Broadening Participation Among Multilingual Learners Through High School Teachers' Professional Learning Experiences in the Instructional Conversation (IC) Pedagogy

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Background

Across the nation, many school districts are experiencing rapid expansion in the enrollment of multilingual learners, yet many high school teachers do not have corresponding opportunities to learn how to effectively support these students' engagement in scientific and engineering practices. This exploratory project will address this issue by developing and testing a model of professional learning for high school teachers that embeds the Instructional Conversation (IC) pedagogy within NGSS-standards-aligned lessons grounded in scientific and engineering practices (SEPs).

Under this model, high school science teachers will collaborate with high school ESOL teachers to:

- Co-develop linguistically-sustaining instructional materials that provide students with intentionally scaffolded opportunities to practice using scientific dialogue and collaborate to explain natural phenomena or design solutions through engineering
- Co-teach science classes including students receiving ESOL services
- Reflect and debrief with an instructional coach regarding whether and how their instructional approaches supported students' dialogue-rich engagement with SEPs

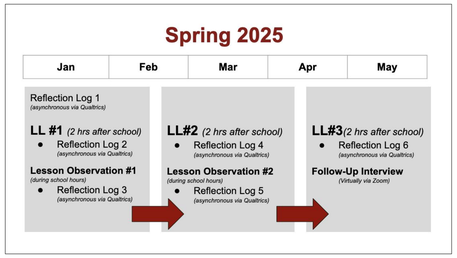
Research Questions

- **RQ1:** What evidence do we find that IC pedagogical strategies promote Teachers' attitudes, knowledge, and skills needed to enact the three identified NGSS instructional shifts (*asset-based science teaching with multilingual learners (MLs); integrated content and language instruction; collaboratively engaging MLs in science and engineering practices*)?

- **RQ2:** What supports do teachers need to facilitate effective multidisciplinary collaboration for NGSS-aligned science teaching with MLs?

Study Framework: Learning Lab Cycles

The professional learning model includes three Learning Lab cycles, each aligned with a specific science or engineering practice (SEP)-- one each semester for three semesters. During each cycle, high school science and ESOL teachers will co-create Joint Productive Activity Task Cards, aligned with principles of the Instructional Conversation (IC) pedagogy, which guide student collaboration and dialogue as they engage in a specific standards-aligned task, aligned with the identified SEP. Instructional coaches will debrief and reflect with educators regarding their implementation of the Task Cards. During the next Learning Lab, the high school teachers will reflect on the implementation feedback to co-design improved task cards based on a different science standard.



Study Methods

Research Question	Research Participants	Data Sources	Analytic Methods and Contextualizing Information
RQ1	4 Science Content Teachers 4 ESOL Teachers	144 Reflection Logs **(RL)** (6 logs/semester x 3 semesters x 8 teachers) 3 Follow-up Focus Group Interviews **(FG)** (1/semester)	**Thematic analysis** (Braun & Clarke, 2006) with *deductive* codes (based on targeted areas of focus) and *inductive* codes (those that emerge from the teacher responses) (Creswell, 2013; Roulston, 2010) to examine teachers' attitudes and knowledge with regard to the 3 Next Generation Science Standards (NGSS) shifts. **RL** data will comprise teachers' written responses to prompts tied to the RQ (e.g., What supports most impacted your understanding of the NGSS shifts? How?) **FG** data will comprise teacher responses to semistructured interview questions that probe teachers' understanding of the factors impacting their learning of NGSS-aligned shifts.
		24 JPA Task Card Lesson Plans & Artifacts (2/semester x 3 semesters x 4 ESOL-Science teacher pairs)	**Text Analysis** (Kuckartz, 2019) to examine shifts in practice in the integration of NGSS content and language standards in the Task Cards/Artifacts. Analysis of Task Card structure, language and content (e.g., what scaffolds are included in the task cards to amplify the language of science and foster ML students' abilities to practice and demonstrate science content knowledge) will yield insights about where teachers may need further support in the creation of assets-based lessons that integrate science and language in mutually supportive ways. Student Artifacts can illustrate evidence of instructional impact.
		24 Classroom Observations using EFSR **(CO)** (2/semester x 3 semesters x 4 teacher pairs)	**Project-Adapted Essentials for Success Rubric (EFSR)** (Luning & Wyatt, 2010) to analyze alignment of teacher skills with the 3 NGSS shifts to promote culturally and linguistically sustaining practice. Analysis of **CO** data using the EFSR rubric will help researchers identify areas where teachers need more support fostering culturally and linguistically sustaining practices.
RQ2	4 Science Content Teachers 4 ESOL Teachers	144 Reflection Logs **(RL)** (6 logs/semester x 3 semesters x 8 teachers) 3 Follow-up Focus Group Interviews **(FG)** (1/semester)	**Thematic analysis** (Braun & Clarke, 2006) with *deductive* and Asynchronous *inductive* codes (Creswell, 2013; Roulston, 2010) to examine the factors that facilitate or hinder multidisciplinary collaboration between the ESOL and science content teachers using the reflection logs to identify, and the focus groups to establish and co-construct an understanding of needed support. **RL** data will comprise teachers' written responses to prompts tied to the RQ (e.g., How did your understanding of identifying and leveraging ML assets evolve after collaborating with your peers to co-create JPA lessons?) **FG** data will comprise teacher responses to semistructured interview questions that probe teachers' perceptions of factors that fostered or hindered multidisciplinary collaboration.

To investigate whether this professional learning approach supports the teachers in enacting practices aligned with the principles of the Instructional Conversation pedagogy, as well as explore factors impacting multidisciplinary collaboration among educators, we will collect the following data each semester:

- Teacher Reflection Logs
- EFSR Rubric Data and Rubric-Based Feedback on Classroom Observations of EOSL/Science Teachers' collaboratively planned lessons
- Artifacts, such as the Task Cards and materials;
- Transcripts from teacher focus group interviews; and
- Select transcriptions of video-recorded professional learning ("Learning Lab") sessions.

Each semester will include a Learning Lab cycle centered on a different SEP and the data above will be collected each Learning Lab cycle. Thematic and text analysis will explore potential shifts in teachers' pedagogical practices with multilingual learners, as well as the supports needed for effective multidisciplinary collaboration.

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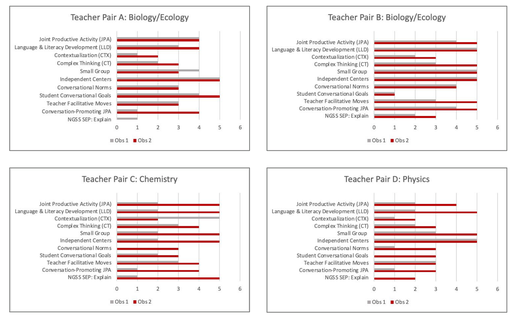
Preliminary Outcomes

We have just completed the first year of this project and preliminary analyses show the following thus far:

RQ1: Change in teacher practice (EFSR Data)

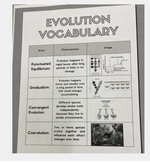


RQ1: Teachers' enactment of the 3 identified NGSS instructional shifts (Artifact Data)

Asset-based science teaching with multilingual learners (MLs)

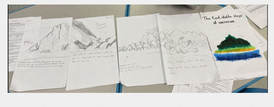
Semi-preconstructed phrases that provide frames for explaining ecological succession translated into Spanish and Vietnamese to leverage student assets and build biliteracy

Integrated content and language instruction



Multimodal representation of scientific vocabulary utilizing words and connected visual images to support conceptual understanding

Collaboratively engaging MLs in science and engineering practices (SEPs)



Collaboratively-generated sequential explanation (SEP #6) of ecological succession

RQ2: Factors Impacting Multidisciplinary Collaboration (Reflection Log Data)

- Time and opportunity to collaborate
- Shared Vision
- Willingness to learn and be vulnerable
- An understanding of the new content
- Respect for others
- Understanding of the others' specialty/ strengths
- Both having a desire to do a "good job"
- Clear Roles