



Rethinking the Application of Culturally Relevant Education:

A Systematic Review of Native American STEM Learners

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Abstract / Introduction

Native American learners have been identified to be consistently the most underrepresented minority group in STEM. Therefore, this study reviewed the evidences demonstrated in literatures that showed a connection between culturally relevant science education and Native American (indigenous/aboriginal) learners' motivation into STEM fields. More specifically, this systematic review provides a descriptive review of relevant studies in answering the following research questions: (1.) what types of culturally relevant science education (CRSE) motivate and engage Native American learners? (2.) what are the shared experiences of Native American STEM professionals and students?

Result revealed more than half of the reviewed studies reported that CRSE is beneficial and increase interest among Native/indigenous learners. This systematic review provide a robust landscape of findings and key gaps in the literature that future studies may seek to fill

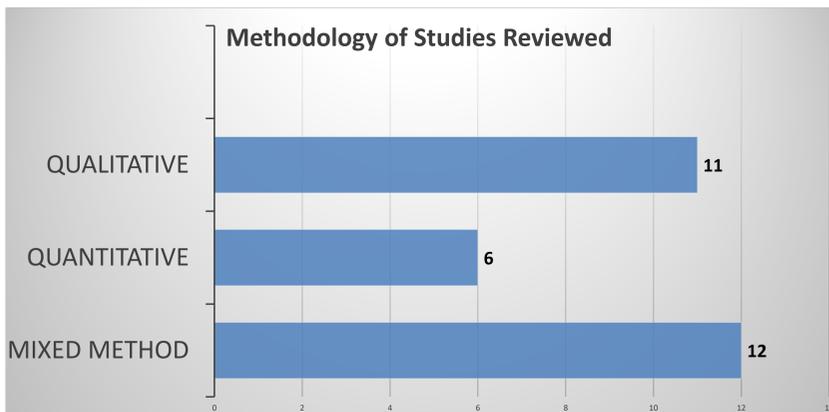
Methods

Study Selection

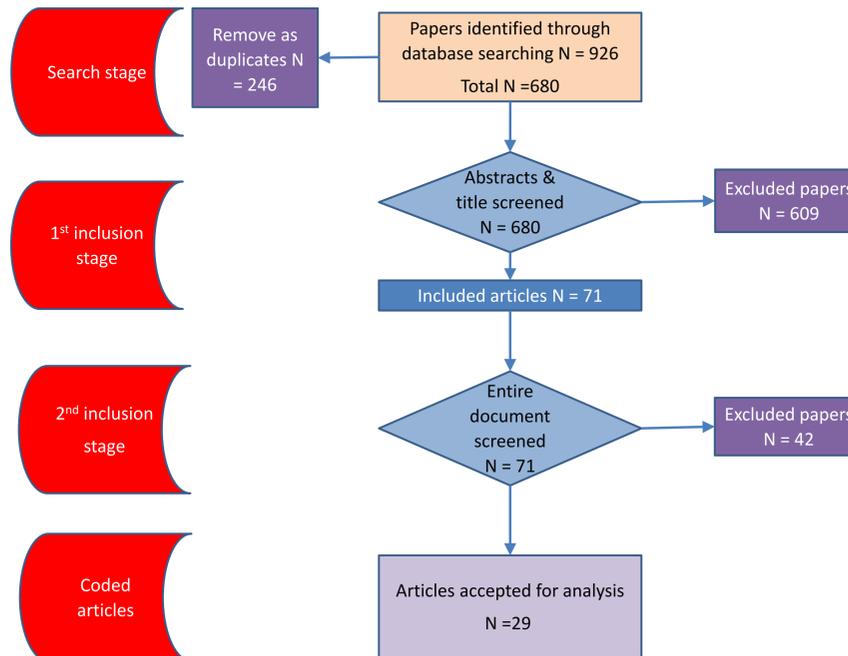
Eligibility criteria:

- (a) demonstrate a connection between culturally relevant science education and motivation, engagement, achievement among Native American/ Indigenous learners in STEM fields.
- (b) report a high population of Native American students in the study ;
- (c) studies reviewed were limited to those published in English;
- (d) publicly available through databases, journals, reference list or library archives;
- (e) studies that focused on student outcomes

Study Characteristics



- Total studies coded 29
- 3 countries (US, New Zealand, and Canada)
- Primary studies reported 25,066
- Studies between 2000 and 2019



Results

The results are summarized in two parts based on the research questions driving the systematic review.

(1). what types of culturally relevant science education (CRSE) motivate and engage Native American learners?

Out of the 29 studies reviewed, 24 studies showed a connect between CRSE and Native student motivation/engagement. These four components were retrieved: **cultural identity, culturally relevant hands-on learning/mentoring, communal value and goals, tribal family and community support.**

(2). what are the shared experiences of Native American STEM professionals and students?

3 studies out of the 29 studies reviewed revealed the voices of Native scientist. All the studies on native scientist connected the relevance of **personal interest, mentors, parent and community, communal goals and STEM programs as beneficial** to their success in STEM.

However, two studies did not find culturally relevant science education (CRSE) to benefit, or motivation Native learners toward STEM. These may be because they excluded family support or culturally relevant hands-on learning in their component.

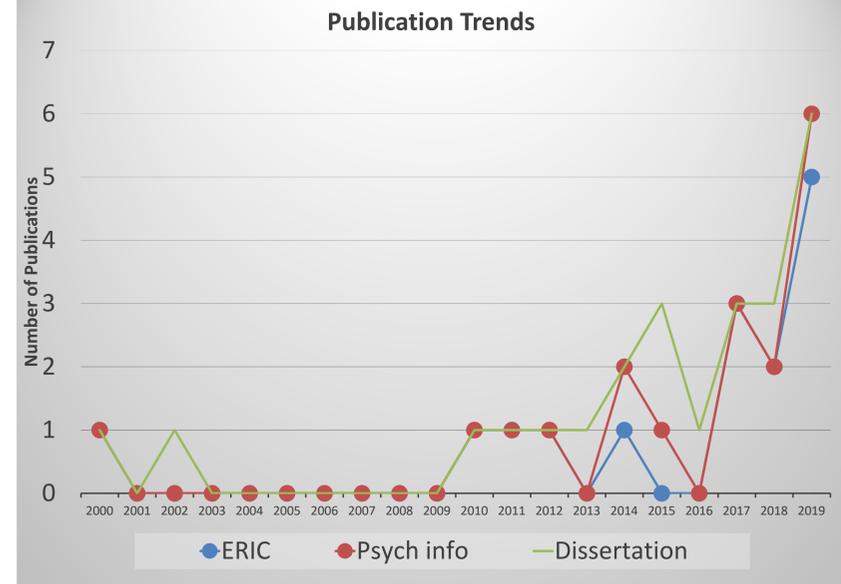
The culturally relevant STEM components adopted across the reviewed studies that found impact are as follows:

- (1) culture identity (native language, story, craft & art)
- (2) cultural hands-on learning (mentorship),
- (3) communal value and goals (giving back)
- (4) tribal family and community involvement.

Studies Findings



Publication Trends



Conclusion

This systematic synthesis provides a comprehensive review of what is known to date about CRSE among Native American population. Themes identified from this review showed that an effective culturally relevant science education with the appropriate component can engage Native American learners toward STEM. Below are the gaps in the literature.

- Few studies examine the interaction of CRSE and student motivation among Native American population (Chow-Garcia, 2016, Kant et al., 2018).
- Fewer experimental studies limit the ability to conduct a meta-analysis.
- Further primary studies may replicate the findings and increase empirical strength on CRSE.
- Further studies may examine how informal/formal education may influence selection of CRSE component.
- Findings from this systematic review may guide the use of culturally relevant science education across the Native/indigenous population.