STEM Teacher Prep

SEPTEMBER 15, 2020

DISCLAIMER

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QUESTIONS

patti.curtis@ed.gov

STEM Newsletter www.ed.gov/subscriptions

STEM Webpage www.ed.gov/STEM

ED Grants https://www2.ed.gov/fund/grants-apply.html

STEM Request for Information – comments due October 19.
https://www.federalregister.gov/documents/2020/09/04/2020-19681/notice-of-request-for-information-on-stem-education

Email questions to: Patti.Curtis@ed.gov

On being timely…

MIA HOWERTON
Program Manager, Effective Educator Development, U.S. Dept. of Education

KAMAL HAMDAN
Director, Center for Innovation of STEM Education, California State University – Dominguez Hills

JANET STRAMMEL
Professor, College of Education, Fort Hays State University

COLLEEN HINDS-RODGERS
National Director of STEM, Teach for America

DAVID STROUPE
Associate Professor, Department of Teacher Education, Michigan State University

NIRAL SHAH
Assistant Professor, College of Education, University of Washington

Mia Howerton

Program Manager

Effective Educator Development

U.S. Dept. of Education

Office of Elementary and Secondary Education

Effective Educator Development Division (EED)

Venitia Richardson, Director

Orman Feres, Group Leader

Mia Howerton, Group Leader (Mia.Howerton@ed.gov)

Effective Educator Development

EED Mission:

To serve educators by providing districts, states and other key stakeholders with financial support and technical assistance to promote the development and use of evidence-based practices for the preparation, recruitment, retention and engagement of P-12 educators.

EED Vision:

We imagine an educational culture where all practitioners routinely use evidence to drive inquiry, creativity, collaboration, engagement and decision-making that maximizes student success.

How We Do It:

- Help improve local educational agencies (LEAs) ability to recruit, train, support and retain effective teachers, principals, and other school leaders in high-need schools;
- Help improve LEA's ability to providing evidence-based professional development that addresses literacy, numeracy, remedial education, or other needs of school districts and the students they serve;
- Provide principals with the tools necessary to make school-level decisions, like staffing, in order to build high-performing instructional leadership teams for high-need schools;
- Support non-traditional preparation and certification pathways that allow teachers, principals, or other school leaders to obtain employment in traditionally underserved LEAs; and
- Support LEAS in implementing a differentiated salary structure for P-12 educators who teach in high-needs schools or teach high-need subjects, raise student academic achievement, and/or take on additional leadership responsibilities that also help raise student academic achievement.

EED Programs

Supporting Effective Educator Development (SEED)

Teacher Quality Partnerships (TQP)

Teacher and School Leader Incentive Fund/Teacher Incentive Fund (TSL/TIF)

American History and Civics – Academies (AHC-A)

American History and Civics – National Activities (AHC-NA)

Teach to Lead

School Ambassador Fellowship

https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/effective-educator-development-programs/

SEED

(Educator Prep Program)
Eligible Entity = IHE or National Nonprofit Organization

Program Purpose:

SEED seeks to increase the number of highly effective educators by supporting the implementation of **Evidence-Based** practices that prepare, develop, or enhance the skills of educators.

Absolute Priorities:

- Supporting Effective Teachers. (*Moderate Evidence*)
- Supporting Effective Principals or Other School Leaders. (*Promising Evidence*)
- 25% Annual Nonfederal Match Requirement
- 3-year grants with potential for 2 additional years

- **Currently there are 25 Active SEED Grants across 22 states**
  - **Teach For America –** SEED FY 17 –Pre-ESSA and FY 18 Post - ESSA

- **Competitive Preference Priorities (CPP)**
  - 2018 and 2020 TQP competitions also contained CPPs that encouraged the preparation of teachers who would teach STEM subjects but these CPPs placed an emphasis on Computer Science.
  - Approx. $145 million awarded in for STEM educator prep over the last three years under the SEED program.
  - New FY 20 SEED awards will be announced on October 1, 2020.

https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/effective-educator-development-programs/supporting-effective-educator-development-grant-program/

TQP

(Teacher Prep Program)

Eligible Entity = "Eligible Partnership"

(Partner IHE, College of Education and College of Arts and Sciences Partner high-need LEA, partner, high-need schools)

Program Purpose:

TQP seeks to improve student achievement by improving the quality of new teachers. TQP projects aim to meet the needs of their partner high-need LEAs. This includes recruiting, training, and retaining teachers in STEM and other high-need subject areas.

Absolute Priorities:

- Partnership Grants for the for the preparation of teachers (Pre-bac Model)
- Partnership Grants for the Establishment of Effective Teaching Residency Programs (Residency Model)
- LOTS of program requirements
- 100% Nonfederal Match Requirement
- 5-year grants

- **Currently there are 52 Active TQP Grants across 22 states and the District of Columbia**
  - **CSU – Dominguez Hills** TQP - FY 14

- **Competitive Preference Priorities (CPP)**
  - 2014 and 2016 TQP competitions both contained CPPs that encouraged the preparation of teachers who would teach STEM subjects
  - 2018 and 2019 TQP competitions also contained CPPs that encouraged the preparation of teachers who would teach STEM subjects but these CPPs placed an emphasis on Computer Science.
  - TQP GPRA Measures specifically speak to the number of STEM teachers that graduate the TQP program each year.
  - Approx. $160 million dollars in STEM teacher prep awarded since 2014 under the TQP program.
  - New FY 20 TQP awards will be announced on October 1, 2020.

https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/effective-educator-development-programs/teacher-quality-partnership/

Dr. Kamal Hamdan

Director, Center for Innovation of STEM Education

California State University – Dominguez Hills

CALIFORNIA STATE UNIVERSITY DOMINGUEZ HILLS

CSUDH

CISE

STEM Teacher PREP Webinar

US Department of Education

HELLO & WELCOME

KAMAL HAMDAN

California State University Dominguez Hills

September 15, 2020

CSUDH

EXPERIENCES & LESSONS LEARNED

From my K-12 experience:

- **Developed** an understanding of the challenges of being a teacher at a high need school & the need to have highly qualified teachers;
- **Learned** that we must staff schools with the right teachers; It is not simply about staffing schools, it is about staffing schools with the right teachers.

From my IHE experience:

- **Developed** an understanding of teacher preparation and the challenges of being a teacher candidate;
- **Learned** that we must develop better and more diverse teacher pathways (Alternative routes to certification, residencies, blended, etc.) to empower those who aspire to become teachers to choose the right program for themselves (Not the one-size fits all approach);

EXPERIENCES & LESSONS LEARNED

From my USDOE & NSF grants experience (such as Teacher Quality Partnership grants):

- **Developed** a much deeper understanding of the need to diversify the teaching force
- **Learned** that:

1. We must recruit the right candidates for the right schools: It is not about meeting your target number.
2. We are not in the business of convincing someone to become a teacher; we are in the business of making it possible for those who choose to become teachers (Intrinsically motivated) to become teachers by developing the right programs for them.
3. We learned the most important lesson of all, that there isn't a shortage of people who want to become teachers; and make no mistake, there isn't a shortage of people of color who aspire to become teachers. What we are short on are good programs that make it possible for good people to become good teachers.

WHY DIVERSIFY THE TEACHING WORKFORCE?

Adrienne Rich, an American poet, wrote:

"When those who have the power to name and to socially construct reality choose not to see you or hear you...when someone with the authority of a teacher, say, describes the world and you are not in it, there is a moment of psychic disequilibrium, as if you looked in the mirror and saw nothing. It takes some strength of soul--and not just individual strength, but collective understanding--to resist this void, this non-being, into which you are thrust, and to stand up, demanding to be seen and heard."

DIVERSITY IN THE STEM WORKFORCE

What are the numbers & what do they tell us?

Ethnicity	US Population	% US Population	All Jobs 150,000,000	STEM Jobs 9,750,000	Engineering	Computer Science	Math
White	196,200,000	60%	65%	69%	73%	65%	68%
Hispanic or Latino	58,860,000	18%	16%	7%	8%	7%	6%
African American	42,510,000	13%	11%	9%	5%	7%	9%
Asian	18,638,000	5.7%	6%	13%	12%	19%	14%

DIVERSITY IN CALIFORNIA'S STEM WORKFORCE

Population & Ethnicity	California	Los Angeles	Los Angeles STEM Workforce	Sacramento	Sacramento STEM Workforce	San Francisco	San Francisco STEM Workforce
Population	40,000,000	4,000,000		500,000		885,000	
White	37.2%	28.4%	63%	33.1%	54%	40.8%	57%
Hispanic	39.1%	48.7%	11%	28.3%	10%	15.3%	6%
African American	6.5%	9%	6%	13.4%	5%	5.3%	5%
Asian	15.2%	11.7%	21%	18.7%	31%	34.2%	37%
Women	50%	51%	28%	51%	29%	49%	27%

WHAT IS GOING ON HERE?

STEM JOBS & THE STEM WORKFORCE

2018

2.4 Million jobs were unfilled in 2018

2022

1 Million more STEM jobs will be added by 2022

CA will have the largest STEM workforce in the nation by 2022

$81,000

STEM college majors earn much more

$60,000

Non-STEM Majors

What is going on?

Reasons for the underrepresentation of minority groups in STEM:

- California's "Leaky STEM Pipeline":
  - Of half million 9th graders, only about 5% earn a STEM Bachelor's Degree (25,000)
  - About 55% of H.S. Graduates are College Ready
  - Of the college ready graduates, only 21% major in STEM and 10% earn a STEM degree (or 11% & 5%)

- 75% of Americans say they liked science in K-12 (Due to labs and hands-on activities)
- 68% of Americans say they liked the subject matter and **not the teaching of science**
- More than half of Americans (52% & 63% of college grad) say that people do not pursue a STEM degree because it is hard

What else is going on?

- **Major underlying reasons for the underrepresentation of minorities in STEM:**
  - Less likely to have access to quality education
  - Not encouraged to pursue STEM at an early age
  - Less likely to believe you can succeed in STEM
  - Lack of role models, and discrimination in recruitment and promotions
- **Perceived reasons more women are not working in STEM:**
  - Face discrimination in recruitment, hiring, & promotion
  - Not encouraged to pursue STEM at an early age
  - More difficult to balance work/family in STEM jobs

DIVERSITY OF THE TEACHING FORCE

We know that:

- There are about **3 million public school teachers** in the US.
- Only **8% are Hispanic teachers & less than 6% African American** (compared to about 80% White). Number of Hispanic teachers increased over the past 25 years but not consistent with growth of the Hispanic student population.

- The student-teacher gap is still wide, more so in states such Texas, Arizona, and Nevada, and is likely to continue to widen unless more effort is put forth.
- Minority teachers are leaving the profession at a higher rate than other teachers (Teachers of color have the highest turnover rates).

LACK OF DIVERSITY IN THE TEACHING FORCE

Student population vs. Teacher population

US

Ethnicity	Student Population	Teacher Population
White	49%	82%
Hispanic	26%	8%
African American	15%	6%
Other Minorities	9%	4%

CA

Ethnicity	Student Population	Teacher Population
White	25%	65%
Hispanic	53%	18% (Males: 5%)
African American	6%	3% (Males: 1%)
Other Minorities	15%	9%

Why is diversifying the teaching force important?

- The importance of recruiting & retaining teachers of color for students of color is well reported and deeply researched.
- We know that ALL students have favorable perceptions of teachers of color (e.g. Asian students had positive views of black teachers)
- We know that, academically, teachers of color produce more favorable outcomes for students of color of similar backgrounds.
- Teachers of color tend to provide more culturally relevant teaching and better understand the situations that students of color may face.

Why is diversifying the teaching force important?

- We also know that, emotionally & socially, teachers of color serve as role models for students of similar backgrounds. (e.g. Hispanic or Latino teachers connect with EL students)
- When students have teachers of color, fewer students are represented in special education, student absenteeism decreases, and parents' involvement in school activities increases.

Why not pursue a career in teaching?

- Students of color perceive a career in teaching as a low status career and thus it is not an appealing career choice.
- Potential teacher candidates of color are not able to pursue a career in teaching because of cost associated with the process. (Ex: Moms, dads, low income, etc.)
- The process of becoming a teacher is a financial burden, especially for many students of color “who often must help support their families”. (Cost of multiple tests, credential applications, university and program applications, tuition, etc.)

What must be done?

- Invest much more in high-quality teacher preparation programs, especially those serving large numbers of minority students (Such as CSU Dominguez Hills)
- Develop multiple pathways that lead to certification (Alternative routes to certifications, residencies, blended programs, etc.) and offer incentives to those who target teachers of color
- Reduce cost to enter and complete a teacher certification program and strengthen financial support for teachers of color
- Emphasize teacher diversity in recruitment and hiring (by IHEs, LEAs, Unions, etc.) and increase oversight and hold accountable
- Form stronger partnerships between certification programs and school districts to meet staffing needs and increase diversity
- The days of recruiters waiting for aspiring teachers to willingly hand over their tuition in exchange for a certificate are over. If we want teachers of color, colleges are going to have to recruit outside their social networks. Meaning, they really have to recruit.

What did our university do about it?

CSUDH developed a systematic approach to recruit, train, place, and retain teachers of color:

- **Phase I:** Built pipelines from K-12 to certification programs founded on academic, financial, and psychological support.
- **Phase II:** Offered pro-active academic, financial, and affective support to teacher candidates as they transition to and meet the requirements of certification programs.
- **Phase III:** Offered pro-active support as candidates complete the certification programs.
- **Phase IV:** Continued to offer support as candidates become teachers of record and lifelong teacher-learners.

What is our university doing now?

- We recruit from within.
- We streamlined the application, registration, and hiring processes.
- We designed a course schedule convenient for our participants.
- We assembled a highly qualified team of course instructors.
- We meet off campus at a **convenient location** for our teachers.
- We assembled our own instructional team-**full time coaches**.
- We trained a team of exceptional mentors and master teachers.
- We offer one-on-one support - **Teacher Support Institute.**
- We transformed the clinical experience (Lab Schools).
- We stay in touch with our partners and address challenges quickly.
- We hold operations team meetings monthly with our partners.
- We have become a **one-stop-shop** for our candidates and teachers.
- We offer instructional, academic, financial, and psychological support.

THANK YOU!!!

Dr. Janet Strammel

Professor

College of Education

Fort Hays State University

Principles of Effective STEM Teaching for ALL Elementary Students

Janet Stramel
jkstramel@fhsu.edu

Elementary Teacher Preparation with a STEM Focus

Presenting today:
Janet Stramel jkstramel@fhsu.edu
Professor & Edna Shutts Williams Endowed Chair
Fort Hays State University

Fred Uy, California State University
Kassie Davis, CME Group Foundation
Lisa Pallatt, Notre Dame of Maryland University
Kristina Wambold, ESD112

Our goal: Explore the changes an elementary teacher preparation program would need to make in order to prepare elementary teachers who have STEM content knowledge and pedagogical knowledge.

- This project recommends changes for elementary teacher preparation programs in order to prepare elementary teachers to increase their STEM content knowledge and pedagogical knowledge.
- The outcome of this project suggests a revisit and reconceptualization of approaches needed to fit into an existing elementary program of study.

We developed a Concept Paper

- **Principles of Effective STEM Teaching for ALL Elementary Students**
  - https://grandchallenges.100kin10.org/progress/100kin10-project-team-elementary-teacher-preparation-with-a-stem-focus-2020

Principles of Effective STEM Teaching for ALL Elementary Students

Elementary School Teachers….

- have strong **knowledge and understanding** of STEM content to be effective in integrating all subjects for ALL students.
- **plan and design** STEM teaching and learning for ALL students in college and career pathways.
- **engage and support** ALL students, including diverse learners, in their STEM instruction.
- **guarantee and ensure** that ALL students are in effective STEM learning environments.
- **assess** regularly, effectively and appropriately ALL students in their STEM learning.
- continue to **grow professionally** as a STEM educator.

Principle #1

P1 - Elementary School Teachers have strong knowledge and understanding of STEM content to be effective in integrating all subjects for ALL students.

- *P1.1 Demonstrating knowledge and understanding of STEM content, standards, and curricula.*
- *P1.2 Applying knowledge of students' strengths, interests, needs, and proficiencies into STEM instruction.*

Principle #2

P2 - Elementary School Teachers plan and design STEM teaching and learning for ALL students in college and career pathways.

- *P2.1 Using current research-based framework for high quality STEM instruction*
- *P2.2 Planning instruction based on knowledge of students' academic readiness, language proficiency, cultural background, and individual development.*
- *P2.3 Incorporating appropriate strategies to meet the learning needs of all students*

Principle #3

PS3 - Elementary School Teachers engage and support ALL students, including diverse learners, in their STEM instruction.

- *P3.1 Address the needs of English Learners and students with Individualized Educational Plans (IEPs) by providing equitable access to STEM content*
- *P3.2 Personalize instruction according to students' individual needs*

Principle #4

PS4 - Elementary School Teachers guarantee and ensure that ALL students are in effective STEM learning environments.

- *P4.1 Create diverse learning experiences focused on collaboration through student centered instruction.*
- *P4.2 Center learning around high expectations for all students.*
- *P4.3 Participate in career connected STEM networks.*

Principle #5

PS5 - Elementary School Teachers assess regularly, effectively and appropriately ALL students in their STEM learning.

- *P5.1 Using multiple measures to inform STEM instruction*
- *P5.2 Using assessment data to establish learning goals to plan, differentiate, and modify instruction*
- *P5.3 Engaging all students in self-assessment, goal setting, and self-monitoring*

Principle #6

PS6 - Elementary School Teachers continue to grow professionally as a STEM educator.

- *P6.1 Self-assessing and reflecting on one's teaching practices in support of student learning*
- *P6.2 Demonstrating collaborative and collegial practices focused on improving instructional practices and student learning in STEM*
- *P6.3 Seeking professional networking, and STEM organizations and institutions for memberships, conferences, workshops, presentations, publications, etc.*
- *P6.4 Developing partnerships with other STEM-related organizations including professional training, policy review, and funding opportunities*

STEM Exploratory Questions

- Communicate Like A Stem Professional
- Analyze All Aspects Of The Problem
- Recognize A Pattern/Design
- Follow A Particular Structure
- Extend An Idea To A Generalization
- Practice Equity
- Make Intelligent/Smart Predictions
- Settle All Issues And/or Situations
- Look At The Problem From Different Views
- Make Thinking Contemporary
- Include Other Areas Of Study
- Suggest Ideas For Further Studies/Exploration
- Recognize Limitations

100Kin10.org Grand Challenges

- Prestige
- Preparation
- Elementary STEM
- Professional Growth
- Teacher Leadership
- Value of S, T, and E
- Instructional Materials

Colleen Hinds-Rodgers

National Director of STEM

Teach for America

Alternate Routes to Effective STEM Teaching

Colleen Hinds-Rodgers

she/her/hers

Managing Director of STEM, National TLD

September 2020

USDOE Presents STEM Teacher Prep

TEACHFORAMERICA

Our Mission

Teach For America works toward the day when **every child will receive an excellent and equitable education**. Teach For America finds, develops, and supports a diverse network of leaders who expand opportunity for children from classrooms, schools, and every sector and field that shapes the broader systems in which schools operate.

THE PROBLEM AS WE SEE IT

Potential is equally distributed across lines of race and class, but opportunity is not. Today in America, the circumstances of a child's birth predict the opportunities they have in life.

Our Theory of Change

1. **Change requires** sustained leadership both inside and outside of the system to challenge conventional wisdom and the status quo by demonstrating what's possible.
2. **Change requires** a broad and diverse coalition of people united around common purpose and shared values working to translate proof points into policy and practice.
3. **Change must be shaped** by those most directly impacted by the injustice, and led by those with personal proximity to the problem.

TEACHFORAMERICA

THE POWER OF A MOVEMENT

62K

Corps members and alumni across the country.

50+

Regions served by Teach for America teacher leaders (rural, urban)

1/3

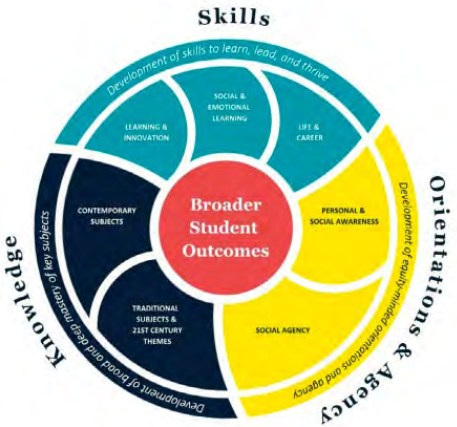
Of incoming corps members are placed in STEM classrooms.

How is TFA Upskilling New STEM Teachers?

USDOE SEED GRANT

STEM Priorities

1. **Recruit and rigorously select** 7,800 talented individuals for the 2019 and 2020
2. **Provide intensive pre-service preparation** through summer training institutes. These institutes place culturally-responsive pedagogy (CRP) at the center of CM training and position CMs to deliver effective instruction aligned with 21st Century Learning and College and Career-ready (CCR) standards
3. **Ensure that CMs build on the foundation of knowledge and skills** they acquire at institutes and develop into effective teachers **by providing regional ongoing support and development** during their first two years in the classroom.
4. **Increase access to effective STEM teachers** by fielding a corps in which nearly one-third is trained to teach math and science **and for the first time includes secondary CS teachers.**



The Pandemic Portal

"Pandemics have always forced humans to break with the past and imagine their world anew. This one is no different. It is a portal, a gateway between one world and the next."

-Arundhati Roy

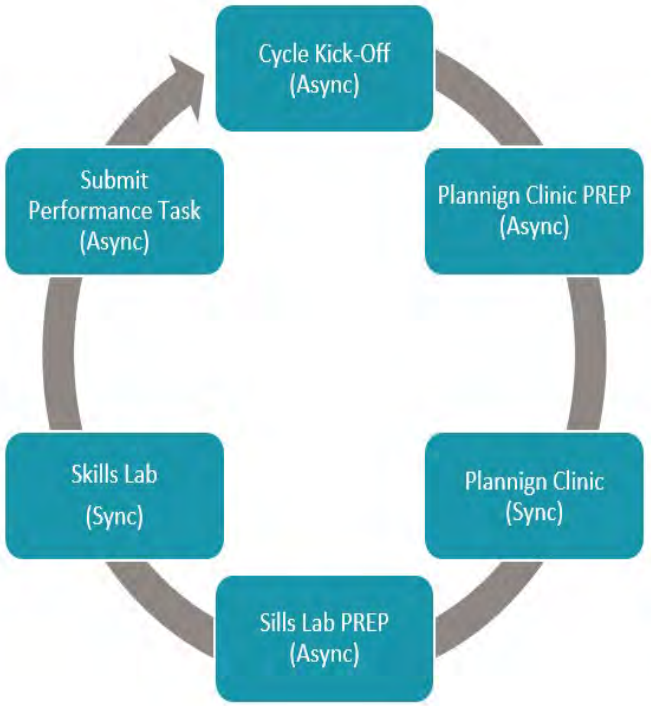
Leveraging the Pandemic Portal

virtual summer teacher training

DOMAINS AND OUTCOMES

These four domains of learning are the foundation for summer training, designed to equip corps members to teach virtually, blended, or in-person.

CULTURE UNDERGIRDS ALL FOUR DOMAINS. The world needs leaders who act and move forward differently because the world is different. Together, we use bold and creative leadership to shape the future of TFA and education. To facilitate this, we cultivate a culture in which **connections, collective action, and courageous creativity** are at the center of what we do.



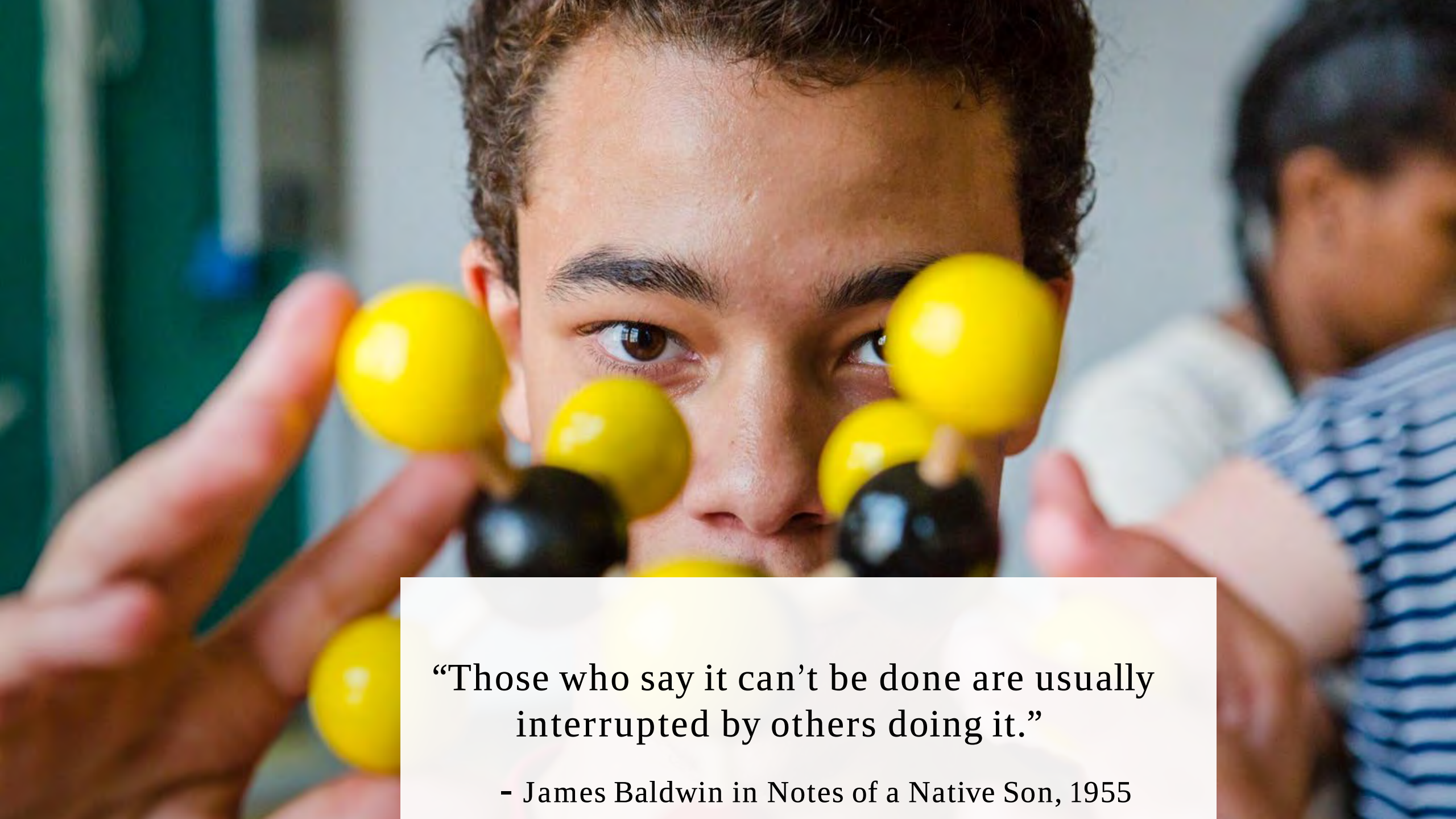
virtual summer teacher training

Secondary Math C&P	Secondary Science C&P
• Backwards Planning • Guided Inquiry as a Pedagogy of Liberation • Making Student Thinking Visible • 5 Practices for Orchestrating Productive Conversations (NCTM) • Addressing Academic Trauma and Cultivating Positive Mathematical Identity	• Teaching towards an instructional Goal • Phenomena based instruction • Affirmation of students scientific identity • Claims, Evidence & Reasoning Assessment • Just in Time Instruction • Supporting Changes in Student Thinking

Ongoing STEM Integration Support:

- Project based learning (PBL)
- Interdisciplinary Approaches to STEM
- Using STEM to solve community-based problems

TEACHFORAMERICA



“Those who say it can’t be done are usually interrupted by others doing it.”

- James Baldwin in Notes of a Native Son, 1955

Alternate Routes to Effective STEM Teaching

Colleen Hinds-Rodgers

she/her/hers

Managing Director of STEM, National TLD

contact info: colleen.hinds-rodgers@teachforamerica.org

TEACHFORAMERICA

Dr. David Stroupe

Associate Professor

Department of Teacher Education

Michigan State University

MICHIGAN STATE UNIVERSITY College of Education

Preparing STEM teachers to disrupt epistemic injustice

David Stroupe, Ph.D.

dstroupe@msu.edu

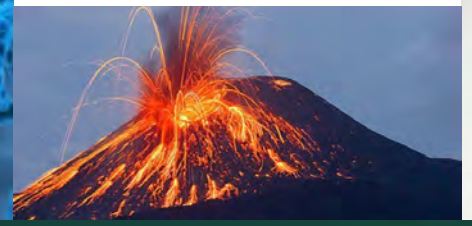
Associate Professor

Associate Director of STEM Teacher Education in the CREATE for STEM Institute

Situating STEM

- STEM exists in social/historical/political contexts and is not separate from human's sense-making of the world – including biases and assumptions. STEM has been changed by people over time, and continues to change as powerful people deem such changes necessary (Shapin, 2010)
- Not everyone gets to participate in STEM, and that is purposeful. Feminist epistemologists point out that certain people with power (often White men) have shaped the conceptual, epistemic, material, and social practices of canonical STEM. Therefore, STEM reflects the values and practices of some people, but not others (Harding, 2015)
- No one is quite sure what STEM is as a field – sub-disciplines have different knowledge goals, epistemic aims, practices, and ways to communicate the ideas (Knorr-Cetina, 1999)






Epistemic Injustice

- Purposeful denial of people's ideas and testimonies, their exclusion from knowledge production and practices, and the delegitimization of their ideas and cultures (Dotson, 2012; Fricker, 2007)

Epistemic Injustice and Disrupting 3 Myths about STEM Teaching

- Myth 1: STEM is objective and bias-free
- Myth 2: Teaching = “sage on the stage”, in which a charismatic teacher delivers subject matter information to students
- Myth 3: Everyone has equal access and opportunities in STEM and in classrooms

What does this mean for classroom interactions?

- Teachers must recognize moments of potential epistemic injustice
- Make professional decisions in the midst of uncertainty

From Wolf to Woof

- 7th grade class about evolution: How do we get chihuahuas from wolves?
- Quentin's story
- Maria's response
  - White teacher publicly valuing ideas of Black student
  - Norm that all ideas have value
  - Shut down potentially stigmatizing and racist comments of peers

How can STEM teachers learn such pedagogies?

- Teaching is a learnable profession
- New teachers' ideas about STEM and instruction need to be disrupted
- New teachers need opportunities to rebuild a framework for equitable and ambitious teaching
- New teachers need opportunities to rehearse equitable and ambitious teaching

Extended teaching rehearsals

- Macroteaching (Stroupe & Gotwals, 2018)
- Teach 10-12 instructional hours during methods class to peers
- Learn to recognize epistemic injustice and navigate uncertainty

CREATE for STEM Institute

NSF

ASTP
AMBITIOUS SCIENCE TEACHER PREPARATION

of Education

June 4-7, 2018

Dr. Niral Shah

Assistant Professor

College of Education

University of Washington

STEM Teacher Preparation for Racial Equity

Niral Shah, Ph.D.

niral@uw.edu

UNIVERSITY of WASHINGTON | COLLEGE OF EDUCATION

Equity & Inequity:
Looking *Inside* STEM Classrooms

How can we support STEM teachers in making racially equitable teaching concrete in everyday practice?

Isaac's Story

"They think…just because [Polynesians] are so big that we don't know how to do math. They think we're dumb…But me and my brother…we try to prove them wrong. Not that we're only big and good at sports, but we're trying to also tell them that we're also smart. We're scholar-athletes, ya know what I mean? That's what we're trying to prove."

- Isaac (12th Grade, Algebra 2, Tongan)

The Process of *Learning* STEM is Racialized

Asian people are…

Latinx people are…

White people are…

Black people are…

Polynesian people are…

Shah, N. (2017). Race, ideology, and academic ability: A relational analysis of racial narratives in mathematics. Teachers College Record, 119(7), 1-42.

Evidence of Racialized Experiences and Inequity across STEM Disciplines

- **Mathematics Education**
  - Martin, D. B. (2009). Researching race in mathematics education. The *Teachers College Record, 111*(2), 295-338.
  - McGee, E. (2013). Young, Black, mathematically gifted, and stereotyped. *The High School Journal*, 253-263.
  - Nasir, N. S., & Shah, N. (2011). On defense: African American males making sense of racialized narratives in mathematics education. *Journal of African American Males in Education, 2*(1), 24-45.
- **Computer Science Education**
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- **Physics Education**
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Problem #1:

To Address Racism =>

Teachers Must First Learn to See Racism

Racial Noticing Framework

Using Case-based Scenarios + Live Classroom Observation

- **In Classroom Interactions**
- **In Curriculum**
- **In Course Placement**

Shah, N., & Coles, J. A. (2020). Preparing teachers to notice race in classrooms: Contextualizing the competencies of preservice teachers with antiracist inclinations. *Journal of Teacher Education*, 1-16. doi:https://doi.org/10.1177/0022487119900204

Problem #2:

To Address Implicit Bias =>

Teachers Need Classroom-Level Data

EQUIP: Equity QUantified In Participation

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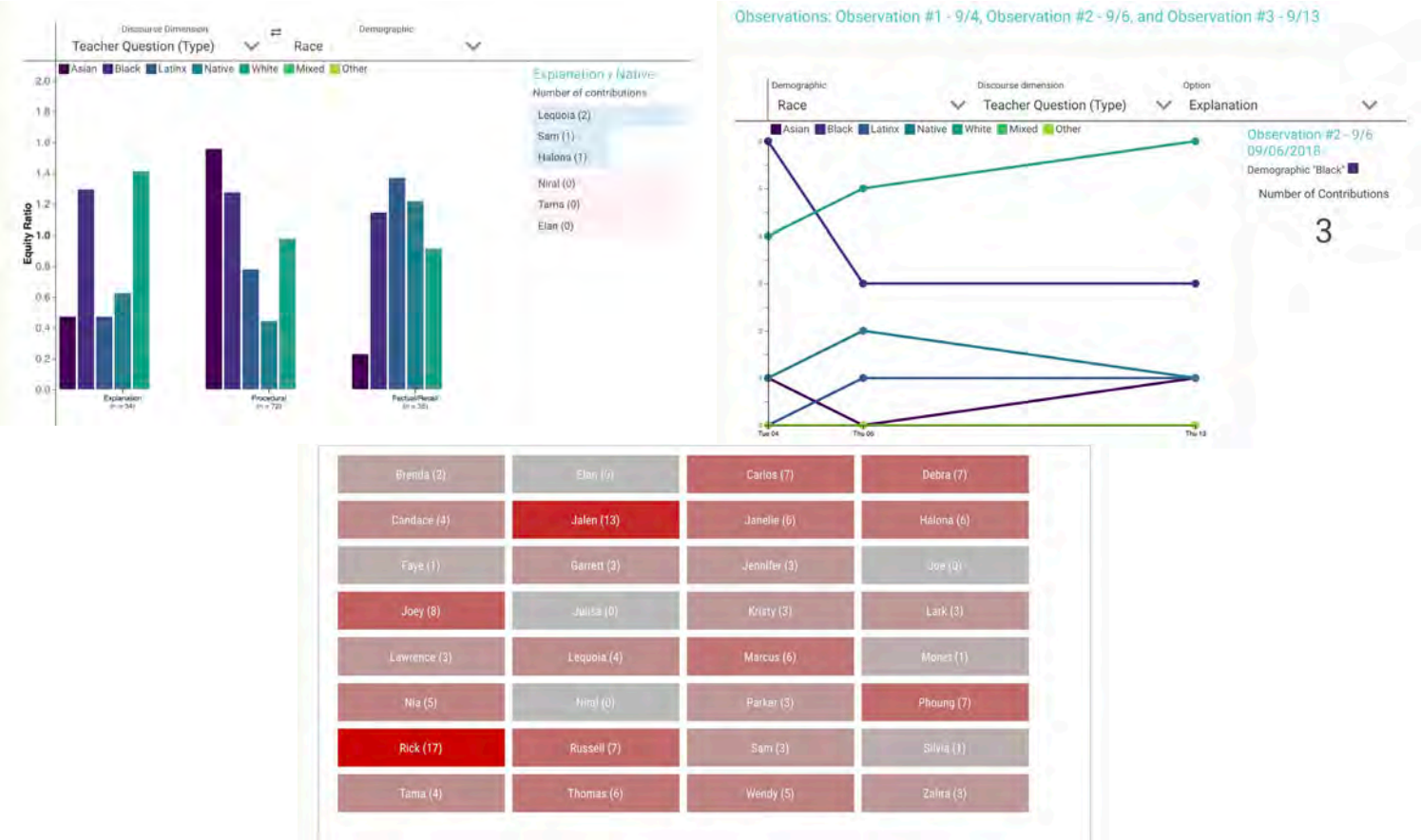

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https://www.equip.ninja/

- **Data on equity patterns is a first step**
- **Coaching + data => increase equity for minoritized students**

Reinholz, D. L., & Shah, N. (2018). Equity analytics: A methodological approach for quantifying participation patterns in mathematics classroom discourse. *Journal for Research in Mathematics Education, 49*(2), 140-177.

Shah, N., Herbel-Eisenmann, B., & Reinholz, D. (2020). Why Mrs. Stone never calls on Debra: A case of race-gender ideology in practice. In M. Gresalfi & I. S. Horn (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 1* (pp. 1974-1981). Nashville, TN: International Society of the Learning Sciences.

Key Takeaways

- **STEM learning happens in a complex racial context**
- **STEM teachers need support in making racial equity concrete in their daily teaching practice**

Niral Shah, Ph.D.

niral@uw.edu

The opinions expressed do not necessarily represent the views of the the Institute of Education Sciences, National Science Foundation, or the National Academy of Education/Spencer Foundation.

MIA HOWERTON
Program Manager, Effective Educator Development, U.S. Dept. of Education

KAMAL HAMDAN
Director, Center for Innovation of STEM Education, California State University – Dominguez Hills

JANET STRAMMEL
Professor, College of Education, Fort Hays State University

COLLEEN HINDS-RODGERS
National Director of STEM, Teach for America

DAVID STROUPE
Associate Professor, Department of Teacher Education, Michigan State University

NIRAL SHAH
Assistant Professor, College of Education, University of Washington

Questions

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