligned to the California K-5 CS Standards.
- Fall Integration Workshop: 4 additional modules that focus on the theory and practice of integrating CS standards across the K-5 curriculum.

Reach 272: Coding for Teaching

This course provides candidates with an opportunity to learn basic computer programming (coding) skills in Scratch, AppLab, and Python. This course focuses on empowering candidates to create educational software that solves authentic problems of practice, using skills and concepts aligned to the CA K-12 Standards for Computer Science. Topics covered in this course include design thinking, input and output, user interfaces and data.

Fall 2023

Reach 333: CS Pedagogy and Andragogy

This course empowers candidates to build foundational K-12 computer science content knowledge and coding skills in a range of block-based programming languages, as well as best practices in CS pedagogy (teaching children) and andragogy (teaching adults.) Course completers will be prepared to teach the Reach undergraduate course CS 300, which is aligned to state and national standards for K-12 computer science.

Spring 2024

Reach 333: CS Pedagogy and Andragogy

This course empowers candidates to build foundational K-12 computer science content knowledge and coding skills in a range of block-based programming languages, as well as best practices in CS pedagogy (teaching children) and andragogy (teaching adults.) Course completers will be prepared to teach the Reach undergraduate course CS 300, which is aligned to state and national standards for K-12 computer science.

Elementary for Computing (E4C) Year 2

- Spring Integration Workshop: 4-day workshop focusing on supporting teacher self-efficacy in the program development segment of the California K-12 CS Standards.

Summer 2024

CS 300: Computer Science

This course introduces candidates to core concepts and practices common to state and national standards for computer science. It aims to build teacher self-efficacy and pedagogical content knowledge through hands-on investigations of Computing Systems, Data and Analysis, Networks and the Internet, Algorithms and Programming, and Impacts of Computing. It fulfills the Computer Science Competencies for Elementary Teachers, Grades K-6, required by the Arkansas Teaching Standards.

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Logic Model

1	←	2	←	3	←	4
K-12 students will need foundational computing education to access the future of job-embedded learning.		K-12 teachers must be prepared to integrate computer science content and practices into their classrooms.		Schools of education must incorporate computer science into their core programs.		Faculty at schools of education must have the pedagogical and andragogical content knowledge to teach CS courses.

Implementation Timeline

Summer 2023 👉
Pilot 3-credit undergraduate course CS 300 with 8 sections of 200 candidates taught by 4 existing instructors

👈 **Fall 2023**
Pilot graduate course Reach 333 to support CS adoption and integration by Reach faculty and staff; adapt CS 300 with feedback from Summer pilot

👈 **Spring 2024**
Deploy graduate course Reach 333 to train 6 non-CS faculty to teach CS 300 in the Summer; include faculty from other Schools of Education

Summer 2024 👉
Implement CS 300 with 19 sections of 500 candidates taught by 11 instructors

👈 **Fall 2024 - Spring 2025**
Ongoing evaluation and program improvement; advocacy/awareness efforts; 2 more semesters of CS 333 for internal and external candidates

Summer 2025 👉
Full implementation of CS instructor/candidate pipeline

Partnerships

We maintain membership in CSforAll, supporting its goals for collective impact and its 2023 Summit in Oakland.

Reach University makes a commitment to provide pre-service teachers in our apprenticeship degree program with an inclusive, comprehensive, compulsory 12-week CS course aligned to state standards in Alabama, Arkansas, Louisiana, and California, serving 700 teachers by Fall 2024.

We partner with CSEdResearch.org to bring evidence-based practices to educators by producing the CS Teaching Talks Podcast and CS Pedagogy Briefs, in addition to a weekly CSEd Discussion Group open to all.

We serve in the Higher Education Working Group of CSforCA, sharing teaching materials with IHEs across California, and advocating for CS-forward educational policy at the state and national level.

We deliver professional development to in-service Elementary teachers and paraeducators in California through quarterly online workshops and facilitator training at the Seasons of CS.

We partner with the Beyond100K network to implement solutions that will end the STEM teacher shortage by 2043, especially for those most excluded from STEM opportunities.

AI Literacy for All in CS 300 (2024)

Using AI
Candidates will recognize AI systems in use around them and make ethical decisions about participating in them.

Impacts of AI
Candidates will explore the impact of AI systems on people and planet.

Building AI
Candidates will move from naive consumers of AI to critical consumers through the experience of building models, abstracting data, designing AI systems, and navigating tradeoffs.

Module	Topic	Essential Question	AI Touchpoints
1	Welcome to CS 300	How will you take up space in CS?	**Using AI**: Academic Integrity Policy on use and citation of generative AI
2	CS and Feelings	What does computer science feel like?	
3	CS and Identity	Who is computer science for?	
4	CS and Language	How do we communicate about computing?	**Using AI**: Text-to-Speech and Machine Translation in Scratch
5	CS and Community	Who owns art?	**Impacts of AI**: Ethics of AI-generated art
6	CS and Friends	What is a hackathon?	
7	CS and History	What is a computer?	**Building AI**: Design and analysis of a chatbot using Input - Processing - Output
8	CS and Mindsets	What strategies set you up for success in coding?	
9	CS and Reading	How is CS linked to literacy?	
10	CS and the Earth	What are the environmental impacts of computing?	**Impacts of AI**: Energy, Water, and Data Centers
11	CS and Future	Will robots take our jobs?	**Building AI**: Training and testing image classifiers **Impacts of AI**: human and machine bias, AI's impact on the economy
12	CS and School	How will you take CS forward?	Candidates may choose a lesson on AI as the topic of their final project