

Secondary STEM Projects Cultivate Rural Agricultural Communities in Latin America

A case study in effective science teaching

Becca Shareff

UC Berkeley Graduate School of Education

rlshareff@berkeley.edu

E·S·R·C
ECONOMIC
& SOCIAL
RESEARCH
COUNCIL

TFI
TINKER
FOUNDATION
INCORPORATED

DFID
Department for
International
Development

CS
Berkeley
UNIVERSITY OF CALIFORNIA

Motivating Problem



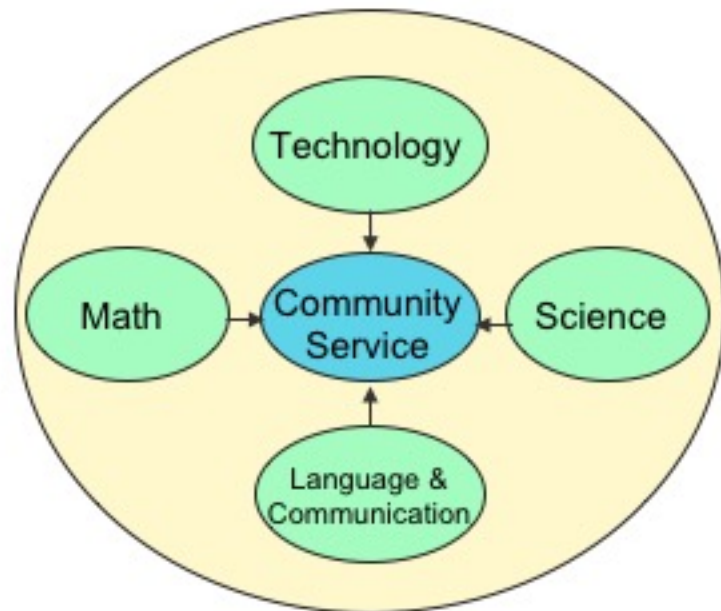
Nonattendance

Decontextualized

Inauthentic

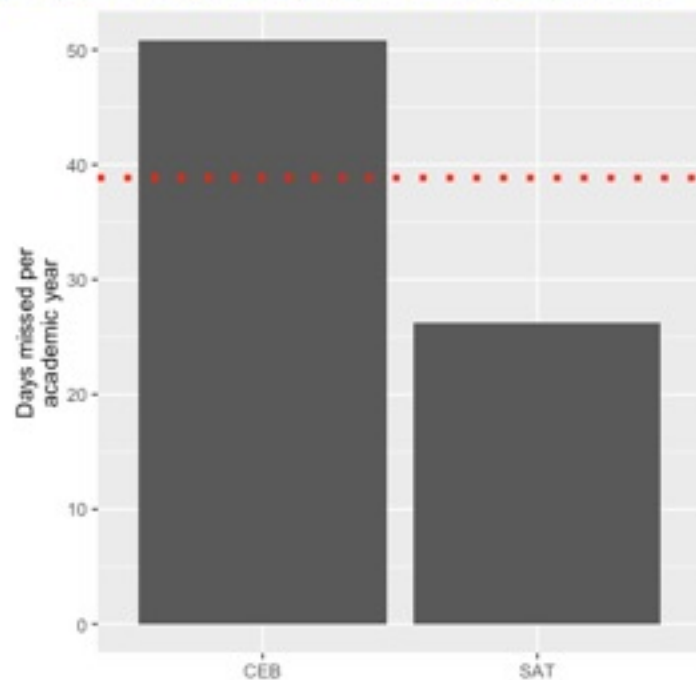
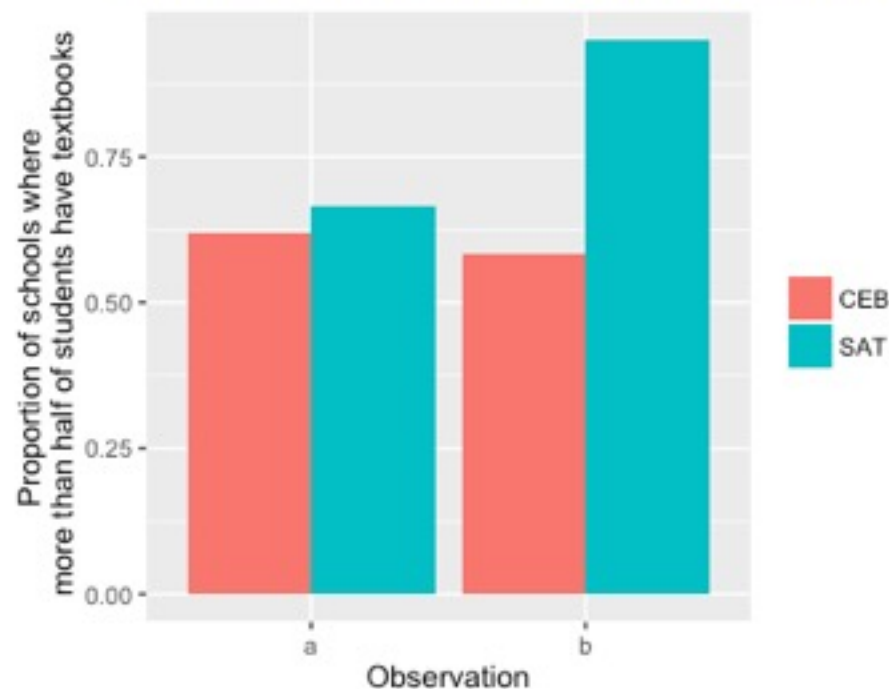
Promising Approach

SAT (Sistema de Aprendizaje Tutorial)



Previous Research (McEwan et al., 2015)

SAT composite scores **.21 SD higher** and cost-per-student **10% lower** than CEB students



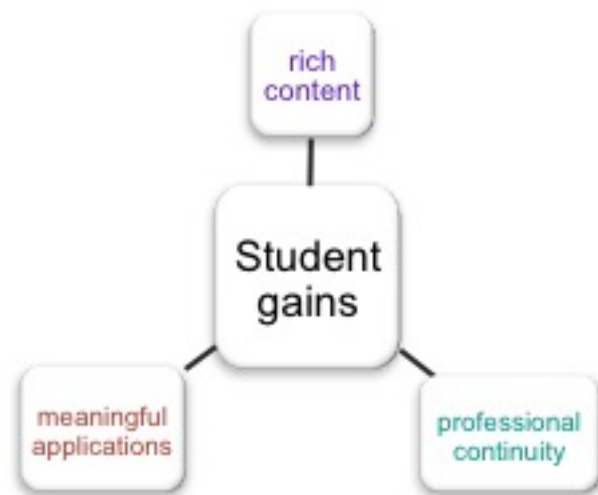
Model of Effective Teaching

Hypothesis: SAT students have access to:

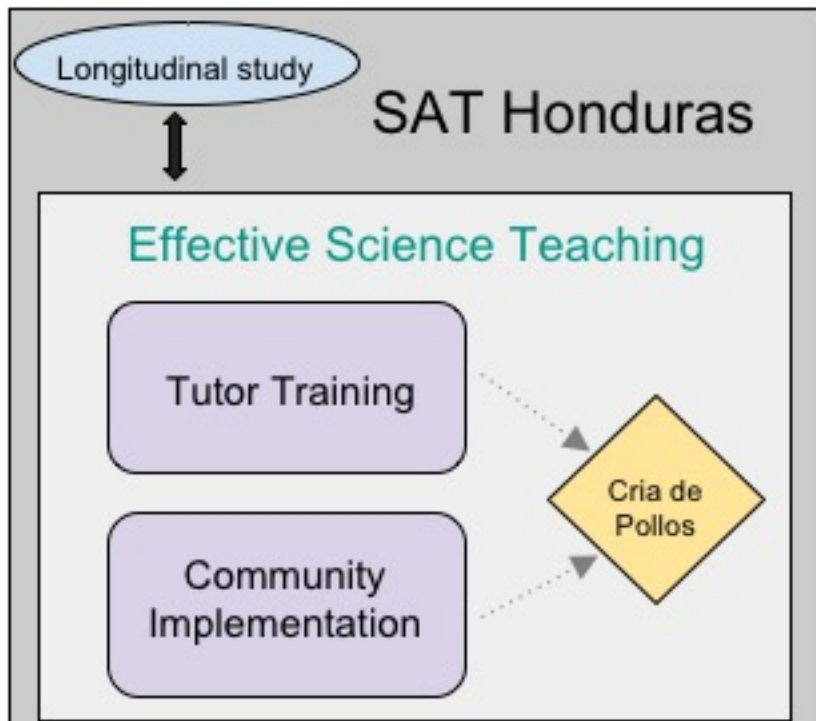
rich content

professional continuity

meaningful applications



Investigative Design



3.5 weeks in Summer 2016

- Weeks 1 & 2: Training
- Week 3: Field Visits

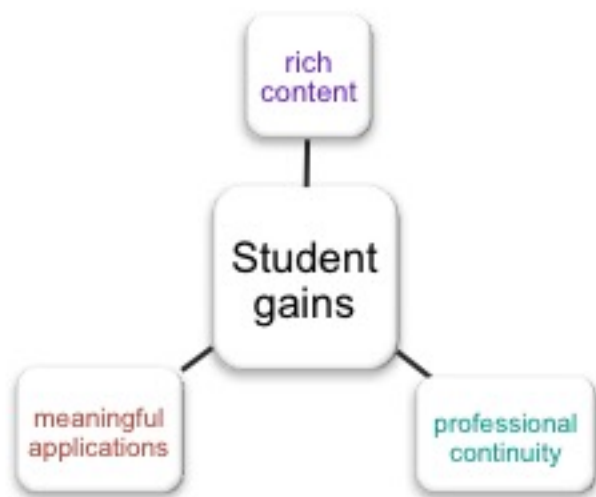
Data Description

Weeks 1& 2 (Training):

- Direct & Participant observation of tutor trainings
- Workbooks collected & annotated from trainings
- Interviews with 4 Tutors and 2 Administrators

Week 3 (Field Visits):

- Direct observation of classrooms
- Informal garden talks with students and families
- Interviews with 4 Tutors and 8 Students



Analysis Methods

QDAS (Dedoose) developing grounded coding scheme based on initial inquiry (descriptive), with emergent more sophisticated codes.

- Examples:
- Community perception of SAT
 - Community engagement
 - Hands-on activity
 - Content relevance

Looking to triangulate across data sources to validate constructs

Transcripts for interviews produced by Honduran research assistants

Preliminary Findings

Training

Field Visits

Cria de Pollos



Training



Training



Themes emerging from training



Field Visits

Unforeseen challenges:
timing/ holidays/ meetings



Field Visits

Unforeseen challenges:
timing/ holidays/ meetings



Field Visits

Unforeseen challenges:
timing/ holidays/ meetings



Field Visits

Unforeseen challenges:
timing/ holidays/ meetings



Field Visits

Unforeseen challenges:
timing/ holidays/ meetings



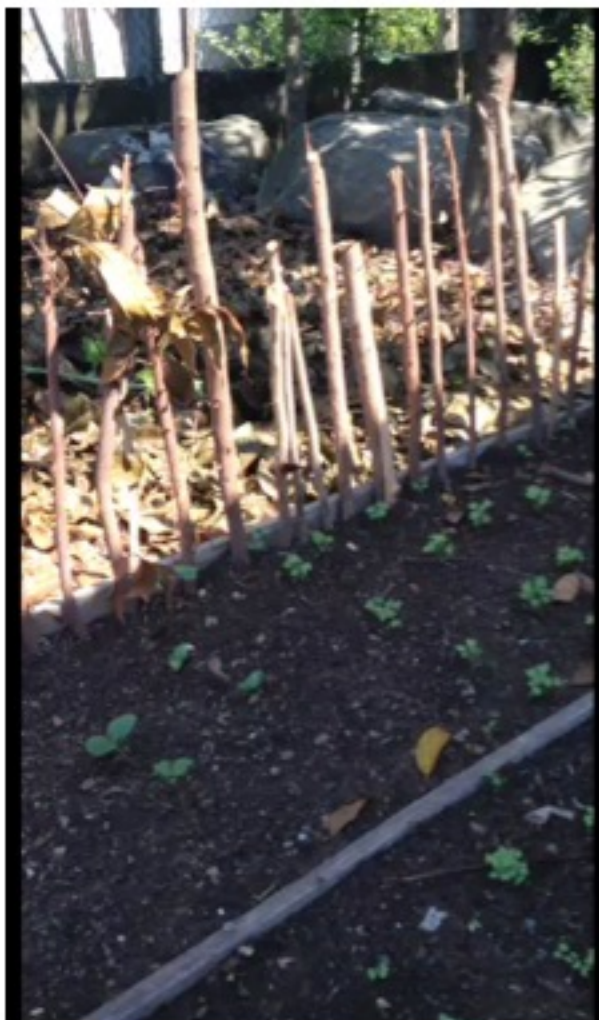
Themes from field visits

Projects include families

- Content
- Setting
- Results

↻ Environmental preservation ↻
↻ Economic development ↻

- Changing attitudes requires new skills and resources
- Child-parent dynamic



Special case- *Cria de Pollos*



Special case- *Cria de Pollos*



Special case- *Cria de Pollos*



Special case- *Cria de Pollos*



Interview Excerpts ~ Cria de Pollos

Yandi (student) – *Anticipates the project as a future job opportunity within her community.*

“Eso **nos beneficia mucho**, tenemos, vamos a tener más conocimiento y, este, el maestro nos ha, nos ha hablado acerca de eso y dice que cuando nosotros **estemos grandes, ya podríamos tener una micro empresa**. Cada quien si quiere criar pollos, ya **va a tener el conocimiento**.”

Interview Excerpts ~ Cria de Pollos

Javier (trainer)- *relatable to women, technical knowledge indicative of SAT*

“...Muchas veces también **las mamás se identifican más**, en el hogar la parte productiva casi la tiene el padre de familia y la mama más la, la, la parte de la cocina y dar comidita, entonces está más relacionado con la gallinas y pollos entonces ese es un proyecto también que de alguna, cuando lo vemos la cría de pollos, ayuda a potenciar también esa producción pero ya con **ciertos criterios técnicos que enseñamos** de alguna forma en el SAT.”

Interview Excerpts ~ Cria de Pollos

Lucia(tutor)- related it to running a business: handling data, projections, calculations, gains and losses. Shared the learning experience, supported community with funds.

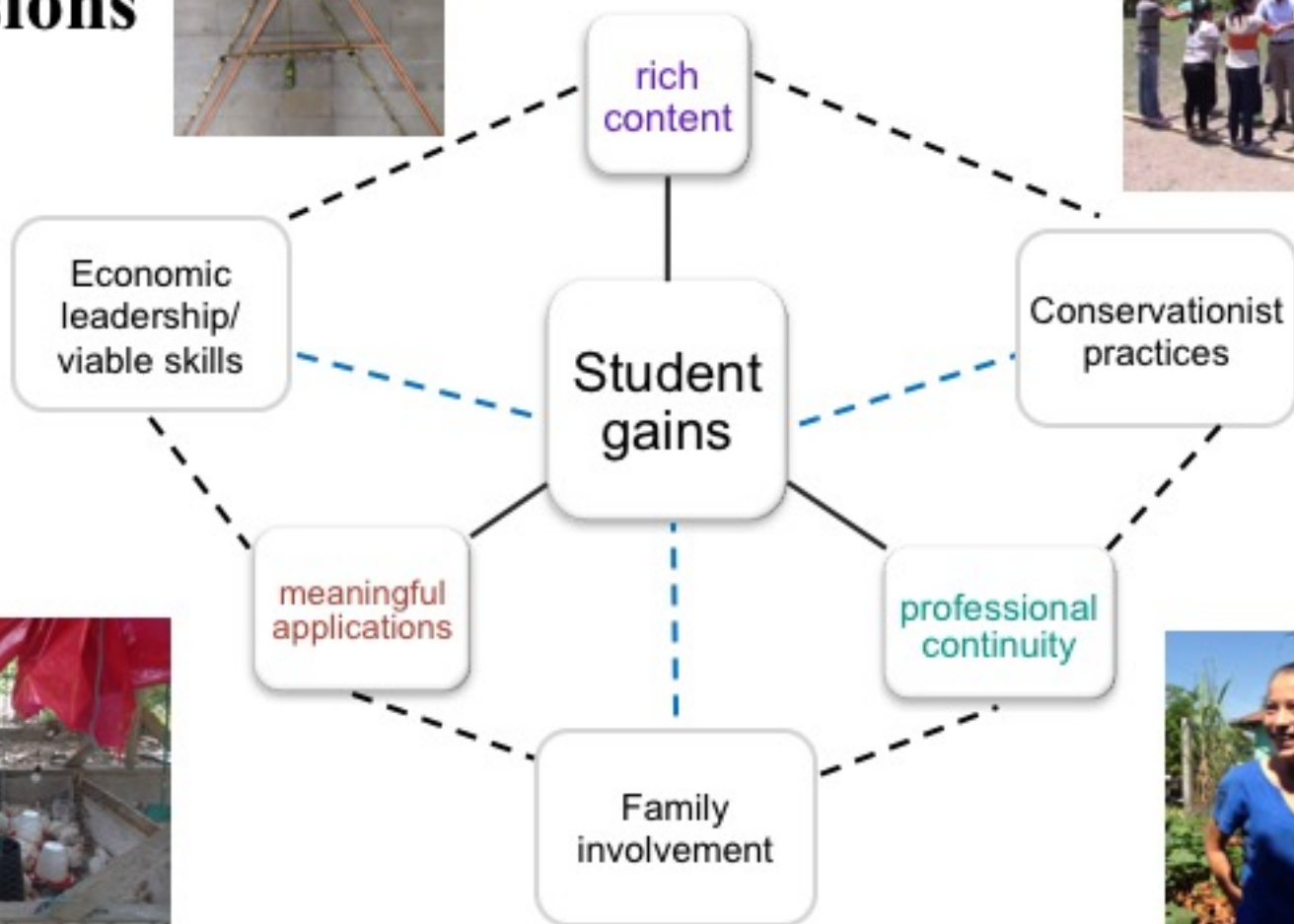
“Ellos tuvieron que aprender, **yo aquí vine aprender** ... A matar pollos! Mire, vendimos la carne, las vísceras o sea el hígado, la molleja, las patitas...y nos **genera ganancias** y esas gana, tenemos también cultivos y todo eso a nosotros nos, mire todos esos ese dinero es **empleado para las celebraciones**, o para arreglar la **infraestructura del centro educativo**.”

Interview Excerpts ~ Cria de Pollos

Nataniel (tutor)- *researched extra material for pigs, practical extension of math content*

“Anteriormente en matemática ellos habían visto eso de **eficiencia de conversión**. Lo vieron digamos matemáticamente, pero hasta **ahorita lo estamos aplicando a la vida real.**”

Conclusions



Implications

Accessible and highly technical **STEM content viable for underserved populations** through economic and ecologically relevant project-based instruction.

Community involvement as students develop leadership skills supports **retainment of gains and shifting practices** within rural / educationally isolated setting.

How might this work relate to constructs around garden based learning and authentic science instruction in US education?

Thank you!



Becca Shareff

rlshareff@berkeley.edu