Theory of NIC Development
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Session Overview

- What are the distinguishing features of a networked improvement community (NIC), and how do NICs change over time?
- In this session, NIC scholars and coaches will share Carnegie’s current theory of NIC development.
- Methods and findings will be explored through a case study of the Better Math Teaching Network (BMTN), a NIC which aims to improve student engagement in algebra.
- You will also practice applying the framework to your own organization.
Session Agenda

• Presentation on NIC Development Framework
• Practice applying the NIC development framework to your own organization
NIC DEVELOPMENT FRAMEWORK
NIC Development Framework

- Fostering vital norms and identities consistent with a scientific-professional learning community
- Structuring network roles and relationships
- Learning and using improvement methods
- Understanding the problem to be addressed
- Iteratively refining the theory of practice
- Utilizing a measurement and analytics infrastructure

Scientific-Professional Learning Community

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Catalyzing the development of a scientific-professional learning community

**Scientific-Professional Learning Community**

- NICs are communities grounded by shared goals, norms, theories, and practices
- NICs are professional communities engaged in disciplinary inquiry
- NICs coordinate and accelerate learning through strategic knowledge management
The Better Math Teaching Network

The Funder: The Nellie Mae Education Foundation

Aim: Increase student engagement in Algebra I

The Hub: American Institutes for Research

Teacher Group: 41 high school math teachers across New England

Leadership Group: 8 state, district, and school leaders across New England
The Pitt Developmental Evaluation

Guiding questions

NIC Outcomes

NIC Initiation and Development

Dissemination of Lessons Learned

Nellie Mae The Hub Pitt Team
Our Process

Data collection & analysis

Observations of practice
- Member survey
- Hub self-assessment
- Interviews
- Case studies

Meet with Hub

Tweaks to NIC design
Critical domains of effort for operating a NIC
The NIC Core Technology
The BMTN Driver Diagram

**Aim Statement**

**Primary Drivers (WHAT?)**

**Mathematics Instruction**
Mathematical instruction provides ongoing opportunities for all students to connect, justify, and solve in algebra.

**Classroom Environment**
Positive, caring learning environment for all students

**Student Attitudes**
Students see school and learning as important and valuable

**Student Readiness**
Students enter algebra with the requisite knowledge, skills, and dispositions to succeed

**Student Engagement in Algebra**

2,019 in 2019:
By 2019, the number of students who connect, justify, and solve with depth in algebra will increase by 2,019.

Connect: Make connections among mathematical algorithms, concepts, and application to real-world contexts, where appropriate.

Justify: Communicate and justify mathematical thinking as well as critique the reasoning of others

Solve: Make sense of and solve challenging math problems that extend beyond rote application of algorithm
Structuring network roles and relationships

- Social Connections
- Relational Trust
- Membership
- Participation & Engagement

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Structuring network roles and relationships: Participation and engagement
Participation structures specify members’ roles and clear expectations for ongoing engagement in the network. This likely includes planning and executing: (1) network meetings and (2) activity during action periods between meetings.
Participation & engagement in BMTN

Network meetings—4 per year

Action periods between meetings

Each teacher engages in PDSA cycles

Small group (2-3) virtual meetings tied to cycles

Optional small (3-4) study group meetings (bi-monthly)
Teachers find BMTN activities useful

- In-person network meetings: 3.65
- Analyzing data related to PDSA learning cycles: 3.48
- Planning for PDSA cycles: 3.39
- Preparing for and engaging in PDSA team calls/virtual meetings: 3.30

1: Not at all useful
4: Very useful
The majority of teachers **strongly agree** there is value in participation in the network.

- I value the opportunity to be part of the BMTN: 91% strongly agree, 9% agree.
- The BMTN is worth the time it takes: 86% strongly agree, 14% agree.
- I’d recommend the BMTN to a colleague: 82% strongly agree, 18% agree.
- I feel invested in the success of the network as a whole: 77% strongly agree, 23% agree.
- Being a part of the BMTN feels special to me: 73% strongly agree, 27% agree.
Participation challenges

Challenges (Survey)

- Time spent doing PDSAs: 45%
- Using improvement science: 44%
- Finding time to meet with your virtual small group: 44%
- Integrating this work with the curriculum at your school: 29%
- Using student-centered instruction: 29%
- Time required for participation in network meetings: 22%
- Time spent traveling to network meetings: 17%
- Communication and clarity about expectations for your...: 12%
- Interpersonal challenges in your virtual small group (can be...: 8%
Structuring network roles and relationships: Social connections

- Strong interactions within local improvement teams
- Connections emerging across improvement teams
Emerging network of connections in the BMTN

Teacher-initiated interactions:
Work time choices during network meetings cluster by small group and joint work structures
Structuring network roles and relationships

- Membership
- Participation & Engagement
- Relational Trust
- Social Connections

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Fostering vital norms and identities

Collective Identity

Evidence Based Culture

Shared Narrative

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Fostering vital norms and identities: Evidence-based culture

- Members display a growing commitment to the testing process, grounded in evidence, to guide their improvement work.
- Members feel safe in sharing their data and engaging in critical conversations about what is working and what is not.
- Members embrace the need to document small tests of change so learning can guide the work of others.
- Members embracing opportunities to test and build on the improvement work of others in the network.
Developing an evidence-based culture in the BMTN

Teachers are enthusiastic about the use of PDSA cycles to improve their practice

I can see how small tests of change, such as PDSA cycles, can result in big improvements in student engagement in algebra

PDSA cycles are useful in informing efforts to improve deep engagement in algebra

1
Strongly negative

3.50

3.63

4
Strongly positive
Developing an evidence-based culture in the BMTN

Active engagement in PDSA cycles

- All teachers engaged in PDSA cycles and small group meetings
- Challenges we are seeing with PDSAs:
  - Documentation not capturing the work
  - Relying on intuition about outcome of test versus data-driven next steps
  - Connected to challenges with practical measurement
Fostering vital norms and identities: Evidence-based culture

- Members of a mature NIC will hold a “we perspective”, identifying as members of a scientific-professional learning community improving practice in our field, in addition to a singular focus on their classroom or school
- Members begin to see how they can contribute to the production of practical knowledge through their work in the network
• 41 teachers
• 8 leaders

Engaging in individual improvement
• DEA
• Individual change idea

Moving to collective learning
• Identifying good routines
• Knowledge management
NIC Development Framework
Back to end goal…scientific-professional learning community

Scientific-Professional Learning Community

- NICs are communities grounded by shared goals, norms, theories, and practices
- NICs are professional communities engaged in disciplinary inquiry
- NICs coordinate and accelerate learning through strategic knowledge management
Applying the framework

- Think about your own organization.
- How does it approach problem solving and collective learning?
- In what ways does it look like a scientific professional learning community?

Purpose of this activity:
- Help you deepen your understanding of the framework by applying it.
- Generate some ideas about how your organization might develop the characteristics of a scientific professional learning community.
Activity

- Read the handout, rate your own organization on the three components of a scientific professional learning community, and reflect on the provided questions (10 minutes).

- Discuss your responses with a table partner or a group of three. (15 minutes)

- Full group share out (10 minutes)
  - What are your organization’s areas of strength? Weakness?
  - What action steps might you take and why?
  - What other questions do you have about the NIC development framework?
For more information on the framework

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