

# Urban Science Teacher Education Across Contexts: Social Justice, Identity, and Agency

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### INTRODUCTION

- Teacher education programs have an important role to play in the development of teachers who espouse social justice in their beliefs and practices (Cochran-Smith, 2004).
- Pre-dispositions strongly determine science teacher beliefs, regardless of experiences in preparation (Hong, Greene, & Hartzell, 2011; Ye, Varelas, & Guajardo, 2011).
- This study is framed by the research questions:
  - What pre-dispositions about social justice and science did prospective science teachers bring to an urban science teacher education program?
  - How did these pre-dispositions influence science teachers' learning about how to teach science?
  - How did these pre-dispositions influence science teachers' beliefs and reported instructional practices as first year teachers?

### CONCEPTUAL FRAMEWORK: DISPOSITIONS

- Dispositions:** Beliefs about teaching, learning, and students (Bialka, 2016).
- Social Justice Dispositions:** We conceptualize teaching for social justice as reflecting an individual and/or structural orientation (Chubbuck, 2010; Whipp, 2013).
  - Individual includes "curricula, pedagogies, teachers' expectations and instructional styles [that] improved the learning opportunities for all students" (Chubbuck, 2010, p. 198).
  - Structural emphasizes, "how structural inequities of schools can impede student learning, and they will challenge and, ultimately, work to transform those structures," (Chubbuck, 2010, p. 198).
- Science Teaching Dispositions:** We conceptualize science teaching beliefs as reflecting the interplay between beliefs about the nature of science, and teaching (Duschl & Grandy, 2013).
  - Range from more traditional didactic methods (learning about) to more reform-oriented, practice-based approaches (figuring out)

### METHODS

#### Context

- A case study (Yin, 2013) of the Urban Science Teaching Program (USTP) (pseudonym).
  - A 1-year MEd program funded by the Noyce Foundation.
- Participants were one cohort including 4 "Scholars" as embedded units of analysis.

#### Data Sources

- Longitudinal study spanning 2 academic years: 1-year MEd and 1st year of teaching.
- Interviews (6), lesson plans and written reflections (4), focus group (1), survey (1).

Table 1: Scholar Information

Scholar*	Gender	Race/ Ethnicity	Age	Under- graduate Major	School Background	1 <sup>st</sup> Year Teaching Position(s)
Sara	F	Asian	22	Biology Applied Psychology	Suburban Public	Charter HS Biology Public HS Math/ bio
Gabriel	M	White	22	Chemistry	Urban Parochial	Public HS Chemistry
Alan	M	White	22	Environmental Geosciences (Minor Biology)	Suburban Private	Public Alternative HS Biology
Felicia	F	Black	22	Biology Psychology	International Public	Charter MS Science

\*pseudonyms

### METHODS, cont.

**Data Analysis:** Deductive and inductive methods.

- Deductive:**
  - Read all data chronologically by Scholar, open coding (Corbin & Strauss, 2008).
  - Wrote detailed case reports for each Scholar at three time points:
    - before USTP, during USTP, and the first year of teaching.
  - These reports were reviewed by the research team and each Scholar as member checks to assure reliability (Lincoln & Guba, 1985).
- Inductive:** We used these reports to classify Scholars' dispositions to social justice (Chubbuck, 2010) and science teaching (Duschl & Grandy, 2013) at 3 time points (before USTP, during USTP, and the first year of teaching).
- Engaged in within and cross case comparisons to identify salient themes and distinctions (Miles, Huberman, & Saldana, 2014).

### FINDINGS

Table 2: Summary of Findings

Scholar	Pre- Disposition*	Post- Disposition*	Profile	Description
Sara	I – L	I – L	"The Nurturer"	Sara emphasized the importance of science content expertise. She also highlighted the importance of forming personal relationships with students to individualize instruction to motivate and support unique learning needs.
Gabriel	S – F	S/I – F	"The Activist"	Gabriel was critical of science and science education and sought to empower students through science teaching.
Felicia	I – F	I/S – F	"The Facilitator"	Felicia emphasized her role as a teacher to encourage and support students to be independent learners.
Alan	S/I – F	I/S – F	"The Reformer"	Alan was critical of schools and school systems in perpetuating inequality and focused on his role as a teacher to interpret and enact instruction in a way that best served disenfranchised students.

\*Key: Social justice (Chubbuck, 2010; Whipp, 2013) I = individual; S= structural; I/S and S/I = blended with one more prominent. Science teaching (Duschl & Grandy, 2013) L = "learning about", F= "figuring out"

#### Sara "The Nurturer"

- Goal to make science more accessible to disenfranchised students.

*"You don't see a lot of students in urban settings going into medicine, engineering, or science in college because they think it's difficult."*
- Emphasized the importance of "content expertise" as a science teacher
- Emphasized the importance of "accommodating" and "individualizing" instruction

*"[T]eaching isn't just teaching students what something is, but it's more like trying to also accommodate their learning styles and also trying to understand what kind of background they're coming from. This is not just standing up, talking, or just demonstrating a certain experiment."*
- Working in a charter school with a scripted curriculum inhibited her ability to individualize instruction; but, she did not challenge inequitable structures, and left.

*"I did not enjoy teaching at all. I always felt like why am I teaching, why am I here? It just got to the point where every day was miserable."*

### FINDINGS, cont.

#### Gabriel "The Activist"

- Goal to challenge the way science is taught.

*[W]hat I'm most passionate about in about science and education really is the ...empowerment of individuals and groups to discover and inquire about the world around us... I think if science education is done in the right way innovation will become a tool of liberation, rather than one of oppression.*
- Intended to foster the development of a "scientific mindset" through his science teaching.
- Developed an emphasis on developing relationships with students.

*I am not necessarily the best teacher but all my students really appreciated having me because they could tell that I really cared. They can tell that I can sympathize with them. I can help my students with academic and personal things.*
- Challenged school structures that were inequitable.

*But, like I know that if I wanted to, and I do want to, and I will, I could come up with my own stuff. And, like the um... And, the only thing that's like sort of dictating what I have to teach is this communal like midterm and final and stuff like that. And, yet I asked, hey can I make a different midterm or final for my, you know, sheltered students, you know, the emerging bilingual students, and the answer I got was yes. So, then I did that.*

### DISCUSSION & IMPLICATIONS

- A central component of urban science teacher preparation is to support and develop social justice orientations encompassing the work of teaching both within and outside of the classroom (Cochran-Smith, 2004).
- The pre-dispositions of prospective teachers must be revealed and challenged during teacher preparation. This confrontation is as important, if not more, than the knowledge and skills they acquire in teacher education (e.g. Villegas, 2007).
- Findings indicate the work within the classroom was well-supported through concrete pedagogical skills learned in coursework and through student teaching from strong mentor teachers. However, teacher engagement in social justice out of the classroom was largely dependent on teacher pre-dispositions.
- Findings offer three insights for teacher education programs.
  - Urban science teaching must be positioned as a political act; teachers should reflect on their own background and the role of power and privilege in science and science education(e.g. Madkins & De Royston, 2019).
  - Strategies and models for engaging in political activism must be provided through mentor teachers and coursework providing concrete tools and strategies for beginning teachers to engage in structural analysis.
  - Prospective teacher dispositions toward science and social justice should be a consideration in recruitment and acceptance of prospective urban teachers.

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