Introduction to Improvement Science

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SREE Conference

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Carnegie Foundation for the Advancement of Teaching
What do we hope to accomplish?

• **Provide overview of Six Principles of Improvement**
  Use case studies to exemplify the ideas.

• **Introduce basic tools of improvement**
  Provide opportunities to apply them to problems in education
AGENDA

1) Introduction to improvement science and the work of the Carnegie Foundation

2) Overview of Carnegie’s Six Principles of Improvement

3) Seeing the system and understanding the problem
   • Case: Cincinnati Children’s Hospital
   • Activity: Causal Systems Analysis

-Break-

4) Building a learning system
   • Case: Community College Project - Productive Persistence
   • Activity: Aim Statements

5) Iterative testing
   • Case: Building a Teaching Effectiveness Network
   • Activity: PDSAs

6) Closing thoughts
What is improvement science?

Disciplined inquiry aimed at quality reliably at scale.
Last Decade: Evidence-based Practice Movement

An academic has an idea

He/she design and fine tunes an intervention

An RCT field trial (5 years later)

Evidence it can work

Reviewed by What Works Clearing House

Goes on an “approved list”

Districts required or “incented” to buy only from approved list

Educators “Implement with Fidelity”

PRACTICE IMPROVES!

But there is a problem...
<table>
<thead>
<tr>
<th>Clinical Procedure</th>
<th>Landmark Trial</th>
<th>Current Rate of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flu vaccination</td>
<td>1968</td>
<td>55%</td>
</tr>
<tr>
<td>Thrombolytic therapy</td>
<td>1971</td>
<td>20%</td>
</tr>
<tr>
<td>Pneumococcal therapy</td>
<td>1977</td>
<td>35.6%</td>
</tr>
<tr>
<td>Diabetic eye exam</td>
<td>1981</td>
<td>38.4%</td>
</tr>
<tr>
<td>Beta blockers after MI</td>
<td>1982</td>
<td>61.9%</td>
</tr>
<tr>
<td>Cholesterol screening</td>
<td>1984</td>
<td>65%</td>
</tr>
<tr>
<td>Fecal occult blood</td>
<td>1986</td>
<td>17%</td>
</tr>
<tr>
<td>Diabetic foot care</td>
<td>1993</td>
<td>20%</td>
</tr>
</tbody>
</table>

“The problem that is managing quality is not just an intellectual endeavor; it is a pragmatic one. The point is not just to know what makes things better or worse; it is to make things actually better.”

Dr. Don Berwick
Founder, Institute for Healthcare Improvement
So how do you achieve quality with reliability at scale?
An Insight about Knowledge….

**Research Knowledge:** Knowledge about what works.

**Professional Knowledge:** Knowledge of organizational context, structures, and processes.

**Improvement Knowledge:** The interaction of the theories of systems, variation, knowledge, and psychology.
Knowledge for Improvement

Quality and Reliability

Combine research, professional, improvement knowledge in creative ways to develop effective changes for improvement.
Our Mission Statement

The Carnegie Foundation for the Advancement of Teaching is committed to developing networks of ideas, individuals, and institutions to advance teaching and learning. We join together scholars, practitioners, and designers in new ways to solve problems of educational practice. Toward this end, we work to integrate the discipline of improvement science into education with the goal of building the field’s capacity to improve.

*Networked Improvement Communities (NICs)*
Carnegie’s NICs

Building a Teaching Effectiveness Network

- The learning to teach problem

Student Agency Improvement Community

- The student agency problem

Community College Pathways (CCP)

- The developmental mathematics problem in Community Colleges
Table Activity

- At your table, introduce yourself (role, organization, etc.) and give a brief summary of the type of knowledge(s) you bring to solving problems in education.

- Please keep your introductions to less than one minute each 😊
An Insight about Knowledge…

Research Knowledge: Knowledge about what works.

Professional Knowledge: Knowledge of organizational context, structures, and processes.

Improvement Knowledge: The interaction of the theories of systems, variation, knowledge, and psychology.
How Do We Accelerate Improvement?

6 CORE PRINCIPLES

- Problem-specific & user-centered
- Understanding variation
- See the system
- The power of networks
- Measurement for improvement
- Disciplined inquiry
Activity

- As we review each principle, use your note-taking sheet to jot down…
  - Any interesting thoughts or insights you might have about each principle
  - Any questions you might have about a particular principle
PRINCIPLE #1

Make the work problem-specific and user-centered
NEW PROBLEM EMERGED:

Bad soap $\rightarrow$ Bad cleaning tool
Variation in performance is the core problem to address
An Interesting Case Example

- First year results from a large randomized field trial of Reading Recovery (i3 initiative)

**Key:** A multi-site trial (141 schools)
RCT (average) Treatment Effect: Reading Recovery
N=141 schools

It is a success let's spread it!
Distribution of RCT Treatment Effects: Reading Recovery
N=141 schools
Distribution of RCT Treatment Effects: Reading Recovery
N=141 schools

Effect Size

Count

Undesirable/Weak Outcomes
Positive Deviants
Goal of Improvement:
Replicate Positive Results over Diverse Contexts

Positive Deviants: Opportunities to Learn to Improve

Typical variation in performance found in complex systems

Goal of Quality Improvement: Achieving efficacy reliably
See the system that produces the current outcomes
UNDERSTANDING COMPLEXITY

Every system is perfectly designed to achieve exactly the results it gets.
We cannot improve at scale what we cannot measure
CCP Theory of Practice Improvement

Increase the number of Community College students achieving college math credit within one year of continuous enrollment
Anchor practice improvement in disciplined inquiry
Implementing Changes

Ideas for change

Planning

Failures that we don’t understand

Quality with reliability at scale

Implementation of Changes
Improvement Science Approach

Quality with reliability at scale

Implementation of Changes

Very Small Scale Test

Follow-up Tests

Wide-Scale Tests of Change

API 2013
PRINCIPLE #6

Accelerate improvements through networked communities
Often overlooked…

The human component: “Psychology of Change”
Get to know other people!

Q1: Which principle do you find the most intriguing?

(1) At the signal, go stand next to that principle

(2) Talk to 2 other people about your particular interest in this principle.
Get to know other people!

Q2: Which principle raises the most questions for you?

(1) At the signal, go stand next to that principle

(2) Talk to 2 other people about the questions you have.
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for the Advancement of Teaching