For those who have used systems tools in classrooms, their power to help students of all ages and abilities clarify thinking and communicate it to others doesn’t come as a surprise. Many educators employ these tools to learn how much their students understand and what their mental models are about literature or other reading materials, depending on them for on-going formative assessment. Systems tools as constructs to help students write cohesively are extremely helpful. The resources to guide teachers in learning and practicing the use of systems tools in literacy are readily available. There are many examples of curriculum on the CLE website for free download; we have highlighted a few of them in this article to encourage you to delve further into our library.

One of two papers available to help guide the use of tools in all areas is Tips for Using System Dynamics Tools, written collaboratively by the Waters Foundation and The Creative Learning Exchange. This short piece is an excellent reference guide for teachers and older students. The other, a companion paper, was developed for the student exposition, DynamiQueST: Rubrics for Understanding Using System Dynamics Tools. Both of these papers appear in the short and useful booklet to help guide student projects, Communicating Critical Thinking: Visual Tools for Student Projects.

The use of behavior-over-time graphs is a favorite among teachers throughout the grade levels. Using either a graph with numeric or descriptive labels (see this short video), teachers can ask students to graph anything that goes up and down over time—the love, anger or confidence of a character or the tension in the story. Everyday Behavior over Time Graphs, by Gene Stamell and Debra Lyneis, gives a good description of many different ways of using BOTGs in all areas of the curriculum, including enhancing literacy. For older students, a good description of the use of BOTGs in literature is found in both BOTG Activities for Ninth Grade Literature by Heidi Blocker, Carrie Brennan and Eve Rifkin, and Behavior-Over-Time Graphs as Literature and Writing Tools by Frank Draper.

For the younger set, as well as older students, such books as The LORAX by Dr. Seuss, are excellent platforms to use the ST tools to enhance understanding and expand awareness, creating interdisciplinary learning. When the movie based on the book was released, experienced mentors Alan Ticotsky and Rob Quaden used their skills to help teachers bring critical thinking insights to students. Both Lessons from The Lorax: Using Graphs to Study Change and Studying The Lorax with Feedback Loops are excellent approaches to helping students delve into the message of The LORAX. Obvious additional resources beyond the book are the movie and other environmentally related topics.

The Climate Interactive site has a bathtub simulator model to help students and teachers understand some basics of both stocks and flows and carbon dioxide in the atmosphere.

The perennial favorite, Tuck Everlasting, is incorporated into Tuck Everlasting: System Dynamics, Literature, and Living Forever by Carolyn Platt, Rob Quaden and Debra Lyneis. Behavior-over-time graphs and simple models can help students wrestle in a meaningful way with the conundrum presented in the book, the challenges and issues of living forever.

The tragedy of Romeo and Juliet is addressed in two of the CLE’s Literacy continued on page 3
Winter finally arrived in the Northeast after a balmy fall and Christmas/Winter holiday season. The daffodils weren’t up, but we certainly were worried about them! At the moment, however, a thin blanket of snow is covering the ground and we actually have had a few days where the thermometer stayed below freezing. Of course you will all remember that this time last year we had had no snow at all. As the global weather elf becomes warmer, it also becomes more quixotic. We shall see what February brings!

As we are staying warm, and actually enjoying a winter landscape, this period between the New Year and the spring is filled with activity at the CLE. We have two events coming up in the next six months. The first event is a second-year repeat of the revival of DynamiQueST, being held once more on March 11 at WPI thanks to the generosity of the System Dynamics group there. Please consider coming to join us. Bring your students and their projects using the systems tools to make their thinking visible. Those who sign up will be sent a copy of Communicating Critical Thinking: Visual Tools for Student Projects.

The second event is our biennial conference, the Systems Thinking and Dynamic Modeling Conference held at the Babson Conference Center, June 25-27. It promises to be an enjoyable and exciting event with expert teachers, system dynamicists, and students interacting in a comfortable learning environment. The day before the conference, on June 24th, we will host an Introductory Workshop to give folks a running start on integrative learning. The call for presenters is in this newsletter, so those of you who would like to share what you do, please get in touch with me as soon as possible.

We hope to see you this spring!

Take care,
Lees Stuntz
(stuntzln@clexchange.org)

Updates

Feedback from Recipients of the ST/DM 2014 Conference Scholarships

from Christopher DiCarlo

I wrote a short report of the things that I have been working on recently. I’ve been continuing the rocket project in my Physics class that I started a couple years ago. Students build paper rockets and predict how high they will go using a stock-flow model that accounts for gravity, wind resistance and a launch force. They launch the rockets outside using a compressed air launcher and collect data about how high and fast they go. They then go back to their models and revise them to see if they can figure out where their initial assumptions were incorrect and get a better idea of what actually happened during the launch.

I also have started a new project in my Conceptual Physics class that involves modeling temperature changes over time using a stock-flow model. We start by observing the cooling of hot water and then attempt to model it using a stock-flow model based on Newton’s law of cooling. This is a simple stock-flow model with only one outflow representing the energy lost from the water. Then we move on to solar ovens. Students build solar ovens out of cardboard boxes, aluminum foil and insulation. We added an energy inflow to the model to represent energy from sunlight and we attempted to determine a steady state temperature of the ovens. We then took them outside and cooked some pizza bagel bites on a cold winter day using nothing but energy from the sun. Finally, we went back and adjusted our model to account for any differences between the preliminary model and our experimental results.

I really enjoy these projects because they get students closer to doing the type of work that professional scientists would do. Much of science comes down to creating models that predict something and verifying those models with experimental data. In this way, Systems Thinking and Dynamic Modeling gets our students doing engaging and meaningful work in science.

Come to the 2016 ST/DM Conference and learn more about integrating hands-on activities with modeling.
online simulations. Part of a 19-lesson series* with curriculum appropriate for three ages levels, these two lessons for middle and high school students use a simulation based on a system dynamics model to highlight the oscillatory nature of the Romeo and Juliet relationship. The hands-on simulations pull students into deeper discussions about what Shakespeare really had to say about these two star-crossed lovers.

The theme of many pieces of literature that are used in English curricula in middle and high school is that of one group having total control over another. Examples include *Animal Farm*, *The Lord of the Flies*, and, more recently, *The Hunger Games*, to name a few. The online simulation *Beyond Closed Gates* uses a system dynamics model based on the experiment run by Phillip Zimbardo at Stanford in 1971. The lessons generated by the simulation and debrief help create rich discussions about the issue that the structure a group functions in can create the behavior that is generated.

Other curricula specifically addressing individual pieces of literature with a central theme of control are available on the website. *Chocolates, Vanillas, Strawberries, and Orwell: An Animal Farm Physical Simulation* by Nancy Campbell and Ron Michalak, was written for middle school students. For high school students, *Teenagers with Global Control* by Theresa Hazel and Timothy Joy, uses a few simple models to look at the issues posed in *Fahrenheit 451*.

One more take in using the ST/SD tools to increase reading and writing skills is found in Tim Joy’s *Writing and Modeling: Using a Notebook to Learn about System Dynamics*. Tim uses journaling with his students to help them clarify their thinking, to lead to more logical and understandable writing and communicating. Multiple writing and mapping exercises integrate the writing process with system dynamics instruction. These guidelines and exercises are especially helpful for middle and high school students who are building some early confidence in basic stock and flow mapping, as well as those students ready for model building and testing.

No article on literacy would be complete without mentioning the writing of Linda Booth Sweeney. *Learning to Connect the Dots: Developing Children’s Systems Literacy* is an excellent introduction to the use of the concepts of systems thinking to aid literacy. Her books, *When a Butterfly Sneezees* and *Connected Wisdom*, give insight into the use of stories to teach systems lessons with young children. Linda also has a blog, *Talking about Systems*.

Another blog that is worth checking is *Literature Connects* by Sheri Marlin. Her work as well as the lessons and lesson ideas by the Waters Foundation are excellent resources.

---

*Experiencing Ups & Downs Over Time: Oscillating Systems* is a multi-disciplinary series highlighting the generic nature of the oscillating systems that surround us in all walks of life.
Save the Dates & Start Gathering Your Team for Camp Snowball!

July 11-15, 2016

We invite you to join us at Camp Snowball, a hands-on, five-day professional development program for teachers, school administrators and students, steeped in Systems Thinking, Education for Sustainability and Organizational Learning.

Why Attend Camp Snowball?

At Camp Snowball, you and your district’s or school’s team will learn and practice the skills to support 21st-century skills for student success. After Camp Snowball, you will be able to put your collective knowledge to use and enjoy the “Camp Snowball Effect” of having an immediate impact and building your school or organization to provide students with the skills that will help them succeed in school and in their lives.

“Going with a team to Camp Snowball develops your sense of your organization. It gives you tools you can use in the classroom, at your meetings with principals, at the district level, and with the governing board. Looking at all the changes as a system helps you see their interconnectedness so that you can find ways and tools to manage that change.”
- Parvin Ahmadi, Superintendent, Castro Valley USD, CA

Learn More About Camp Snowball

It's impossible to predict what students will need to know by the time they become adults in our rapidly changing world. Camp Snowball provides skills to help empower students to think deeply and critically, manage high complexity, work collaboratively, communicate effectively and achieve academically, so that they can chart their paths as co-creators of a sustainable future.

This year’s theme is Partnering for Success: Meeting the Learning Needs of All Students. Workshop sessions will address how the tools of systems thinking and organizational learning can support educators in meeting all students’ social, emotional and academic needs, including those who are facing achievement gaps.

At Camp Snowball, you will work closely with esteemed faculty who have many years of practical school and classroom experience, your team, your peers from around the country, as well as leading thinkers and provocateurs like Camp Snowball co-host Peter Senge, author of The Fifth Discipline: The Art and Practice of the Learning Organization.

Who Attends Camp Snowball?

Primarily teams of Pre-K to 12 teachers and administrators. About 20% of our participants are students. Parents, and community and business leaders are also encouraged to join teams. Camp Snowball offers a fantastic opportunity to gain insights into perspectives you might otherwise not begin to be able to imagine.

Register Now
Take Advantage of Early-Bird Rates!

Is Camp Snowball Right for Your School or District’s Professional Development Needs? Please feel free to email us with questions, or arrange a call to discuss your situation and find out whether Camp Snowball is a good fit for your professional development needs.

Email LeAnne Grillo, Camp Snowball Director, at LeAnne@Spaces-for-Change.com.
Call for Presenters!

How to Submit a Presentation Proposal for the CLE 2016 ST/DM Conference

The following sessions will be offered at the 2016 ST/DM conference:

1. **Workshops** (Beginner to Advanced) for learning in depth about systems thinking, system dynamics and their use in K-12 education. Skills and conceptual building sessions encouraged (3 hours)

2. **Sessions** to share stories, curriculum, teaching techniques and lessons learned, with a special emphasis on the use of ST/SD tools to integrate classrooms and schools (90 minutes)

3. **Simulations** of all types, games, on-line simulations to stimulate learning and critical thinking (90 minutes to 3 hours)

   The proposal should list all presenters’ names, emails and addresses. A paragraph about the session should include:
   - a description of the session
   - the context and history behind the session
   - the experience level of the participants for whom it is geared

   The proposal should be sent to Lees Stuntz at stuntzln@clechange.org before **February 8, 2016**.

   A more complete outline or paper is expected by **June 1, 2016**.

***Timeline***

- **February 8, 2016** – Submit an abstract to Lees Stuntz via e-mail (stuntzln@clechange.org) that includes the context and history of the session topic and the experience level of expected participants.

- **February 25, 2016** – All authors will be notified of the status of their submission via e-mail.

- **June 1, 2016** – A final outline/presentation or paper due via e-mail for incorporation into the conference material.
DynamiQueST is a showcase of student projects that utilize critical thinking skills to analyze complex dynamic systems in a relaxed environment, free from “winner/loser” constraints. Students ages 8-18 will showcase their work using their ability to analyze and to clearly communicate critical thinking using the tools and methods of systems thinking and system dynamics (ST/SD).

**WHAT ARE THE GOALS OF DYNAMIQUE ST?**

- Give students the experience of being coached on their projects by experts in the systems field, teachers, and other students, in a helpful and supportive manner.
- Permit teachers from different schools to see evidence of student work communicating critical thinking using systems thinking and system dynamic.
- Provide a venue for teachers and kids to network and learn from each other.
- Showcase student work for the wider community.
- Have some fun and celebrate with kids!

**DO STUDENTS NEED A LOT OF EXPERIENCE TO PARTICIPATE?**

No! DynamiQueST creates a venue for celebrating what has been done, informing those who wish to start, and providing encouragement for all!

**WHO ARE THE COACHES?**

- Professionals well versed in analyzing complex systems using the tools and methods of ST/SD
- Teachers who have used ST/SD in their classrooms for years
- Other participating students

**JOIN US!**

- Students and teachers with projects/presentations
- Educators who wish to see what students are capable of thinking and communicating
- Community members who are curious about better ways to help students learn about the complex systems that are everywhere

**HOW DO I SIGN UP?**

- Identify project(s) about topics that change over time. Look at the Rubrics for Projects and Tips on Using System Dynamics Tools or email Lees Stuntz for a free copy of Communicating Critical Thinking: Visual Tools for Student Projects.
- Check Creative Learning Exchange for information or email the director, Lees Stuntz. If you are new to learning systems thinking, get in touch with the CLE. We have both the resources and the willingness to help you get ready for DynamiQueST.
- If you are new to thinking critically about systems and don't have any projects this year, just come and join us to experience the day, and mostly enjoy what students can do!

For more information, visit DynamiQueST. Download the brochure.
Continue the Learning Journey

The Systems Thinking and Dynamic Modeling Conference for K-12 Education put on by the Creative Learning Exchange provides resources and opportunities for educators and interested citizens to explore what is current and possible in K-12 systems education.

In the Boston area again in 2016, the 12th biennial ST/DM Conference will host an impressive slate of systems educators and system dynamics professionals.

The focus for this conference will be to extend and expand the knowledge and practice of teaching using the tools and mind-sets of systems thinking and system dynamics.

An introductory workshop will be held at Babson Executive Conference Center on **June 24th**, the day before the conference. This training workshop will include 8 hours on Friday (9 AM to 5 PM), breaks and lunch on Friday, a 3-hour workshop session on Saturday afternoon, and mentorship time scheduled during the conference, tailor-made to help integrate the offerings of the conference. Systems mentors with decades of experience will help integrate the stimulating material and discussion presented throughout the conference.

For over 25 years, the CLE and the Waters Foundation have worked to advance the use of Systems Thinking and Dynamic Modeling in K-12 education, through curriculum, training and support. Many educators have started down the road of utilizing the powerful tools and attitudes generated originally by the field of system dynamics.

Previous ST/DM conferences, workshops, and training from both the Waters Foundation and the CLE have given a good start to many teachers and administrators focused on maximizing their students potential for critical thinking.

In recent years, the annual Snowball Conference, sponsored by the Sol Education Partnership, in conjunction with the Waters Foundation, the CLE, and others, has augmented the base of educators primed to move forward in the classroom as well as the school organization.

The conference is designed to build on that initial interest and training. This year we are lucky to have John Sterman from MIT, a consummate teacher and system dynamics modeler as our beginning keynote speaker!

Workshops and sessions will include:
- A full day introductory workshop before the conference (June 24) to get beginners “up-to-speed.”
- Sessions on how systems thinking and dynamic modeling fit into the bigger picture of those two disciplines.
- How to integrate the concepts and tools of ST/DM into curriculum.
- Curriculum make-over workshops, both with the beginning and more advanced tools of ST/DM.
- Integrating ST/DM tools and mindsets into administration and leadership in the school environment.
- Examples of what students are capable of doing, both in group modeling and in the classroom.

Join us for another instructional and educational conference as we continue the learning journey. System dynamics and systems thinking provide strategies and methodology to explore complexity, connections and change over time. The ST/DM conference will provide attendees with examples, vignettes, and materials to help educators further learning using systems thinking.

For more information, contact Bunny Lawton (lawtons@clechange.org) at the Creative Learning Exchange, or call us at 978-635-9797. Scholarship applications and registration forms are available online.
SCHOLARSHIPS

The Creative Learning Exchange is proud to offer scholarships for the upcoming conference. These are designed to encourage the use of systems thinking and dynamic modeling in K-12 education.

Some or all of the following criteria will apply. You do not need to meet all the criteria:

- Evidence that the recipient has done his/her own learning in the area of SD in K-12. The recipient has explored the basics and knows why ST/SD is relevant, and why there is more to learn.
- The recipient is willing to write a report on how he/she has used ST/SD in the classroom or organization in the 2016-17 school year.
- The recipient is involved with others who are also interested and committed, either in their school or nearby.

The application is the same for all of the scholarships. Any questions concerning scholarships should be directed to Lees Stuntz.

Tracing Connections in Systems Thinking Scholarships

In 2010, a book titled Tracing Connections: Voices of Systems Thinkers was published in honor of the late Barry Richmond. The Richmond family and isee systems, the company Barry founded, are generously giving the profits from the book for the Creative Learning Exchange to offer learning opportunities for educators to use systems thinking and system dynamics in K-12 education.

This year we are offering some scholarships to help educators attend the ST/DM Conference. The scholarships will be for $225 to defray the cost of registration. Apply online or download an application.

Invest in Education

Your financial support of our effort here at The Creative Learning Exchange is always appreciated. You may donate any amount you wish; perhaps $50.00 is a reasonable amount for a year. All contributions are tax-deductible.

Enclosed is _________________ to The Creative Learning Exchange to help invest in the future of K-12 systems education.

Name________________________________________________________
Address___________________________________________________
__________________________________________________________
E-mail_____________________________________________________

THANK YOU!
The Creative Learning Exchange, 27 Central Street, Acton, MA 01720