One Size Fits All?: Mapping Out STEM Learner Empowerment Across Educational Contexts  
A Doctoral Research Study through Portland State University’s Graduate School of Education  
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Why should we care about culturally sustaining STEM ecosystems?

Research and experience alike indicate that learners are not engaging in STEM or being supported in fostering STEM interest at equitable rates, and we as STEM educators do not sufficiently understand their individual and cultural motivations and needs, nor how they engage with their holistic STEM ecosystems to seek out culturally sustaining experiences and resources through their educational journeys.

What questions are guiding this research?

RQ1: In what ways do the feelings of self-efficacy expressed by Portland-area learners correspond with expressed preferences regarding the various resources in their local STEM education ecosystem?

RQ2: In what ways do race, gender, and ethnicity impact the relationship between expressed self-efficacy and STEM ecosystem preferences among Portland-area learners?

RQ3: To what extent do Portland-area learners report feelings of cultural sustenance when engaging with the various resources in their local STEM education ecosystem?

RQ4: How is the relationship between feelings of cultural sustenance across STEM ecosystem resources among Portland-area learners mediated or moderated by race, gender, and ethnicity?

RQ5: In what ways do Portland-area learners indicate that their agency engagement in their various STEM ecosystem resources correspond to the learning outcomes proposed by the Six Strands of Science Learning?

What is the problem?

Research and experience alike indicate that learners are not engaging in STEM or being supported in fostering STEM interest at equitable rates, and we as STEM educators do not sufficiently understand their individual and cultural motivations and needs, nor how they engage with their holistic STEM ecosystems to seek out culturally sustaining experiences and resources through their educational journeys.

What is my study design?

Theoretical Framework: Critical theory paired with complexity theory

Key Concepts: (a) Culturally sustaining pedagogy, (b) Self-efficacy, (c) The six strands of science learning, (d) STEM learning ecosystems, (e) Communities underrepresented in STEM

Methodology: Critical quantitative

Method: Cross-sectional survey design

Sampling Frame: Portland, OR area 6th- to 8th-graders

Instrument: 99-item questionnaire comprised of four ecosystem location-specific pages, each with 24 items assessing self-efficacy (8 items), six strands of science learning (6 items), and cultural sustenance (10 items), as well as one demographics page (3 items)

Data Collection Procedure: Survey administered by researcher in 12 Portland-area 6th- to 8th-grade STEM classrooms

What challenges have I encountered?

- There have been few prior implementations of critical quantitative methodology
- No quantitative measures of culturally sustaining pedagogy appear to exist
- Peer-reviewed literature regarding STEM ecosystems and six strands of science learning is minimal
- There are numerous bureaucratic complexities involved in gaining access to 6th- to 12th-grade classrooms
- Individually and culturally meaningful incentives for students can be challenging to identify and include in a cost-effective manner

What questions, ideas, cautions, or resources would you like to share with me?

Please use a sticky note to offer any suggestions and recommendations you wish—I am so grateful for the opportunity to learn from my wonderful STEM education colleagues!