Integrating Computing into Teacher Education

Leveraging Research to Support Change at Multiple Levels

Dr. Sara Vogel | Michigan State University | Sept. 9, 2025

https://tinyurl.com/MSU-Vogel-CITE

Dr. Sara Vogel

Director, Computing Integrated Teacher Education,
City University of New York

🗺️ Roadmap

- What is CITE?
- Stepping back and storytelling...
  - How did I get here?
  - How did CITE get here?
- Conversation with all of you!

LANDSCAPE CHALLENGE

When they enter the classroom, here are just some of the things that new teachers need to be prepared to do:

Integrate **computing-enhanced pedagogies** that elevate learning across core disciplines

Grapple with **emerging technologies** like LLMs and policies like phone bans.

Integrate **cross curricular competencies** like data literacy, media and digital literacy, and computational thinking

Address inequities in technology and computing education within their teaching

Appropriately **vet and select educational technologies** relevant to their discipline

Utilize data to improve assessment and inform instruction

LANDSCAPE CHALLENGE

Most teachers don’t have opportunities to develop computing and digital literacies (CDLs).

What is CITE?

Computing Integrated Teacher Education (CITE) is an initiative at the **City University of New York** founded in 2021.

CUNY is made up of 25 colleges. Of those, there are 16 institutions with education programs that enroll approximately 11,000 teacher candidates.

CUNY

NYC Public Schools

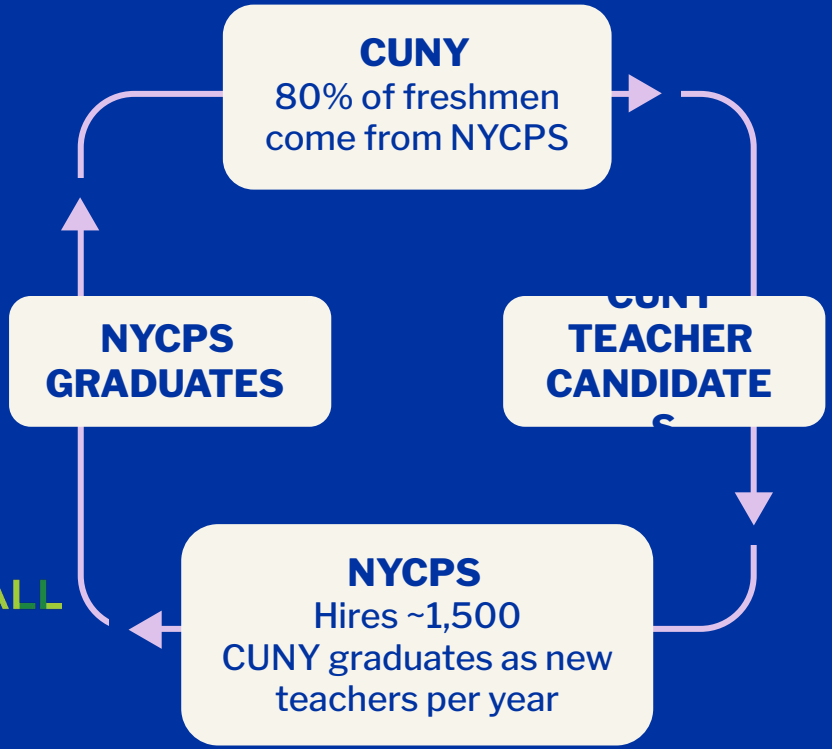
GOTHAM GIVES

Google

ROBIN HOOD LEARNING + TECHNOLOGY FUND IN PARTNERSHIP WITH OVERDECK FAMILY FOUNDATION AND SIEGEL FAMILY ENDOWMENT

SIEGEL FAMILY ENDOWMENT

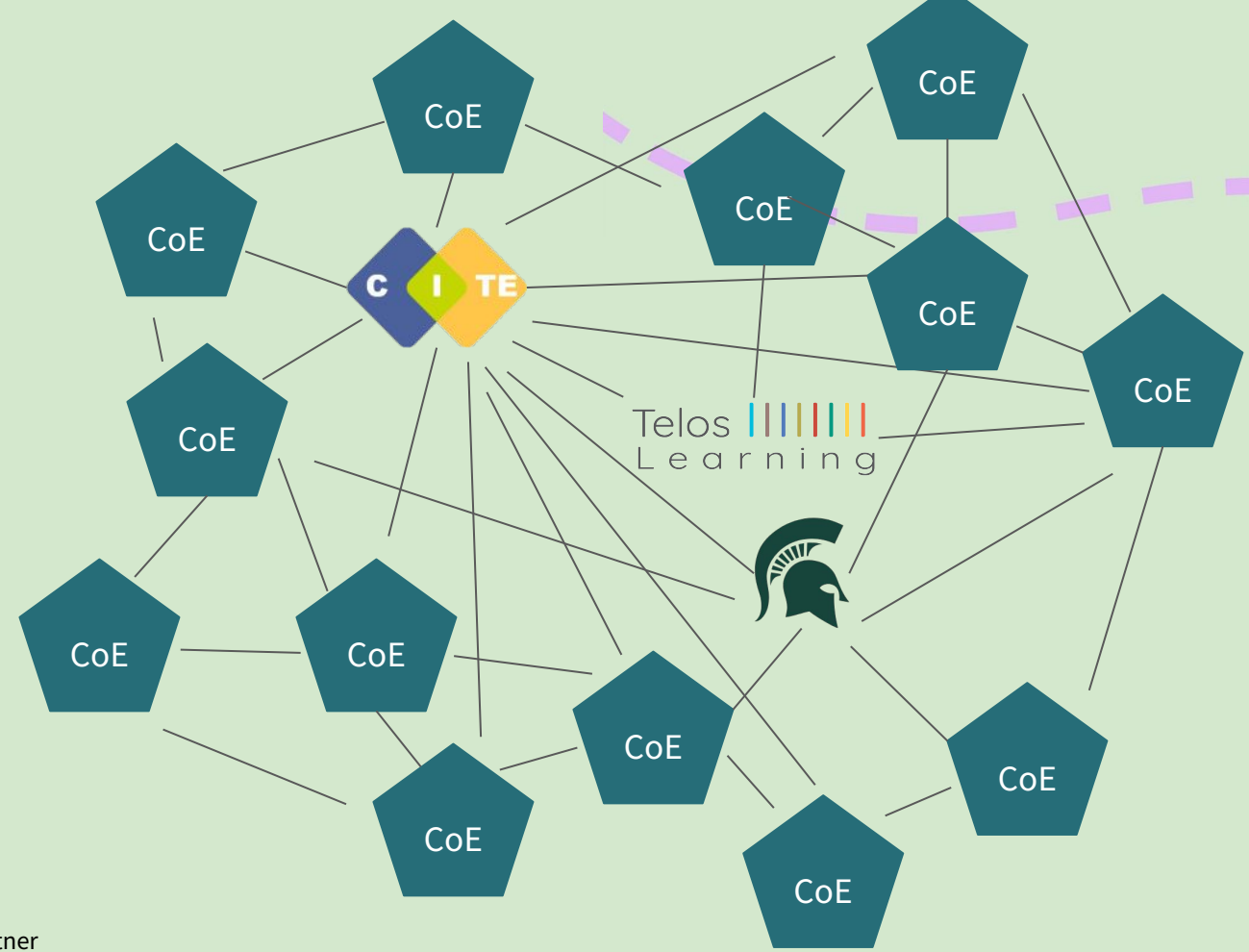
OUR ECOSYSTEM & SCALE



NYC Public Schools | COMPUTER SCIENCE FOR ALL

MISSION

Prepare every CUNY P-12 teacher candidate in every discipline to equitably, meaningfully & coherently integrate computing and digital literacies (CDLs) into public school classrooms.



16 Colleges of Education

Network leader and designer

Research and improvement partner

Research and professional learning partner

CITE Team Members

Anthony
(he/him)

Sarane
(she/he)

Sara
(she/her)

Aman
(he/him)

Olamide
(she/her)

Yesim
(she/her)

Rosa
(she/her)

Jenia
(she/her)

Gabrielle
(she/her)

Indranil
(he/him)

Ifeoma
(she/her)

Aankit
(she/her)

InSCITE RPP Research, Strategy & Design consultants *(Telos Learning)*

Rafi
(he/him)

David
(he/him)

Colin
(he/him)

Jean
(she/her)

Conditions and Obstacles

- Resistance of ed schools to change
- Financial and capacity-related barriers
- Logistical barriers
- Technological and policy change and impacts

SUCCESS METRICS

Faculty learning

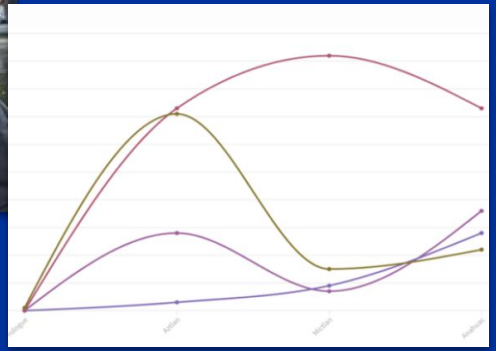
- Over 320 faculty engaged in PD in 2021-2024 to (re)design curriculum with almost 50% committing multiple years to the effort.
- 80 faculty have led research activities to investigate changes in curriculum, faculty practice, and teacher candidates' experiences.

Curriculum revisions

- Over 8,000 CUNY teachers candidates have participated in CITE activities since 2022.

FACULTY SPOTLIGHT

Dr. Cecilia Espinosa, Lehman College, CUNY



Dr. Espinosa designed a series of assignments for her Childhood Biliteracy course that guided teacher candidates to explore the intersection of computing and language arts.

Teacher candidates…

- interpreted data visualizations related to racial and cultural representation in children's literature
- used a data visualization tool of word frequency in a bilingual novel to make meaning of plot, characters
- reflected on digital tools' affordances and limitations for their own meaning-making and biliteracy teaching.

HEAR FROM A TEACHER CANDIDATE

Michelle Ortiz, Lehman College - CUNY Alumna

Attended LUTE-STEM program and participated in Dr. Espinosa's CITE activities.

Learn more about her journey.

SUCCESS METRICS

Program transformation

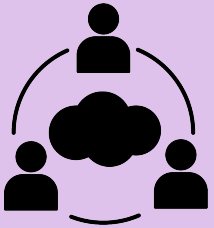
As of Sept 2025, teams from 13 colleges are at various stages of program re-design:

- 24 programs enrolling approximately 1900 teacher candidates are developing CITE learning goals.
- 32 programs enrolling approximately 3800 teacher candidates are aligning their instruction to finalized CITE learning goals.
- 12 programs representing 83 students are implementing CITE goal aligned instruction

How to advance one's own agenda? The agenda of a large change initiative?

Start with personal and collective values

Build community & common framing around problems that matter



Research, inquiry and **inclusive processes** are cross-cutting tools that animate these moves!


AND YOU MAY ASK YOURSELF
"HOW DID I GET HERE?!"

Start with personal and collective values

Grad School, a place to hone values

Bilingual teacher

Digital media educator

Global Kids

Work in education in Latin America

THE GRADUATE CENTER

...translanguaging

...CRSE

...critiquing deficit-based education

...creative, critical computing

...multiliteracies

Start with personal and collective values

Grad School, a place to hone values

Bilingual teacher

Digital media educator

Global Kids

Work in education in Latin America

THE GRADUATE CENTER

Core hypothesis and commitment:

By broadening the rationale and visions for CS Ed, the field can better serve especially marginalized learners and communities.

Build community & common framing around problems that matter

CUNY-NYS INITIATIVE ON EMERGENT BILINGUALS

Supporting bilingual learners' equitable participation in CS ed

HIVE
EXPLORE + CREATE + SHARE

csnyc

NYC Department of Education | COMPUTER SCIENCE FOR ALL

CsforALL

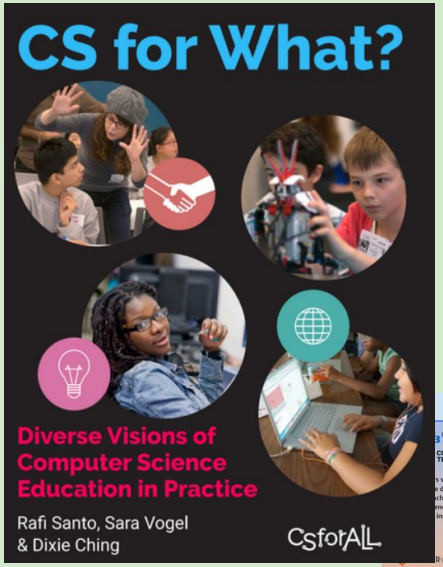
Start with personal and collective values

Build community & common framing around problems that matter

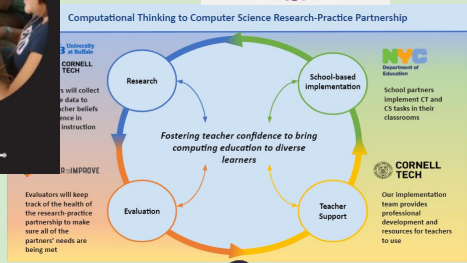
Research, inquiry and **inclusive processes**

Leveraging research in RPPs to:

- surface values
- build common framing
- test out solutions and guiding theory
- produce practitioner-facing resources and supports



HUNTER COLLEGE · THE CITY UNIVERSITY OF NEW YORK · MIHI CURA FUTURI



PiLa-CS

Build community & common framing around problems that matter

Other Factors & Caveats

- Right place, right time, right policy context
- Leveraging broader policy and movements' momentum to advance personal and institutional commitments
  - Doing so ethically and responsibly in our times?

How did we get here?

The CITE Story

Start with personal and collective values

CITE RPP team values

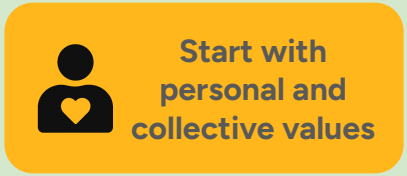
What computing and digital literacies did we value for CUNY TCs? Why?

Start with personal and collective values

Research, inquiry and **inclusive processes**

EnCITE Framework: We prepare teacher candidates to teach and learn **about, with, through, and against** technology and computing *(Vogel et al., 2024)*

	ABOUT	WITH	THROUGH	AGAINST
To support teachers' learning	Teachers engage in conversations **about** technology and its impacts	Teachers **learn with** technology to help them explore concepts for themselves.	Teachers **express themselves and their learning through** their creation and modification of computational artifacts	Teachers **think critically about technologies** to discontinue, dismantle unjust tech that shapes education, society, students and communities.
To support teachers' pedagogy	Teachers **strategically bring these conversations to their students.**	Teachers **teach with** technology to support student learning and participation.	Teachers prompt their **students to express themselves through** creation and modification of computational artifacts.	Teachers **strategically bring these conversations to their students**.



What did we mean when we said CITE would be equitable?

Start with personal and collective values

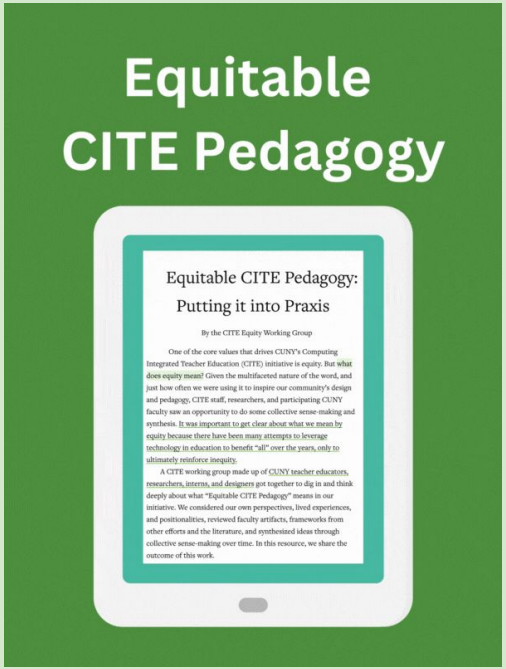
Research, inquiry and **inclusive processes**

Goals:

- A collectively deliberated framework for equity in CITE ——————————>

Methods:

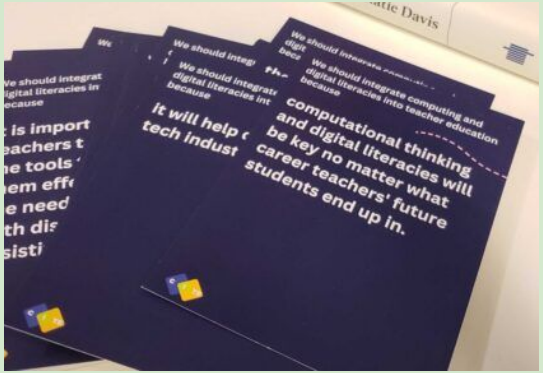
- **Convened an "Equitable CITE working group" to engage in participatory knowledge building** (Santo et al., 2017)
- **TC Focus groups, surveys**



Start with personal and collective values

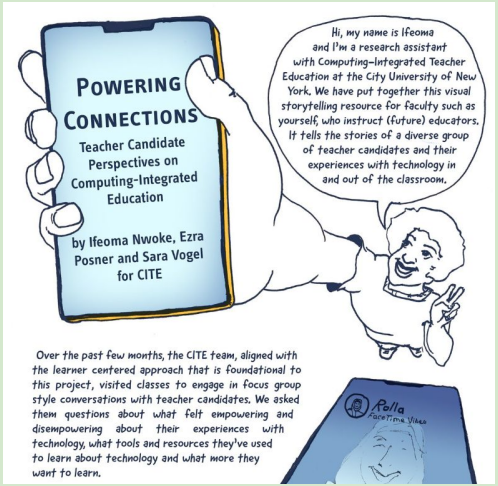
Supporting faculty to surface their driving values

CITE Values Card Game



Faculty Spotlights

TC Perspectives Zine



Build community & common framing around problems that matter

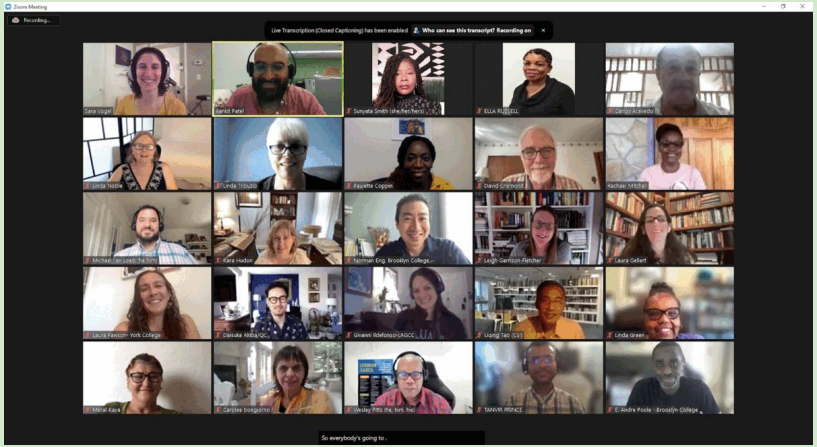
Research, inquiry and **inclusive processes**

Research projects focused on:

- Faculty artifact content and quality
- Faculty beliefs
- TC beliefs

Our faculty were taking ownership of the problem of CDL integration in teacher ed!

...but our research helped us uncover other problems of practice that were starting to matter....



Build community & common framing around problems that matter

Re-framing the problem

- Are TCs participating in meaningful CITE learning?
- Are TCs participating in coherent CITE learning experiences?
- Are all TCs participating in equitable CITE learning experiences?

Build community & common framing around problems that matter

Re-framing the problem

How could CITE support faculty teams to transform their programs so that ALL TCs get to experience meaningful, equitable, and coherent CITE learning?

CITE's THEORY OF ACTION FOR PROGRAM CHANGE

Visioning & Drafting CITE Goals

What should teacher candidates know + be able to do by graduation?

Ratifying CITE Goals

Is the faculty on the same page about these goals and how they get sequenced?

Designing Aligned Instruction

How do we align curriculum, faculty PD, assessments, clinical experiences with these goals?

Improving Aligned Instruction

How do we ensure meaningful, coherent, equitable instruction is reaching all TCs?

Strategic Coordination

How do we support and coordinate work across programs?
How do we set expectations and a vision for all TCs graduating from an SOE?

Build community & common framing around problems that matter

Re-framing the problem

How could CITE support faculty teams to transform their programs so that ALL TCs get to experience meaningful, equitable, and coherent CITE learning?

Build community & common framing around problems that matter

Research, inquiry and **inclusive processes**

Inclusive approaches to research and inquiry have helped us:

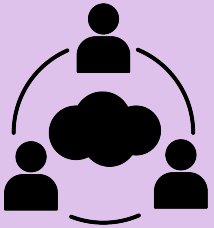
- Determine and get ahead of key problems of practice
  - Including in clinical settings (ask Aman, Ola & Yesim!)
- Evaluate and give feedback to programs on CITE learning goals
- Support teams to design aligned assignments, instruction
- Ensure TC feedback and perspectives drive changes (ask Ola & Yesim!)

Concluding thoughts...

How to advance one's own agenda? The agenda of a large change initiative?

Start with personal and collective values

Build community & common framing around problems that matter



Research, inquiry and **inclusive processes** are cross-cutting tools that animate these moves!