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Ebuwa I. Evbuoma

Washington University in St. Louis, eevbuoma@wustl.edu

Min Hu

Allie Farrell

William Liem

Ellis Ballard

Washington University in St. Louis, eballard@wustl.edu

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Systems Thinking Iceberg: Diving Beneath the Surface in Education Systems

Ebuwa I. Evbuoma^{a,b}, Min Hu^c, Allie Farrell^d, William Liem^c, Ellis Ballard^d
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METHODS BRIEF SERIES 1.01

The iceberg is a classic metaphor that is applied to many disciplines beyond systems thinking. The metaphor describes a situation in which what you see (the tip of the iceberg) is only a small portion of what you can't see (a large, hidden mass of ice below the surface). In systems thinking, we use the iceberg metaphor to think about what is "under the surface" driving the individual events that we see: (1) Patterns of events over time, (2) System Structure that give rise to these patterns and, (3) Beliefs, Mindsets and Goals that inform the design of system structures.

This purpose of this brief is to unpack the Systems Thinking Iceberg as a way to organize reflection and dialogue about systemic challenges in education.

+ THE SYSTEMS THINKING ICEBERG

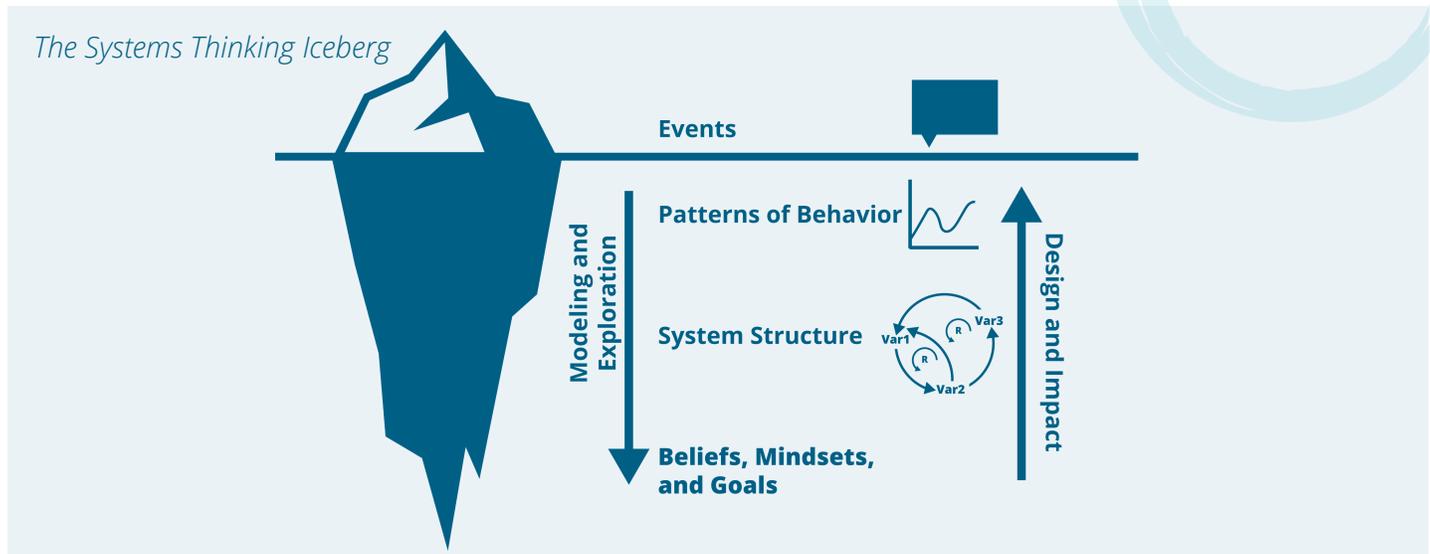
1. Events

These are the outcomes or incidents we see and experience. It can be the individual child sent to the principal's office; the parent who feels disrespected at a parent-teacher conference; the teen who drops out of high school; the teacher who quits the classroom; the school that fails to meet district targets; the district that loses its state accreditation. Because these events are visible and discreet, we often respond and react to them immediately. However, the systems thinking iceberg argues that events are only symptoms of happenings below the surface. If we want to have

lasting impact, and prevent similar events in the future, we need to dig deeper to understand the underlying patterns

Tip of the Iceberg: The outcomes or incidents we see and experience





2. Patterns of Events

These are the trends or patterns of events over time. Thinking about patterns of events forces us to ask ourselves: how often has this event happened? Is it becoming more frequent or less frequent? Do some people experience it more than others? What other patterns have happened at the same time? Thinking in terms of patterns or trends can help us add context to how we understand an individual event. It can also raise deeper questions about why these patterns exist and persist.

3. System Structure

The system structure focuses on how factors are interconnected, and how these interconnections produce the patterns of events we see. Systems thinking argues that system structure determines patterns of behavior that manifest in individual events. These system structures are built, maintained, and re-built based on our underlying beliefs, mindsets, and goals.

4. Beliefs, Mindsets, and Goals

These encompass the deep-seated mental models we hold about why things are the way they are. Our mental models influence why things work the way they do. They reflect our beliefs, values and

assumptions and underpin our reaction to events. The deepest we can dive beneath the surface of the systems thinking iceberg is to unpack our own **beliefs, mindsets and goals**, that ultimately maintain the system structure.

+ SYSTEMS THINKING AS SCUBA DIVING

In order to have a meaningful, sustained impact on a complex problem, systems thinking urges us to use modeling and exploration to dive as deeply beneath sea level. Once we challenge underlying beliefs, mindsets, and goals, we can rise back up to the surface reimagining, redesigning, and ultimately transforming systems. Systems thinking and system dynamics offers visual tools to help us work through each level of the iceberg as groups or individuals.

+ APPLYING THE SYSTEMS THINKING ICEBERG TO EXAMPLES IN EDUCATION

Let's apply the systems thinking iceberg to a pressing topic in K-12 education: school discipline. In this example, the tip of the iceberg (**event**) is a student suspended by school administration after a fight. The problem of the fight may be

temporarily “solved” by removing the student, but the administration recognizes that this is not a lasting solution: there might be another fight and suspension tomorrow, next week, or next month. They haven’t addressed any root causes.

The administration decides to use systems thinking tools to dive underneath the surface and see what is really going on here. They begin to see **patterns of behavior** over time underlying the incident: total suspensions have been steadily increasing over the past six months. In the last 5 years, there have been increased reports of bullying, increased teacher stress levels, and declining attendance rates.

The administration then asks themselves, “what is the **system structure** producing these patterns?” Drawing causal maps as a team, they unravel school policies and practices for managing undesirable behavior and think about the unintended consequences on student-teacher relationships and sense of belonging.

After examining the causal map, the administration asks themselves, “What are our **beliefs, mindsets, and goals** which maintain and uphold this structure?”. Upon reflection, they realize that this system is driven by an underlying belief that: “the purpose of school is to learn how to follow the rules”. They decide to challenge and reframe this belief to be more in line with the outcomes they want to see: “the purpose of school is to support the development of the whole child”.

With this new mindset, the team looks at how they can restructure their policies and programs for managing student behavior to produce the patterns and events they want to see.

+ CONSIDERATIONS FOR APPLYING THE SYSTEMS THINKING ICEBERG

It is important to note that understanding the Systems Thinking Iceberg alone will not solve a problem. It helps us articulate the value of taking a systems thinking approach, but we need to actually go through the process of using systems thinking and system dynamics tools to challenge mental models and seek understanding.

+ GETTING STARTED

- Think of a problem or event in your work that you'd like to change.
- What other patterns are associated with this problem? What structures are in place that may be causing these patterns? What underlying beliefs, mindsets or goals keep these structures in place?
- How does this framing change or refine how you think about the problem?
- How do you see this concept fitting into your teaching/facilitation/management/leadership?

+ ACKNOWLEDGEMENTS

- The Systems Thinking Iceberg can be found in many systems thinking resources. Places to dive deeper into systems thinking concepts include [The Systems Thinker](#), the [Waters Center for Systems Thinking](#), and the [Creative Learning Exchange](#)
- The metaphor of systems thinking as scuba diving should be credited to Donald Martin who used this metaphor at the System Dynamics workshop at the Data 4 Black Lives II Conference in January 2019.
- The examples and stories presented here are inspired by collaborations with students and staff at Jennings High School and Ritenour High School, and with partners in the Systems Thinking for Educational Equity Partnership (STEEP).

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"If a factory is torn down but the rationality which produced it is left standing, then that rationality will simply produce another factory. If a revolution destroys a government, but the systematic patterns of thought that produced that government are left intact, then those patterns will repeat themselves. . . . There's so much talk about the system. And so little understanding."

—Robert Pirsig, *Zen and the Art of Motorcycle Maintenance*

+ ABOUT THE SERIES

Social System Design Lab Methods Briefs are short, digestible notes on applications of system dynamics and systems thinking in community settings. They are meant to capture and share out our current thinking on core ideas.

"Series 1: Systems Thinking Foundations" focuses on introducing core concepts of systems thinking and system dynamics as they relate to issues of education equity. This series draws from community-based modeling work with educators and students over the last ten years. Other briefs in this series include:

- Characteristics of Complex Problems | **1.02**
- Mental Models | **1.03**
- Framing Dynamic Problems | **1.04**
- Understanding Systems from a Feedback Perspective | **1.05**
- Accumulations | **1.06**
- System Archetypes | **1.07**

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