Introduction to Improvement Science: A Learning-By-Doing Simulation

Sessions A1 & B1

Wednesday, April 4, 2018
Objectives:

- Understand on a basic level what it feels like to apply improvement science techniques to solving educational problems
- Reflect on the skills and capacities required to do improvement work in educational contexts

Agenda:

1. Introduction
2. Mini-Lessons + Simulation
   - Short break included
3. Reflection
Learn by **DOING.**
Teaching Team

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Improvement Science
“A formal approach to the analysis of performance & systematic efforts to improve it.”
The Carnegie Foundation

Why?
Support the education field to get better at getting better

What?
Networked Improvement Communities (NICs)
SIMULATION LAUNCH: Your Context
District

- 5 high schools
- 4 middle schools
- 4 elementary schools
Your School: High School
550 students

School Demographics:
Race/Ethnicity:
56% White
25% Hispanic
12% Asian
4% Black
3% Other

Socioeconomic Status:
23% Free & Reduced Price Lunch

The Year: Fall 2011
Students seem to be ABSENT a lot. The ABSENCES disrupt the class. It seems to be worse lately.

Dissatisfaction with the Status Quo

You (the administrative team)… decide to look into it.
This is the first graph you create…

Average Daily Attendance (over the year)

- Our School
- HS average

[Graph showing average daily attendance for 2009-2010 and 2010-2011, with both showing a decrease over the years.]
Data Conversation Protocol
Making meaning of data together

(0) UNDERSTAND: Walk through the data
(1) DESCRIBE: What do you notice?
(2) INTERPRET: What hypotheses or explanations do you have about what you see? What are alternative hypotheses?
(3) ACT: What will you do next?
- Teams of 4-5
- Identify the documents manager
- Distribute new data display
Number of students by absence (2010-2011 school year)

Number of absences during the 2010-2011 school year

(0) UNDERSTAND  (1) DESCRIBE  (2) INTERPRET  (3) ACT
Number of Students by Absence (2010-2011 School Year)

“Chronically Absent” = Misses more than 10%

16%  
88 Students
The Problem

- Problem Statement: **88 students (16%)** were chronically absent last year!
- You decide to launch an improvement project focused on reducing chronic absenteeism
Your Improvement Team

Your improvement team is composed of the following 4-5 members:

– Principal
– Dean of Students
– Attendance Office Manager
– 1-2 Teachers

*Your team has training and experience in improvement science.*
Your Improvement Team

Your improvement team is composed of the following 4-5 members:

– Principal
– Dean of Students
– Attendance Office Manager
– 1-2 Teachers

Your team has training and experience in improvement science.

INSTRUCTIONS:

1. Grab a label & put it on
2. Introduce yourself to your team: Your name & Simulation Role
Improvement Science Cheat Sheet

Focus Collective Efforts

Understand the Problem and the System that Produces It

Generate Ideas for Change

WHAT NEXT?

Spread and Scale

Test and Build Evidence
An interdependent set of interactions among people, the tools, and materials they have at their disposal, and the processes through which they all join together to accomplish work.
Why are we getting the outcomes we are currently getting?

Let’s go investigate.
We can continue to turn the data…

…but we also must become system detectives!
Investigating a Problem as a Team

Divide up the work
Learning as a Team

Consolidate insights!
1. How do users experience our problem?

Conduct an **empathy interview** focused on finding out as much as possible about a student’s experience. We want to understand emotions, thoughts, and needs.

**Team Member Responsible:**

**DEAN OF STUDENTS**
2. What is our current practice?

Create a visual representation of the way work is currently done using a **process map**. Annotate the map with the major issues or barriers that arise in the work.

Team Member Responsible:

**ATTENDANCE OFFICE MANAGER**
3. What are the most common reasons for our problem?

Collect and analyze data about the problem to identify key causes.

Team Member Responsible: TEACHERS
4. What does research & practice knowledge have to say about our problem?

Scan research and other relevant literature to find information about the problem or how it may be solved.

Team Member Responsible: PRINCIPAL
### Strategies for Investigating the Problem

<table>
<thead>
<tr>
<th>TEAM MEMBER</th>
<th>WE WANT TO UNDERSTAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Students</td>
<td>The problem from the user’s perspective</td>
</tr>
<tr>
<td>Attendance Office Manager</td>
<td>Our current practice, by creating a shared picture of &quot;what is&quot;</td>
</tr>
<tr>
<td>Teachers</td>
<td>The types and frequency of causes</td>
</tr>
<tr>
<td>Principal</td>
<td>What is research and practice knowledge say about our problem of interest</td>
</tr>
</tbody>
</table>
SIMULATION: Investigating the Problem

1. Grab the packet for your assigned role.
2. Complete the problem investigation activity inside.
3. Identify your top 1-2 insights about the problem & write them on sticky notes. (1 per sticky note)

Time: 10 minutes
SIMULATION: Learning Consolidation

**Task:** Run the Affinity Protocol

**Facilitator:** Dean of Students

**Affinity Protocol:**

1. **I-by-I Share:** What did you learn about the problem of chronic absenteeism AND where did it come from? [Read post-it aloud and stick on the 11x17 paper]

1. **Cluster:** After everyone has gone, move post-its into clusters based on similar themes (if any).

1. **Insights:** Discuss and record major learning from looking across the insights.
This work is messy!
Improvement Science Cheat Sheet

Understand the Problem and the System that Produces It

WHAT NEXT?

Focus Collective Efforts

Generate Ideas for Change

Test and Build Evidence

Expand and Scale
**Improvement Science Cheat Sheet**

*Focus Collective Efforts*

- Understand the Problem and the System that Produces It
- WHAT NEXT?
- Spread and Scale
- Test and Build Evidence

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Examples of Improvement Aims

A. By June 2018, decrease the yearly number of our students who are chronically absent from 88 to 50.

B. By June 2018, decrease from 20% to 10% the percentage of 9th grade students who miss school more than 5 days per year due to health reasons.
Tool: Aim Statement

What specifically are we trying to accomplish?

What will be improved? (clear operational definitions)

How much? (measureable, specific, numerical goals)

By when? (time frame)

For what/whom? (target population/setting or system/process)
Met with different stakeholder groups
Identified resources and assets
Identified the target population
Investigated the problem carefully and in a variety of ways
Determined priority areas
Our Simulation Aim

What specifically are we trying to accomplish?

By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.
Improvement Science Cheat Sheet

Focus Collective Efforts

Understand the Problem and the System that Produces It

Generate Ideas for Change

Spread and Scale

Test and Build Evidence

AIM

WHAT NEXT?
Spread and Scale

Understand the Problem and the System that Produces it

Focus collective efforts

Generate ideas for change

WHAT NEXT?

Divergent Thinking

Essential for Creativity

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By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.

What specifically are we trying to accomplish?

What changes might we make and why?
Change Ideas

What specifically are we trying to accomplish?

By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.

What changes might we make and why?
What is a “Change Idea”?

By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.

Specific work practices or interventions that represent an alteration to how work is currently done.

What specifically are we trying to accomplish?

What changes might we make and why?
Where Do Change Ideas Come From?

1. **Research knowledge**: What does academic literature have to say about solving this problem?

2. **Practice knowledge**: What have other organizations in the field done to solve this problem?

3. **Design/Creative Thinking**: What new solutions might we design to address this problem?

4. **Analysis of the problem**: What does our analysis of the problem indicate may be a helpful solution?
Where Do Change Ideas Come From?

1. **Research knowledge:** What does academic literature have to say about solving this problem?

2. **Practice knowledge:** What have other organizations in the field done to solve this problem?

3. **Design/Creative Thinking:** What new solutions might we design to address this problem?

4. **Analysis of the problem:** What does our analysis of the problem indicate may be a helpful solution?
PART I: Individually

Refer back to your baseline performance and your problem analysis.

Generate at least one specific change you might make in your school that you have reason to believe would contribute towards reaching your aim.
What specifically are we trying to accomplish?

AIM

What changes might we introduce?

Change Idea
Change Idea
Change Idea
Change Idea
Change Idea
Change Idea
Change Idea
Change Idea
What specifically are we trying to accomplish?

What changes might we introduce?

Driver

Driver

Driver

Change Idea

Change Idea

Change Idea

Change Idea

Theory of Practice Improvement

Key leverage points in the system
...which in turn will...  ...that will impact...  If I do...

Key leverage point in the system
Convened experts
Analyzed data
Examined variations
Reviewed research literature
Created system maps
Identified high-leverage areas
By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.

**Aim**

**Drivers**
- Parent Awareness & Engagement
- Students’ Basic Needs
- Attendance Data Tracking & Use
- In-School Relationships

**Change Ideas**
- Send home handouts at start of year with information and tips about attendance
- Family meeting protocol for discussing and addressing chronic absences
- Provide transportation vouchers
- Weekly attendance data review for detecting students on path to chronic absence
- Assign adult mentor to check-in regularly with student

**Theory of Improvement Version 1.0**

If we *[change idea]*, that will impact *[driver/key leverage point]*, which in turn will lead to *[aim]*.
PART II: As a team

Refer to your first draft of a theory of improvement for improving chronic absenteeism. Select one of the change ideas that you generated and articulate it as a hypothesis on your driver diagram.

Go around and share your hypotheses with your team.

If we ____[change idea]____, that will impact ____[driver]___, which in turn will lead to ____[aim]____.
By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.

**Drivers**

- Parent Awareness & Engagement
- Students’ Basic Needs
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**Aim**

- Provide transportation vouchers
- Assign adult mentor to check-in regularly with student

**Theory of Improvement Version 1.0**

- Drivers
- Change Ideas

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Possibly wrong, definitely incomplete...
Version 1.0
Version 2.0

AIM

- Change
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Version 3.0

AIM

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Version 4.0

AIM

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Version 5.0

AIM

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• Change
Team consensus on a shared aim

Identified measures and documentation of progress, as well as measures for improvement

Theorized cause-and-effect relationships

Brainstorm change ideas

Identified system elements (the what and where)
By June 2014, we will reduce chronic absenteeism at our school from 16% to 8%.

Aim

**Drivers**

- Parent Awareness & Engagement
- Students’ Basic Needs
- Attendance Data Tracking & Use
- In-School Relationships

**Change Ideas**

- Family meeting protocol for discussing and addressing chronic absences
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**Theory of Improvement Version 1.0**

**Change Ideas**

**Family meeting protocol for discussing and addressing chronic absences**

- Send home handouts at start of year with information and tips about attendance
- Provide transportation vouchers
- Weekly attendance data review for detecting students on path to chronic absence
- Assign adult mentor to check-in regularly with student

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SIMULATION: Your change idea!

Family Meeting Protocol

Use to structure the meeting held with absent students and their families.

- Welcome and thank parent & student for coming
- Explain the purpose of the meeting: Student has been absent X times
- Ask why the student has been absent
- Explain the importance of attendance in high school
- Explain consequences of additional absences
- Ask if the student or parent have any questions or concerns
- Thank parent & student again and adjourn the meeting

Inspired by School Attendance Review Board (SARB) meeting process AND your best knowledge of parent conversations
Welcome and thank parent & student for coming

Explain the purpose of the meeting: Student has been absent X times

Ask why the student has been absent

Explain the importance of attendance in high school

Explain consequences of additional absences

Ask if the student or parent have any questions or concerns

Plus/Deltas
SIMULATION: An opportunity to test

You have a parent meeting scheduled for today with a student who has been absent quite a bit lately.

Your team decides this would be a great opportunity to test out your new protocol…

- Welcome and thank parent & student for coming
- Explain the purpose of the meeting: Student has been absent X times
- Ask why the student has been absent
- Explain the importance of attendance in high school
- Explain consequences of additional absences
- Ask if the student or parent have any questions or concerns
- Thank parent & student again and adjourn the meeting
**Improvement Science Cheat Sheet**

1. **Understand the Problem and the System that Produces it**
2. **Focus collective efforts**
3. **Generate ideas for change**
4. **WHAT NEXT?**
5. **DIVERTENT THINKING**
6. **Spread and Scale**

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**Improvement Science Cheat Sheet**

**Understand the Problem and the System that Produces It**

**Focus collective efforts**

**Generate ideas for change**

**Test and Build Evidence**

**ACT**
- Next steps: Adapt, adopt, abandon

**PLAN**
- What’s your change?
- What’s your prediction?
- Plan to conduct test

**STUDY**
- Compare results to prediction
- What did you learn?

**DO**
- Execute test
- Collect data, document observations

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The Plan-Do-Study-Act (PDSA) Cycle

**PLAN**
- What's your change?
- What's your prediction?
- Plan to conduct test

**DO**
- Execute test
- Collect data, document observations

**STUDY**
- Compare results to prediction
- What did you learn?

**ACT**
- Next steps: Adapt, adopt, abandon
The Plan-Do-Study-Act (PDSA) Cycle

**ACT**
- Next steps: Adapt, adopt, abandon

**PLAN**
- What's your change?
  - What's your prediction?
  - Plan to conduct test

**STUDY**
- Compare results to prediction
- What did you learn?

**DO**
- Execute test
- Collect data, document observations

Making your theories, assumptions and hypotheses explicit

Revealing gaps in our understanding
SIMULATION: Run your first PDSA

**Task:** Complete an entire PDSA cycle

**Facilitator:** Attendance Office Manager

**PLAN**

1. Read the family meeting protocol
2. Review the Plan section of your PDSA form
3. Generate predictions for each of the items in the Plan Section.

*What do you think will happen when you test this protocol in a family meeting?*

---

**PLAN**

- What’s your change?
- What’s your prediction?
- Plan to conduct test
What are some differences we notice in our aims?
SIMULATION: Run the test

**DO**

1. Watch the family meeting unfold
2. Record observations in the “Do” section of your form

*Observe from the perspective of your “role”!*
STUDY

1. Collaboratively review your observations from the “Do” section
2. Record the results relevant to each prediction you made
3. Summarize your team’s major learnings from the test

STUDY

- Compare results to prediction
- What did you learn?
SIMULATION: Decide how to act

**ACT**

Based on what you learned, decide what you plan to do next with this change idea:

- **ADOPT** – Make this change a permanent part of our practice
- **ADAPT** – Revise this change and test it again
- **ABANDON** – Discard this idea entirely

**ACT**

• Next steps: Adapt, adopt, abandon
Welcome and thank parent and student for coming

Review attendance record with family & explain how to interpret report

Review social & academic consequences of absenteeism

Discuss possible interventions school may undertake to support student

Answer any additional questions & review next steps

Thank parent again and adjourn the meeting
**Improve the Science Cheat Sheet**

**Understand the Problem and the System that Produces it**

**Focus collective efforts**

**Generate ideas for change**

**Test and Build Evidence**

---

**WHAT NEXT?**

**ACT**
- Next steps: Adapt, adopt, abandon

**PLAN**
- What’s your change?
- What’s your prediction?
- Plan to conduct test

**STUDY**
- Compare results to prediction
- What did you learn?

**DO**
- Execute test
- Collect data, document observations

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Improvement Science Cheat Sheet

Understand the Problem and the System that Produces it

Test and Build Evidence

Generate ideas for change

Focus collective efforts

WHAT NEXT?

Spread and Scale

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Spread and Scale

Understand the Problem and the System that Produces it

Focus collective efforts

Generate ideas for change

WHAT NEXT?

Evidence in Improvement Science
Building Evidence for a Change

How will we know this change is actually an improvement?

Changes that produce quality with reliability at scale

Implementation of Changes

Wide-Scale Tests of Change

Follow-up Tests

Very Small Scale Tests

Initial Hunches & Ideas

DATA

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Managing multiple ramps of PDSAs

Reduced Chronic Absenteeism

Supportive Family Meeting

Change Idea

Adapted from @2009 API
What’s are the “End” Goals?

- Measureable improvement
- Specified changes that led to the improvement
- Improvement capacity to apply to future work
Chronic Absenteeism Bundle

- Regular routine for reviewing attendance data
- 5 absences = letter home
- 10 absences = supportive family conversation

Note: primary strategy is engaging coursework
### Key Dimensions to Consider When Testing

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>Low Confidence</th>
<th>High Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>that the change will lead to an improvement</td>
<td>that the change will lead to an improvement</td>
</tr>
</tbody>
</table>

- **LOW confidence**
  - Low confidence that the change will lead to an improvement

- **HIGH confidence**
  - High confidence that the change will lead to an improvement

Adapted from API, 2009
## Key Dimensions to Consider When Testing

<table>
<thead>
<tr>
<th>LOW confidence that the change will lead to an improvement</th>
<th>Resist</th>
<th>Indifference</th>
<th>Ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH confidence that the change will lead to an improvement</td>
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<td></td>
<td></td>
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</table>

<table>
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<tr>
<th>Participants’ Will</th>
<th>Resist</th>
<th>Indifference</th>
<th>Ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW confidence that the change will lead to an improvement</td>
<td></td>
<td></td>
<td></td>
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Adapted from API, 2009
Key Dimensions to Consider When Testing

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<th>Resistant</th>
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<th>Ready</th>
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</thead>
<tbody>
<tr>
<td><strong>LOW confidence</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>that the change will lead to an improvement</td>
<td>Cost of failure large</td>
<td>Cost of failure small</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
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Adapted from API, 2009
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<tr>
<td>lead to an improvement</td>
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<tr>
<td><strong>Cost of failure large</strong></td>
<td>Very</td>
</tr>
<tr>
<td></td>
<td>Small Scale</td>
</tr>
<tr>
<td><strong>Cost of failure small</strong></td>
<td>Small</td>
</tr>
<tr>
<td></td>
<td>Scale Test</td>
</tr>
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<td><strong>Cost of failure large</strong></td>
<td>Small</td>
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<td></td>
<td>Scale Test</td>
</tr>
<tr>
<td><strong>Cost of failure small</strong></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Scale Test</td>
</tr>
</tbody>
</table>

Adapted from API, 2009
SIMULATION: Assessing your confidence in the change bundle

Right now, how confident are you in the change bundle?

LOW confidence

SOME confidence

HIGH confidence

Should we IMPLEMENT the chronic absenteeism bundle in our school?
Your team has generated the following data display. Use this display to assess your level of confidence in the change bundle.

1. **Individual Task:** Rate your confidence on the scale

2. **Team Discussion:** (The 2\textsuperscript{nd} teacher facilitates)
   - Why did you rate it where you did?
   - What could you do to increase your confidence in the bundle?
High School #1: Our School

% of Students Absent 10% or more

- Low confidence
- Some confidence
- High confidence

STARTS BUNDLE
SIMULATION:
Assessing your confidence in the change bundle:

Now you are the leaders of the whole network.
Based on these new data, are you ready to implement the change bundle network-wide?

1. Individual Task: Rate your confidence on the scale

2. Team Discussion: (The 2nd teacher facilitates)
   - Why did you rate it where you did?
   - What would you do next?
Theory of improvement

Aim

Increase the 4yr college going rate from 66.1% (2012) to 90% by June 2017

Primary Drivers

Pathway to College

Family Engagement

Academic Preparation & Eligibility

Learning mindsets and skills to succeed post graduation

Changes

FAFSA completion workshops

Personal statements as junior English assignment

Conferences with students that miss 2 HW assignments in a row

Equitable group work

Chronic Absenteeism Bundle

Support groups for men of color
WHAT
NEXT?
**Improvement Science Cheat Sheet**

**Focus Collective Efforts**

- **Understand the Problem and the System that Produces it**
  - 5WHYS

**WHAT NEXT?**

- **Spread and Scale**
- **Test and Build Evidence**

**Generate Ideas for Change**

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Reflections & Closing Remarks
Improvement Science

Social learning

Nonlinear

Systems-focused

Disciplined
Building Your Improvement Toolkit

- Data Conversation Protocol
- Empathy Interview
- Scanning
- Process Map Analysis
- Cause Analysis
- Affinity Protocol
- Aim Statement
- PDSA Cycle
- Chart of Data Over Time
- Driver Diagram
**Improvement Science Cheat Sheet**

**AIM**
- Focus collective efforts

**WHAT NEXT?**

- Understand the Problem and the System that Produces it
- Generate ideas for change
- Spread and Scale
- Test and Build Evidence

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Reflections

- From your perspective, how is improvement science different from other approaches in tackling problems? What would enable or constrain the work of improvement in your context?

- Where do you want to learn more in the remaining time at the Summit?
Top 7 Ways to Get Started

1. Start before you’re ready.

2. Run a personal improvement project on your own life!

3. Read *Learning to Improve* and start a book club with colleagues.

4. Next time you are setting a goal, ask, “How will we know?”

5. Use a problem investigation tool to understand a problem.

6. Next time someone wants to make a change, run it as a PDSA!

7. Ask other people at the Summit how they got started!
Thank you for your feedback!