Simulation-Based Learning in Public Health

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Pontifex Consulting
Poll Question

What is your level of experience with computer simulations in Public Health?

A. Have designed and built a simulation
B. Have seen a simulation used
C. Have heard of simulations, but not experienced one
D. No experience
Mental models determine our approach to building public policy strategy
Systems thinking simulation rapidly improves the quality of our *mental models*.
Staffing at General Hospital

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Mentally simulate a future scenario

- Suppose that three months from now, the volume of nurse quitting steps up by a small amount to a new level, and then remains at this level forever.
- The hospital will continue their policy of hiring one inexperienced nurse for each experienced nurse that quits.
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What pattern over time will be traced by the number of experienced nurses following the step-increase in quitting volume?
Possible Patterns

# of Experienced Nurses

Months
Possible Patterns

Months

# of Experienced Nurses

1
Possible Patterns

- # of Experienced Nurses
- Months

1. Possible pattern where the number of experienced nurses remains constant over time.
2. Possible pattern where the number of experienced nurses decreases over time.
Possible Patterns

- # of Experienced Nurses
- Months

Possible Patterns:
1. Initial decrease
2. Stabilization
3. Increase

Diagram illustrates possible trends over time.
Possible Patterns

_months_ of Experienced Nurses

_of Experienced Nurses_ vs. Months

1. 
2. 
3. 
4.
Possible Patterns

- **Months**
  - 1
  - 2
  - 3
  - 4
  - 5

- **# of Experienced Nurses**
  - 1
  - 2
  - 3
  - 4
  - 5

The graph shows possible patterns of experienced nurses over time, with different lines representing various scenarios.
Possible Patterns

# of Experienced Nurses vs Months

Possible Patterns:
- 1
- 2
- 3
- 4
- 5
- 6
Possible Patterns

![Graph showing possible patterns of experienced nurses over months. The graph includes lines indicating different scenarios with months labeled 1 to 7.]
Possible Patterns
What: The Need

Paradigm
Dynamic, time delays, feedback loops, unintended consequences

[Graph showing 'As Is' and 'To Be' trends with axes for 'Avg cost/patient' and 'years']

[Diagram with arrows indicating relationships between Stress, Drug Use, Productivity, and Health]
What: The Need

Language

Population without Disease

developing but undiagnosed

Undiagnosed Prevalence

diagnosing

Diagnosed Prevalence

dying

developing and diagnosed
What: The Need

Process

Observe / Identify Issues

Build / Revise Causal Theory

Develop / Test Strategies

Communicate & Disseminate Solutions & Insights
What: The Need

Technology

Test and improve understanding
What: The Need

Paradigm

![Graph showing the comparison between 'As Is' and 'To Be' scenarios with variables like Stress, Drug Use, Productivity, Health, and Avg cost/patient over years.]

Process

1. Observe / Identify Issues
2. Build / Revise Causal Theory
3. Develop / Test Strategies
4. Communicate & Disseminate Solutions & Insights

Language

![Diagram depicting the flow from Population without Disease to Undiagnosed Prevalence to Diagnosed Prevalence to dying through developing and diagnosed and developing but undiagnosed stages.]

Technology

![Image of a Tobacco Use Prevention Policy Design Laboratory Simulation Control Panel with options like 'Instructions', 'Scenarios', and 'Data Table' and 'Insights'.]
Perspectives on Models: A Continuum

It’s only a model!
The world is much more complex, so it’s not useful.
Our situation is unique so your model doesn’t apply.
Perspectives on Models: A Continuum

It can *predict* the future.
If I can just get everything into the model, then it will be *perfect*.
Poll Question

When using simulation modeling, which of the two perspectives just described, cynic or mystic, is more common?

A. Cynic
B. Mystic
Perspectives on Models: A Continuum

I use models all the time to make decisions, they’re just implicit and usually untested. I can use a model to make my assumptions explicit, share them, improve them, and test them. It will improve our ability to rigorously discuss the issues!

All models are wrong, some are useful! —Box & Deming
Dynamic Dashboard in *Strategy as Learning* Approach

Real world
Takes a long time around the loop!

Develop & Modify Strategy

Implement Strategy

Real World Dashboard

*The Learning School of Strategy is described in *Strategy Safari*, Mintzberg et al
Dynamic Dashboard in *Strategy as Learning* Approach

Develop & Modify Strategy

Real world
Takes a long time around the loop!

Virtual world
Rapid iterations to improve strategy (via modifying mental models)

Implement Strategy in Virtual World

Implement Strategy

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Discrepancies between Virtual and Real Worlds

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Public Policy Challenges

- Engaging Legislators
- Building Policy Options
- Communicating With Public
Common Problems With Mental Models

Focus

Avg cost / patient

Years
Common Problems With Mental Models

Focus

Avg cost / patient

Years

Short-term, event focused
Common Problems With Mental Models

Focus

Short-term, event focused vs. Long-term, dynamic focused

Avg cost / patient

Years
Common Problems With Mental Models

Focus

Perspective

Avg cost / patient

Years

Short-term, event focused

vs.

Long-term, dynamic focused

Detailed: “down in the weeds”
Common Problems With Mental Models

Focus

- Avg cost / patient vs. Years

- Short-term, event focused vs. Long-term, dynamic focused

Perspective

- 30,000 Foot: “Up on the Balcony” vs.

- Detailed: “down in the weeds”
Common Problems With Mental Models

Focus

- Short-term, event focused
- Long-term, dynamic focused

Perspective

- 30,000 Foot: “Up on the Balcony”
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Cause and Effect

A → B
Linear cause and effect
Common Problems With Mental Models

Focus

<table>
<thead>
<tr>
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</tr>
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Perspective

30,000 Foot: “Up on the Balcony” vs. Detailed: “down in the weeds”

Cause and Effect

A → B

Linear cause and effect vs.

C

Feedback cause and effect
Common Problems With Mental Models

**Focus**

- Short-term, event focused
- Long-term, dynamic focused

**Perspective**

- 30,000 Foot: “Up on the Balcony”
- Detailed: “down in the weeds”

**Cause and Effect**

- Linear cause and effect
- Feedback cause and effect
Poll Question

Which of these ways of thinking do you believe most inhibits the ability to make progress on urgent health issues?

A. Short-term, event-focused thinking

B. In-the-weeds thinking

C. Linear cause-and-effect thinking
Example Simulations

Adverse Childhood Experiences

Childhood Obesity (Georgia)

Low Birth Weight (Georgia)

Anti-Tobacco Public Policy Lab
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