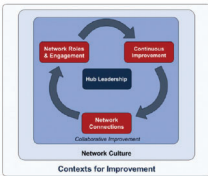


## Introduction & Context

- A Networked Improvement Community (NIC) brings practitioners and researchers together to address a shared problem. Members of a NIC use improvement science methods to engage in iterative improvement efforts toward a shared aim. In education, the NIC model is most often enacted in formal schooling spaces (e.g., PK-12 schools and districts and higher education spaces).
- The STEM PUSH Network is a National Science Foundation INCLUDES-funded Alliance focused on increasing rates of Black, Latine, and Indigenous student enrollment and persistence in STEM undergraduate study. The network brings together precollege STEM program leaders, equity and justice scholars, improvement science experts, and higher education partners to innovate equitable practices and test a novel equity-centered accreditation model.
- The STEM PUSH Network proposed to test the application of the Networked Improvement Community model with its program partners, all of whom operate in the Out-of-School Time (OST) context. The shared aim of the STEM PUSH NIC is: *By 2026, the STEM PUSH Network will strengthen the capacity of 40 precollege STEM programs to serve Black, Latine, and Indigenous students on a STEM undergraduate pathway.*
- Program partners participate in improvement cycles of 3-6 months duration, in addition to other collaborative learning experiences.

## Methods

**Conceptual Framework:** We used the Framework for Network Health (Gomez et al, 2016, Russell et al 2017; Russell et al, 2019) as the lens through which to design and evaluate STEM PUSH NIC development. The framework includes 5 nested, interrelated dimensions. Our study focuses on the **continuous improvement** dimension, because it is the element that differentiates a NIC from other types of learning networks.



**Research Design:** LRDC's Partners for Network Improvement team leveraged its internal developmental evaluation process (Patton, 2011) to construct a descriptive case study of the STEM PUSH network that identifies 1) enablers and constraints of the integration of continuous improvement - via improvement science - into the OST context; 2) subsequent adaptations to network tools, routines, and structures; 3) implications for NIC theory and design. We also examined leading indicators of network health from our annual Network Health Survey data over time to gauge the efficacy of design decisions driven by these differences. This study considers NIC data from January 2020 – March 2023.

Data Source	Description	Analysis
Network Health survey (annual)	Survey on items on validated indices aligned with the network health framework	Descriptive statistics; thematic analysis
Social network survey (annual)	Members identify network connections to other members (frequency, expertise)	Social Network Analysis (Feygin et al, 2021)
Driver Diagram measurement (annual)	Self-reporting tool measuring effort and evidence of improvement and impact of improvement cycles	Descriptive statistics; thematic analysis
Improvement cycle documentation	Templates documenting program change idea planning, testing, learnings, results	Content analysis
NIC facilitator reflections	Observations of member engagement, design adaptations and rationale	(Krippendorff, 1980)

## Research Question

What adaptations are required when building and sustaining a Networked Improvement Community (NIC) in STEM Out-of-School Time (OST) spaces?

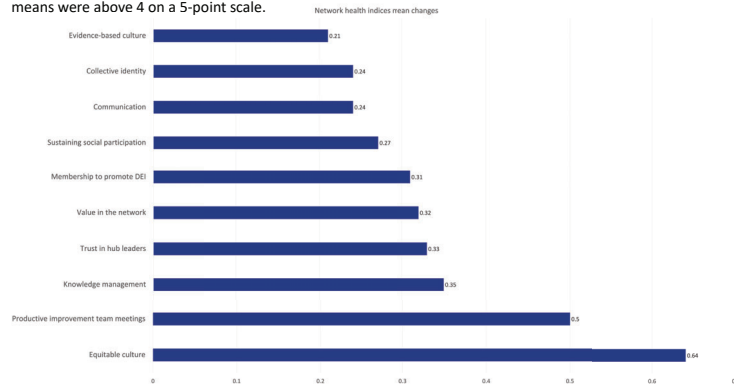
## Findings

### 1. Consequential differences and responsive adaptations

Formal Schooling - OST Difference	Consequence for improvement science practice within the NIC	Adaptation(s)
Centralized vs. decentralized system	Lack of shared or common measures to gauge progress towards aim	<ul style="list-style-type: none"> <li>Developed and iterated measures resonant with OST, with potential for wider adoption</li> </ul>
Relatively consistent schooling structures vs. high variation in program structure	Difficult to find common routines, experiences, and components in which to test the same change idea across multiple programs	<ul style="list-style-type: none"> <li>Higher number of changes tested per improvement cycle than typical</li> <li>Organized changes by "concepts" rather than by specific ideas to try across programs</li> </ul>
Similar school day and school year rhythms vs. high variation in program rhythms	No comparable or standard scope and sequence (e.g., lessons, units, quarters) within which to embed tests of change across programs	<ul style="list-style-type: none"> <li>Expanded definition of change idea (scope of change, grain size of change, cycle length)</li> <li>Offered wider range of improvement approaches beyond Plan-Do-Study-Act cycle</li> </ul>
School or district-level staff size with common responsibilities across roles, titles vs. small staff size with high variation in same nominal role across programs	Lack of capacity for internal improvement teams; NIC members have different levels of agency when choosing and testing changes	<ul style="list-style-type: none"> <li>Organized cross-program improvement teams</li> <li>Flexible design to encourage and integrate multiple program staff into improvement cycles</li> </ul>
Emphasis on instructional outcomes vs. OST and experiential learning outcomes	Programs value "not feeling like school"; learning environment often ill-suited to school-based assessment tools and metrics; improvement science language, protocols, and reliance on extensive documentation privilege white dominant cultural values over other forms of knowledge prioritized in equity-driven OST space	<ul style="list-style-type: none"> <li>Developed alternative framework for evidence of improvement and change</li> <li>Adapted cycle documentation tools and requirements for more equitable access and support</li> <li>Explicitly acknowledged learning culture that foregrounds relationships, STEM identity over formalized articulation of all aspects of program design and implementation</li> </ul>

### 2. Evidence of adaptation efficacy

- We saw improvement on all network health indices between Fall 2021 (n=16 programs) and Fall 2022 (n=27 programs), with the strongest growth in productivity of improvement group meetings and equitable network culture. In Fall 2022, all means were above 4 on a 5-point scale.



- In addition, the Fall 2022 recommendation mean of 9.48 was the highest among 34 education-focused NICs nationwide ("Would you recommend the STEM PUSH Network to a colleague?" 1 = Certainly Not, 10=Certainly).

## Conclusions & Implications

The challenges and affordances we found integrating improvement science into the OST space necessitated strategic design responses, including flexible application of improvement science methods and protocols, the inclusion of other improvement approaches, and a need to reimagine what "counts" as a change idea, improvement cycle, and evidence of improvement.

- More research needed to understand how NIC model translates to contexts with higher programmatic variation and fewer centralized structures, shared data sources, and data collection routines
- Possible reframing of the role of improvement science methodology as part of a collective impact toolbox rather than as a defining NIC feature
- Benefit to exploring intentional design and integration of improvement routines which better align with realities of how change happens "in the wild"
- Opportunities to elevate and capture new practical measures (e.g., shifting mindsets, program change)
- Affirms imperative for humanizing practices within improvement science that attend to equity and disrupt white dominant norms implicit in improvement tools and routines (Iriti et al, 2023)

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