# Multidisciplinary STEM Education with Multilingual Learners to Address Societal Challenges


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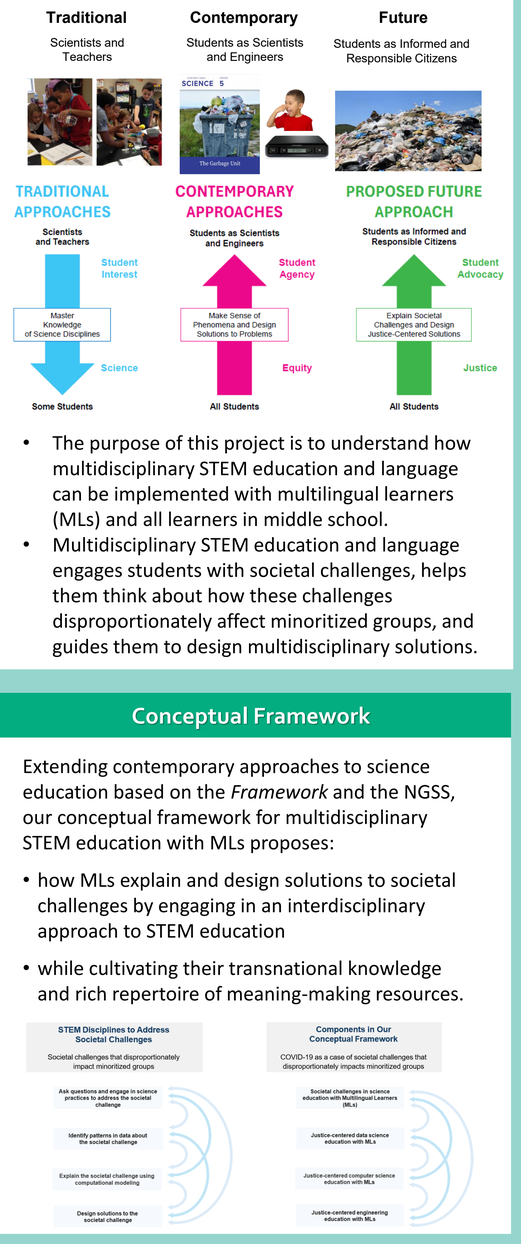
## Context and Purpose




- The purpose of this project is to understand how multidisciplinary STEM education and language can be implemented with multilingual learners (MLs) and all learners in middle school.
- Multidisciplinary STEM education and language engages students with societal challenges, helps them think about how these challenges disproportionately affect minoritized groups, and guides them to design multidisciplinary solutions.

## Conceptual Framework

Extending contemporary approaches to science education based on the *Framework* and the NGSS, our conceptual framework for multidisciplinary STEM education with MLs proposes:

- how MLs explain and design solutions to societal challenges by engaging in an interdisciplinary approach to STEM education
- while cultivating their transnational knowledge and rich repertoire of meaning-making resources.




## Societal challenges in science education with MLs:


Maggie Alvarado was a 10-year-old girl living in CA who made national news. She called into a radio show in which the hosts were talking about COVID-19's disproportionate impacts on Latinos in CA. She was seeking information about the virus to keep her parents safe.

Students ask questions about societal challenges that disproportionately impact minoritized groups.

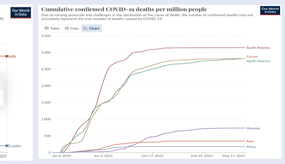

**Driving Question:**
How were people impacted differently by the COVID-19 pandemic?

### Multidisciplinary Data Science

Students analyze and interpret data to identify patterns of disparities for minoritized groups.

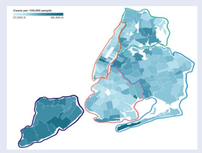
#### Transnational Knowledge

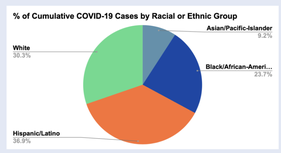

Country Data




Continent Data

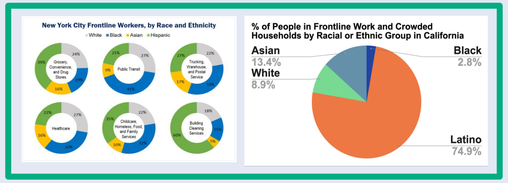
#### Local Knowledge





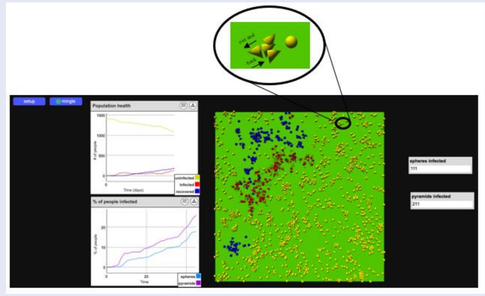

U.S. Data

#### Disproportionate Impacts

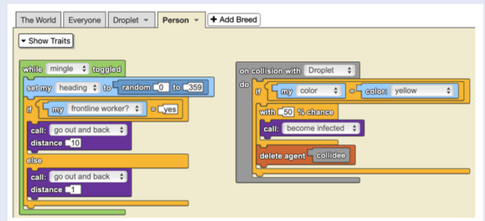



### Multidisciplinary Computer Science

Students use a computational model to test the effects of different conditions (e.g., mobility and crowding) on the spread of a virus.




**Multimodality;**
**Multiple Meaning-Making Resources**




### Multidisciplinary Engineering

Students design solutions to disproportionate impacts on minoritized groups.


Students use data and computational model to design solutions to the problem:

*In a health crisis, health information in languages other than English is not communicated (i.e., spread of information) in a timely manner.*

## References


Grapin, S. E., Haas, A., McCoy, X., & Lee, O. (2023). Justice-centered STEM education with multilingual learners: Conceptual framework and initial inquiry into pre-service teachers' sense-making. *Journal of Science Teacher Education. 34*(5), 522-543. https://doi.org/10.1080/1046560X.2022.2130254

Lee, O., & Grapin, S. E. (2024). Transforming STEM by focusing on justice. *Educational Leadership, 81*(2), 65-68. https://ascd.org/el/articles/transforming-stem-by-focusing-on-justice

Lee, O., & Grapin, S. E. (2025). Justice-centered STEM education with multilingual learners to address societal challenges: A conceptual framework. *Journal of Research in Science Teaching, 62*(5), 1202-1231. https://onlinelibrary.wiley.com/doi/10.1002/tea.21999

Lee, O., & Grapin, S. E. (in press). STEM education with a focus on equity and justice: Traditional, contemporary, and proposed future approach. *Journal of Research in Science Teaching*.



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