



2018 Systems Thinking and Dynamic Modeling Conference for K-12 Education

June 30—July 2, 2018

The Babson Executive Conference Center
Wellesley, MA

FRIDAY, June 29

9:00-5:00

THAMES Pre-Conference Introductory Systems Workshop (registration required) – Anne LaVigne and Julie Guerrero, Creative Learning Exchange

Whether it's your first time experiencing systems thinking or you'd like a refresher, this session is a great way to get a jump start on the conference. We'll get our hands and minds into exploring systems concepts and tools, while considering integration into our work, whether in a classroom or an organization. We'll learn and practice iceberg thinking, behavior-over-time graphs, stock/flow maps and models, connection circles, and feedback loops, while kinesthetically experiencing systems throughout the day.

SPECIAL: Throughout the conference, Jeff Potash, an experienced modeler with extensive K-12 experience, will meet with you by appointment to discuss your model or how to incorporate modeling into your curriculum. Schedule a time with him. Sign-up at the registration desk.

6:00-9:00 pm Conference Registration in Conference Center Lobby

SATURDAY, June 30

8:30-10:00 Registration/Continental Breakfast

10:00-12:00 Welcome, Introductions, and Keynote
MYSTIC A/B

Two Roads Converged in a Yellow Wood: Collaborative Journeys

George Richardson and Anne LaVigne

We may on occasion look back in retrospect at the roads not taken as if somehow we missed some important step. What if, instead, we paid attention to convergence – where and how our journeys cross, such that our thinking and understanding is transformed. Through what door have you entered this systems thinking/system dynamics room? Whom have you found coming from another door that challenges you, encourages you, and even pushes you to shift your own thinking? How can we foster those same kinds of learning experiences in our students, our children, our colleagues? We'll explore this idea through a case study of two people who entered the room through very different doors, yet still found commonalities and a huge benefit in collaborating around systems work within K-12. We'll have time to reflect and identify new possibilities for creating conditions and opportunities for convergence as we step through the next door.

12:00-1:30 Lunch

1:30-5:00 Four Parallel Workshops

1. Teacher as Systems Designer: Classroom Structures for Effective Student Learning – Rob Quaden and Alan Ticotsky, Innovation Academy Charter School (IACS), Tyngsboro, MA

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This workshop examines both the practical and philosophical aspects that contribute to a dynamic, learner-centered classroom. We will look at teaching and learning from several points of view, using a variety of systems tools. In this fast-paced, hands-on introductory session, educators will develop their understanding of systems by using some of the key tools of systems thinking, system dynamics, and organizational learning. Explore how behavior-over-time graphs, iceberg diagrams, stock and flow diagrams, connection circles, and causal loop diagrams can be applied to understand and solve complex problems in an educational setting.

2. Using Systems Tools to Develop Literacy Skills – Brian Bindschadler, Catalina Foothills SD, Tucson, AZ

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In this session, participants will explore various ways to use systems tools to increase deep thinking and literacy in the classroom. We will focus on developing the Habits of a Systems Thinker using the Iceberg Visual, Behavior-Over-Time Graphs, and Stock-Flow diagrams. These tools can be used in any level classroom—from preschool through high school—and beyond. Each tool will be “unpacked” with explanations and examples, and participants will have opportunities to develop their own applications for these powerful literacy tools.

3. Teaching STEM with Systems Tools – Chris DiCarlo, Ashley Young, Katharine Hinkle, and Rachel Henry, IACS,

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In this workshop, participants will see examples of systems tools used to teach STEM concepts. We will examine some of the reinforcing and balancing loops that regulate human body systems, discuss how stock-flow models can be used in Physics and Mathematics, and look at challenging problems like coastal erosion through the lens of a systems thinker. After a presentation of the tools, participants will have time to meet with the presenters and explore some of their own ideas for use in their classes.

4. Introduction and Testing of *Splash!* –Ninad Jagdish, BTN, Singapore

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Ready for a crash course in *Splash!*? Learn by doing as we re-imagine stock-and-flow diagrams in liquid physics. We'll kick-off with *Splash!* 101 and then split up into teams – each with a mission to teleport a given system dynamics model into the *Splash!* universe. Your team will need to race against the clock as it competes with others in a first of its kind *Splash!* modelling challenge. Winner takes all. Maybe. See you there!

5:00-6:30 Meet and Greet with ST/SD Students and System Dynamics Professionals

WOODSIDE

Join us to meet and talk to students who have used ST/SD in their schoolwork as well as system dynamicists who use these tools in their profession.

5:00-5:45 Posters from DynamiQueST showing student projects

5:45-6:30 Panel of students from Innovation Academy Charter School to answer questions

6:30-7:30 Dinner—Dine with System Dynamics Professionals

Have dinner and talk with the interesting coterie of system dynamicists we will have in attendance at the conference this year. See their Bios in your conference folder.

8:00 - 9:00 Evening Session

1. Resources for ST/DM in K-12 Education—CLE and others - Conrad Stuntz, Creative Learning Exchange

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This session will provide an overview of the resources available to help work with system dynamics in the classroom. The overview is designed to introduce people to the plethora of options available. It will focus on the content available at the CLE and on other programs and apps that have been released in the past two years.

SUNDAY, July 1

7:00-8:30 Breakfast

9:00-10:30 Four Break-out Sessions

1. Lessons and Insights Using Stella Online – Diana Fisher, Portland State University, OR

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A hands-on workshop, with 3 introductory lessons to help you get started using the free, web-based Stella Online software.

2. Using Fishbanks and Other Online Simulations to Teach Key Systems Concepts – Anne LaVigne, CLE

POTOMAC

Not sure you're ready to create your own models just yet? Using free, online simulations created by other educators and system dynamicists is a great way to get started with using models. Through individual and multi-user simulations, students can experience a variety of real-world issues – managing a fishery, creating a healthy forest community, or influencing a social issue, like burnout – while making decisions within a virtual interconnected world. All simulations are free and many have accompanying lessons and handouts.

3. Teaching Humanities using Systems Tools – Jeff Potash, Jason O'Neil-Willoughby, Beth Olesen (CLE and IACS)

THAMES

In this workshop, we will explore how different system

tools offers opportunities for students to look for patterns in human history and to ask deeper and more thoughtful questions relating to the causes and connections underlying these patterns. Building systems structures (causal loops, connection circles, models) uniquely empowers students to actively explore “what ifs” in ways that bridge past, present, and future.

4. Beginning at the Beginning: Children's Stories to Foster Systems Thinking – Linda Booth Sweeney

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In this interactive workshop, we'll dive into to some of our favorite children's stories. We'll look at ways to find stories and tell stories that better prepare children for the diversity of the real world patterns they will encounter while supporting literacy development and pK-12 curriculum standards. Together we will learn ways to encourage young readers to be pattern detectives, that is, to understand and show the connection between parts of a system, to look for elements that change over time, and to explore patterns and structures (rather than events) driving that change. I'll have a supply of children's books on hand and I invite you to bring along your favorites as well. We will discuss them as we build our list of good stories for systems thinkers, big and small.

11:00-12:30 Keynote

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Lessons from Implementation of Systems Thinking and Dynamic Modeling in Schools

Educators with experience from across the world.

Three different models: Greg Orpen (Innovation Academy Charter School)

Tim Lucas and Cathy Keegan (Milton PA Public Schools and the Institute for Teaching and Leading)

Benjamin Chung (Korea and Thailand)

12:30-2:00 Lunch

2:00-5:30 Two Workshops

1. Using the World Climate Simulation in the Classroom– Jason O’Neil Willoughby and Chris DiCarlo, IACS

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Participants will learn about the World Climate Simulation and how to use it in a middle or high school classroom. The World Climate Simulation gives students a chance to play the role of negotiators from countries around the world as they attempt to develop a climate agreement. Their pledged actions can be simulated using the provided computer model to show the results of their actions. Participants will have a chance to run through the simulation as a negotiator. Afterward we will discuss how systems tools can be used in debriefing the simulation and its applications in the curricula. The World Climate Simulation was designed by John Sterman at MIT and Climate Interactive.

2. Systems Lessons through Games– Greg Orpen and Alan Ticotsky, IACS

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Games can be a fun way to introduce students to the essential concepts of system dynamics, such as feedback, accumulations, and delays. Whether you consider yourself a novice to systems or a seasoned veteran, this workshop will involve groups playing hands-on and “on your feet” activities that you can bring to your school or organization. This workshop will draw on lessons from *The Systems Thinking Playbook* by Linda Booth Sweeney and Dennis Meadows as well as *The Shape of Change* by Rob Quaden and Alan Ticotsky.

6:00-7:30 Dinner

7:30-8:30 Two Workshops

1. isee systems’ New Offerings: A Workshop for Experienced Modelers - Bob Eberlein, isee systems

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System dynamics is a powerful lens that brings clarity to a complex world, yet many SD models are intimidating and hard to use. Does it have to be this way? Should system dynamics be made more easy, intuitive and fun, and, if so, how? We’ll look at innovations in the fields of story-telling, gamification and next-gen computer interfaces, discuss how SD might benefit from them, and imagine the models of the future. Bring your own questions and help shape the event.

2. *Splash!* Demonstration –Ninad Jagdish, BTN

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Witness the full range of *Splash!*’s features in action – from timed switches and graphical functions to overflowing liquid and automatic feedback loop detection. Using live demos, we’ll take a journey through *Splash!*’s design and its intended role as a bridge between the concrete world of kinesthetic exercises to the abstract world of stocks and flows. We’ll discuss how serving as this bridge makes *Splash!* both useful and quirky, and how those quirks might point to deeper questions about the field of system dynamics and its conventions.

MONDAY, July 2

7:00-8:30 Breakfast

9:00-12:00 Keynote

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Using Group Modeling and Systems Tools to Unpack a Complex Educational Problem

Brad Morrison and Saras Chung

There are a variety of challenges and opportunities that teachers and schools face on a day to day basis. Participants will choose a topic of their interest and work in small teams through an engaging systems thinking process. We will guide the teams to use systems tools for problem definition, the identification of patterns and trends and causal interdependencies, surfacing of ways to intervene leading to action steps. We hope to support novices and challenge the experienced using a highly participatory, practical learning environment.

Keynote Speakers

George P. Richardson's teaching and research center is focused on computer-based tools and analyses for public administration and policy. His recent work has centered on public policy problems in social welfare and the use of formal computer-based modeling methods to help groups move toward policy consensus in complex dynamic systems. For more than twenty years he has been an advocate, mentor and supporter of the use of system dynamics in K-12 education, enlightening the ST/DM conferences with informative and interesting keynote presentations over the years. One of Jay Forrester's students, he has also been active in encouraging other system dynamics experts to become involved with the K-12 effort. He founded and served for seven years as the executive editor of the *System Dynamics Review* and is the author of *Introduction to System Dynamics Modeling with Dynamo* (1981), *Feedback Thought in Social Science and Systems Theory* (1991), both of which were honored with the System Dynamics Society's Forrester Award, and the edited two-volume collection, *Modeling for Management: Simulation in Support of Systems Thinking* (1996). George is a trustee of The Creative Learning Exchange.

Anne LaVigne works with the Creative Learning Exchange as a curriculum designer and facilitator. She collaborates across educational and non-profit settings to increase understanding of dynamic, interdependent systems in ways that empower, engage, and motivate. She has co-authored several books with a goal of making system dynamics more accessible. These include *Systems in Motion: Exploring Complexity through an Interdisciplinary Lens* and *Model Mysteries: An Exploration of Vampires, Zombies, and Other Fantastic Scenarios to Make the World a Better Place*. Anne also coordinates school and community partnerships for CommunityShare and is an associate for the Waters Foundation. When she isn't exploring dynamic systems as part of her work, you'll find her digging in the garden, drawing mountains and valleys, hanging out with family, and enjoying their mini-farm inhabited by horses, pigs, a cow, chickens, turkeys and ducks.

Greg Orpen joined the faculty at Innovation Academy Charter School (IACS) in 2000 and since 2013 has served as its Head of School. As a teacher and administrator, Greg has presented at conferences sponsored by the Creative Learning Exchange, Waters Foundation, Massachusetts Public Charter School Association, Massachusetts Association of Science Supervisors, International Baccalaureate (IB), and Continuous Quality Improvement Network (CQIN). Greg enjoys introducing Systems Thinking to audiences of all ages, as it provides him with a more meaningful framework to discuss teaching and learning.

Benjamin Chung is a system dynamicist from Korea who has been working diligently to gain footholds to infuse SD into the K-12 system in Korea. His strategy is brilliant and progressive and enough to be an excellent example for those who want to spread K-12 SD education into his or her homeland or district where SD is not familiar. His outreach program is ready to come into bloom in Cambodia.

Cathy Keegan is the Superintendent of the Milton Public Schools in Pennsylvania and she has been working with Tim Lucas as a consultant/facilitator to integrate systems thinking into the organizational framework of the Milton Schools.

Tim Lucas is currently serving as the Director of Leadership Strategy for the Institute for Teaching and Leading (i4tl). He has been working actively in the field of ST/SD in K-12 education since he was an elementary school principal in Ridgewood NJ in the early 1990s. He is the co-author of *Schools that Learn*.

Brad Morrison, Associate Professor of Management in the International Business School at Brandeis and Senior Lecturer in the Sloan School of Management at MIT, is fascinated with the challenges people face in accomplishing what they set out to do in organizations. His research examines human performance in dynamically complex settings in healthcare, such as crowded emergency departments and busy operating rooms. He also studies the paradoxes of building organizational capability and implementing innovations, which he has studied in several contexts, such as process improvement settings and firms adopting the practices of lean manufacturing. For example, why do the actions some managers take foster the very problems they are attempting to solve? His methods blend organization theory with tools of system dynamics, feedback theory, mathematical modeling and computer simulation to elucidate the relationships between structure in systems and the patterns of dynamic behavior they exhibit over time. He is a recipient of the Jay W. Forrester Award from the System Dynamics Society and a Trustee of the Creative Learning Exchange. He has taught system dynamics at the Brandeis International Business School, the Heller School for Social Policy and Management, the MIT Sloan School of Management, Brown University, Northeastern University, and the University of Lugano in Switzerland.

Dr. Saras Chung is the executive director of SkipNV, a strategy tank that improves the lives of children and youth by co-designing system solutions with communities across the United States. Her specific interests include school-based supports and ways to improve education for racially and socioeconomically marginalized populations. Before receiving her masters and doctorate in social work from Washington University in St. Louis, Dr. Chung spent over a decade working with and for young people in both nonprofit and community settings. In 2016, she completed training and dissertation fellowships on the topic of social emotional skills and suicide in adolescents with support from the International Society for Child Indicators, the Asian American and Pacific Islander Council of Social Work Education, and the Social System Design Lab. She has consulted with numerous local, national, and global organizations to address system dynamics problems affecting children and youth. In her free time, Saras enjoys running, gardening, and hanging out with her husband and two kids.