the
Creative Learning
Exchange

Using Stock/Flow Visual Tools to Improve Communication Between At-Risk Students and Teachers at an Elementary School

by Clelia Scott, Golden Isles Elementary School, Brunswick, GA

*T*his dissertation project is based on the works on mental models (Senge), stocks and flows (Forrester), and thinking maps (Hyerle). Clelia combined these with Ruby Payne's works on the "hidden rules" of poverty and Joos' and Wood's works on cultural communication.

The purpose of the study was to develop a stock/flow visual tool that would enable elementary teachers to communicate behavior expectations (classroom rules) more effectively to all students, but particularly those who were deemed to be at-risk; the anticipated result was that teachers at the writer's school would be able to decrease the number of discipline referrals. Although we have a large school (around 900), we reduced our discipline referrals by approximately 70%.

This article is a greatly abridged "distillation" taken from Clelia's dissertation.

> Between what I think I want to say,
> What I believe I'm saying,
> What I say,
> What you want to hear,
> What you believe you understand, and
> What you understood,
> There are at least nine possibilities for misunderstanding (Garagnon).

*T*he typical 21st-century elementary classroom may contain students with differing socioeconomic status; medical conditions; physical, emotional, behavioral, or intellectual impairments; and different ethnicities, religions, or cultures. Most teachers themselves come from a traditional middle-class background but find their classrooms filled with students who have been touched by divorce, absentee parents, unstable living arrangements, substance abuse, increased exposure to weapons and violence, exposure to alternative lifestyles, and poverty. Although there appears to be no formal definition for the term at-risk, any of the aforementioned factors can result in a student being identified as at-risk (Georgia Department of Education, 2004).

Students do not come to the classroom in isolation. They bring with them a wealth or a lack of family influences, values, and attitudes. This mélange of diversities is further compounded by the different levels of communication that may be occurring in the classroom between teacher and students or between the students. Communication is influenced by the interplay between a sender and a receiver, and is affected by each one's unique situational responses to the messages, based on individual backgrounds and experiences (Wetherby, Warren, & Reichle, 1998). To maximize the instructional environment, teachers must be able to communicate effectively with their students, particularly those deemed to be at risk. If teachers can not find ways to communicate which actions they deem to be appropriate behavior, students can not participate actively in self-monitoring their own conduct.

THIS ISSUE AT A GLANCE

Updates…

DynamiQUE*ST* 2006
Debra Lyneis

On May 3, 2006, K-12 students, teachers and system dynamics professionals gathered at Worcester Polytechnic Institute for the sixth annual DynamiQUE*ST*. DynamiQUE*ST* is an exposition of student projects using system dynamics tools to address problems ranging from the avian flu to global warming. Unlike a science fair, however, DynamiQUE*ST* is not a competition. It is chance for students to present their projects to teams of experienced system dynamicists, teachers and fellow students, who then give them constructive guidance to move forward in their work. Students and coaches alike thoroughly enjoyed exchanging ideas and learning from one another.

In addition to presenting projects during the morning sessions, students played active systems games challenging them to use teamwork and creativity. After a hearty bagged lunch provided by WPI, students and coaches worked together to use their system dynamics problem-solving skills. This year the problem arose from a National Public Radio story about a troublesome infestation of mice in a Florida town after a nearby field was flooded. Later, led by George Richardson, students shared their reference behavior modes and analyzed the problem by drawing a stock/flow map together.

Twenty six students from three area schools participated in DynamiQUE*ST* this year. Twelve students came from the Murdoch Middle School in Chelmsford, MA:

- Seventh graders Emma Beauchamp and Ben Knight examined the many cultural and economic interrelationships that led to the Civil War. Using connection circles and stock/flow maps, they discovered that the story has many dimensions.

EDITORIAL

As the lovely New England Fall progresses, we here at the Creative Learning Exchange are looking at a year without the tremendous energy drain of organizing a conference—other than the usual necessary items, such as getting a place for the next one! We are looking at collaboration around curricular initiatives as well as whole school, district and community collaborations for the re-vamping of education. We are working to have the rest of *The Shape of Change: Stocks and Flows* available for the 25th International System Dynamics Conference July 29–August 2, 2007. (For more conference information see www.albany.edu/cpr/sds/.) Visit our website, *clexchange.org*, to order *The Shape of Change* and *The Shape of Change: Stocks and Flows.*

As you settle into the school year, please remember that we are here at the CLE to answer questions, collaborate, and share curricula. And don't forget that Jeff Potash and John Heinbokel in the Educational Modeling Exchange are ready and available for help, discussion, and support. **Please** avail yourselves of their expertise. (heinbokelj@clexchange.org or potashj@clexchange.org)

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

- Eighth grader Emma Foley built a STELLA model for personal finance decision-making. How long does it take to save enough money for a car or to pay off a loan at various interest rates? Are there other car expenses?

- Several students did individual and team projects addressing the risks of a flu pandemic. At school, all eighth graders had previously played the Infection Game, graphed the game behavior, and built a basic epidemic model in STELLA. For DynamiQUE*ST*, these students expanded their thinking to examine how various policies would affect the spread of a potential avian flu outbreak. Some teams ran simulation experiments that showed the persistence of the S-shaped pattern of spread for most policies. Others drew more elaborate stock/flow maps focused on implementing quarantines or vaccinations. Although the projects varied in emphasis, all students agreed on the urgent need for early planning to avoid a dangerous pandemic. The following students presented projects on the flu:
  - ⊙ Erica Hughes and Mason Glidden
  - ⊙ Ariel Bliss and Tyler Moules
  - ⊙ Cassie Thomas
  - ⊙ Ian Crowe and Jared Menginstab
  - ⊙ Kelsey Bingham and Shelby Lerner

Thirteen students came from the Carlisle Middle school:

- Sixth graders Bella Bjork, Ali Forelli, Hannah Merry, and Teresa Ventura used a STELLA population model to think about the question raised in the novel, *Tuck Everlasting*: What if people could live forever?

- Sixth graders Derrick Amodei, Alexis Chirban, Jon Juneau, Tyler Koning, and Nick Luther used a connection circle to develop a closed loop argu-

Stock/Flow Visual Tools to Improve Communication *continued from page 1*

Frequently, teachers give directives to students and assume that all students understand. However, teachers tend to communicate in a far more abstract manner than their students do. At the writer's school, students from kindergarten through fifth grade were expected to learn and exemplify 36 character education terms, one for every school week. Some of the abstract terms were: self-control, respect, responsibility, diligence, tolerance, thriftiness, loyalty, and perseverance (Georgia Center for Character Education, 2002). Some teachers posted these abstract exhortations around their classrooms on small posters in lieu of giving rules that students could easily understand. Students were expected to participate in nonspecified activities that would result in a visual product that demonstrated their understanding of these abstract constructs. Teachers were directed to display visible evidence around their classrooms to demonstrate that students understood concepts such as self-control and respect. However, every student's inference was based on a unique background of experiences that was not necessarily the same as that of his or her teacher.

Compounding the problem, at-risk students who had little or no understanding of such abstract terms could have constructed their own inference concerning what each term meant. Discipline referrals may not have been a result of noncompliance or defiance of rules, but rather a simple lack of communication with regards to what behaviors and actions were expected. Regarding mental models, Senge (1990) posited, "These mental pictures of how the world works have a significant influence on how we perceive problems and opportunities, identify courses of action, and make choices" (p. 12).

The vocabulary that teachers are accustomed to using with their students is referred to as formal register. The use of formal register is indicative of a middle- or upper-class background and is characterized by an extensive vocabulary with many abstract terms. The primary function of formal register is to inform. Formal register is directive in nature and requires no participation or reciprocity from the receiver of the message. Without the expectation of response, listeners may actually withdraw from the speaker who uses formal register (Joos, 1962). This reaction makes it problematic for teachers when they attempt to communicate with at-risk students, particularly those associated with poverty.

Students associated with households of poverty tend to have a vocabulary that is minimal and has almost no usage of abstract terms. Joos (1962) referred to this level of speech as casual register. Casual register is used between friends or acquaintances and carries the implication that there is an insider or an intimation of belonging. The language of casual register requires participation and reciprocity of the listener.

Although teachers at the writer's school participated in extensive discipline-management training and implemented a mandated system-wide character education program, the number of discipline referrals and suspensions of students, particularly those deemed to be at risk, continued to increase. Teachers at the school had received extensive staff development training in classroom management programs, assertive discipline training, incentive programs, and character education programs. They had tried group incentive plans, graphic organizers, individual incentive plans, whole-school competitions, and grade-level competitions. The superintendent of the school system had even utilized a program in which upper-level elementary "repeaters" were sent to a "boot camp." By midyear, the assistant principal notified teachers that the number of referrals had tripled when compared with the figures from the previous year. It was also revealed that many of the students who were continually referred for discipline problems were academically at risk.

As discipline referrals increased, more programs were instituted. At faculty meetings, teachers reported that they were at a loss as to what approach to take next to reduce the number of discipline referrals, and that their stress levels were

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at an all-time high. The teachers at the school had implemented all the programs and procedures that administrators of the school system had mandated, without lasting success. They needed to find a method that allowed them to follow the mandated programs of the school system, as well as state and federal requirements, and also allowed them to effectively communicate their own expectations, so that their students understood what constituted appropriate behavior. Teachers needed to be able to communicate their expectations effectively to all students at their grade levels so the school could continue to experience favorable standings with regards to the requirements of NCLB [No Child Left Behind] (2001).

In a system such as a classroom, at least as many mental models regarding appropriate behaviors exist as the number of individuals in the classroom. Young students construct their own particular ideas of what behaviors, such as respect or self-control, constitute, based on their past experiences and their observations of

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others' actions (Wood, 2003). Teachers also construct their personal meanings based on their past experiences, but have the added benefit of schemata that are enriched by their beliefs and values.

In addition to using mandated character terms and programs, many teachers also used their own preferred set of behavior expectations (classroom rules). From grade level to grade level and from classroom to classroom, teachers displayed a wide variety of behavior expectations. However, no accompanying explanations that depicted what actions were desirable or unacceptable were displayed for students in that particular classroom. As each student visited a minimum of six different teachers daily when they switched classes for different subjects and support instruction, teachers spent a great deal of academic time redirecting students, and inappropriate behaviors consumed valuable academic time.

Many of the teachers who entered their first classrooms 20 or 30 years ago were prepared to manage classroom behavior under the mainstream theories that were taught in their college classes. They were taught behaviorist learning principles that embraced an input-output context for producing behavior (Bandura, 2001a). This learning theory maintained that learning could be assured if followed by a permanent change in behavior. However, this theory represented a linear process without any awareness that learning is a dynamic process. It also neglected the possibility that learning could occur with little to no permanent change in behavior.

Children from households of poverty frequently do not possess a schemata based on enriched concrete experi-

ences and have a working vocabulary of between only 400-800 words; they rely heavily on nonverbal cues such as physical signals. To survive, they must rely on their ability to read their environment. Their vocabulary is largely based on sensory representation. This language is called casual register (Joos, 1962). Students who come from households associated with poverty have little or no prior knowledge from which they can share commonality of mental models with their teachers, who have had the benefit of formal education and, more than likely, a middle-class background (Payne, 2002, 2003).

Rather than relying on abstractions, as do their teachers, these students rely on the actions and behaviors of others within their environment to guide their own actions and behaviors (Payne, 2002). According to the Office for Studies in Moral Development and Education (2005), people construct and reconstruct their knowledge of words "as a result of interactions with their environment" (¶

> Mental models are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action.

1). They bring with them the experiences and influences from their own diverse backgrounds. Wood (2003) noted, "[Every] culture includes a number of social communities, and each one distinctively shapes the perceptions, identities, and opportunities of its members" (p. 53). Some of the primary social communities in American culture are race, ethnicity, gender, class, religion, and age.

Because of their middle-class heritage, their years of formal education, and their interactions with others

of their own social community, teachers rely heavily on the language of formal register to communicate with their students. Members of the middle class, like many other cultures, share assumptions about behaviors that guide their actions and their feelings (Payne, 2003). Such assumptions are conveyed in their communications through abstract terms, signals, and idioms. Members of the middle class use the semantics and syntax that reflect knowledge of a vocabulary of 1,200-1,600 words. In schools, textbooks, tests, classroom rules, and teacher directives are usually expressed in formal register. Formal register has its own hidden rules, language, values, emotions, signals, cues, and priorities (Joos, 1962). Formal register contains many abstract words such as respect, self-control, responsibility, and tolerance. Behavioral assessment, as found on a student's report card, is often couched in terms such as accepts responsibility or shows self-control.

Kleiner (1994) noted that mental model is the term used by cognitive scientists and cognitive psychologists to refer to "both the semipermanent tacit 'maps' of the world which people hold in their long-term memory, and the short-term perceptions which people build up as part of their everyday reasoning processes" (p. 237). Abstract words, such as respect, are based on non-sensory experiences and are stored in the brain as mental models. Senge (1990) posited, "Mental models are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action" (p. 8). They can be in the form of a story, a drawing, an analogy, or a metaphor (Payne, 2002).

Mental models are applicable to teachers as well as students; they reflect an individual's beliefs about the system within which he operates. Teachers and students alike perceive and interact with others from the framework of their own experiences. Kleiner (1994) advised, "Differences between mental models

explain why two people can observe the same event and describe it differently; they are paying attention to different details" (p. 236). Senge (1994) quoted Schein, who noted that the culture of an organization or of a system such as a classroom "can be seen as its members' collective mental models—which is why you cannot change an organization without investigating its cultural assumptions" (p. 267). Teachers and their students frequently make the assumption that they share the same values and, therefore, speak each other's language (Payne, 2003). Unfortunately, in their pursuit of understanding each other, teachers and students may be totally unaware of the disparity between their various mental models (Senge et al., 2000). Before teachers and students can begin to communicate effectively with each other, they must be able to go beyond any cultural and socioeconomic gaps to perceive each other's point of view and achieve a commonality of understanding.

Thinking-process maps, such as stock/flow diagrams, are less commonly used in schools, but have the advantage of allowing the viewer to "read" the creator's metacognitive processes and understanding. Hyerle (1996) explained that thinking maps are different from graphic organizers in that they "are devices that allow students to *see* what they think and find the language that will convey that knowledge to their teachers and each other in a clear and organized way" (p. 35).

A stock/flow diagram is one type of visual tool that allows teachers and students to use a common format to bridge cultural and socioeconomic gaps (Hyerle, 1996). A classroom is one form of system whose parts influence all the other parts within it. As one part in a system changes, it has either an immediate or an eventual effect on every other part within that system (Waters Foundation, 2003a). As one student acts, there is a cognitive and behavioral effect upon all the other individuals within that system that is based on each of their unique

mental models. However, it is necessary to reveal those perceptions to understand them better. Using visual tools to create mind maps enables teachers to guide their students toward an understanding of abstract behavior expectations, such as to respect others, and results in increased communication between students and teachers.

Even very young children can evaluate, reflect, and make positive choices from their observations of others' behaviors. When young students understand which actions are appropriate in social situations, they are more likely to emulate others' behaviors. Although young students may not be able to precisely define an abstract term such as respect, they can usually articulate which actions increase or decrease one's respect for others. They base their concept either on their own experiences or on their observations of others' actions. In every culture around the world, children observe the interactions among members of their own cultural group and learn primarily from their observations of others (Bransford et al., 1999).

Bloom (1999) advised that, because products and programs are designed to "affect all students in a school, it is not possible to implement them for some students but not for others. Thus, one cannot randomly assign individual

students from the same school to a program group or control group" (p. 4). Likewise, assigning some teachers and not others to a control group would have been oxymoronic and counterproductive if the intent were to improve school-wide systemic communication.

The Project

The writer had experience in using the stock/flow diagram within the elementary classroom successfully (Scott, 2001) before leaving the classroom to a position of science instructional lead teacher at the school. The writer theorized that the same product might be of value if utilized in classrooms whose teachers experienced high numbers of discipline problems. Based on the data gathered, this writer developed a staff development training workshop that would enable teachers to utilize a stock/flow diagram as a visual tool to improve communication between teachers and their at-risk students.

The writer believed that teachers at the school could work smarter, not harder and introduced the idea that using a visual tool, such as a stock/flow diagram, throughout the school would enable the teachers to have a common format to communicate their behavior

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Leverage Points Interview Highlights Education for Sustainability

The September issue of *Leverage Points* from Pegasus Communications featured an interview with sustainability champion, Jaimie Cloud, in which she discusses how important a systems approach is to her work with schools.

If you are not yet a subscriber to *Leverage Points*, you may want to sign up to receive this free monthly e-newsletter, which always includes stimulating and provocative stories from the field, with links to resources for bringing a systems perspective into classroom and workplace. Find the current issue here: http://www.pegasuscom.com/levpoints/lp78.html

Stock/Flow Visual Tools to Improve Communication

expectations. She was asked to present the stock/flow and to give an overview of the accompanying staff development training that would show teachers how to use the stock/flow. For demonstration purposes, the writer used several generic behavioral expectations of the school district, as located on the conduct section of the report card. She formally presented the stock/flow diagrams and gave an overview of the staff development training workshop, and answered questions raised about the application of a stock/flow diagram in the classroom.

The writer used the discipline tracking system of the school system to gather data regarding the number of discipline referrals before and after intervention. The targeted population consisted of 67 teachers in K-5, counselors, administrators, and instructors at the writer's school who participated in a staff development training module dealing with the stock/flow diagram and classroom expectations during preplanning for the 2005-2006 school year.

All teachers at the writer's school participated in a one hour workshop during preplanning week. They learned how to work with their students to translate abstract constructs (nouns) such as self-control into actions (verbs and verb phrases) so that more effective communication with their students could be achieved and discipline referrals would decrease.

Each of four expectations: respect others; follow directions; accept responsibility; and show self-control, were used at each grade level by the teachers to develop Stock/Flow maps of the behaviors which generate and drain the goal behavior. The behaviors, both unacceptable and desirable, generated by the students and teachers for two of the graade levels for the Stock/Flow map for Self-Controsl are depicted in the following table:

First Grade	
On task	Off task
Report dangerous stuff	Tattle
Walk on Bear Paws	Running
Sit safe	Rock chair
Wait your turn/ Raise your hand	Blurt out
Hand and body check	Poke people
Use green light voice	Yell
Put stuff away	Leave a mess
Fourth Grade	
Pay attention/listen	Goof off
Sit calmly	Rock chair
Raise hand/wait your turn	Blurt out
Report dangerous stuff	Tattle/point at people
Line up/switch class quietly	Horseplay
Soft voice	Yelling/scream
Control temper/count to 100	Whine/Stomp
Work quietly	Rude noises

The results of this applied dissertation indicated that application of a stock/flow diagram to improve communication with students led to changes in how teachers worked with students to improve students' understanding of which actions would or would not be acceptable behaviors in classrooms. In turn, the increased understanding of behaviors led to a decrease in the number of discipline referrals.

Note: the school's discipline referrals decreased approximately 71% at the end of this project and remained down even after the project was completed. This year, there are hundreds of stock/flows on display in classrooms!

Recommendations for Practice and Further Research

The questions of this project provide a frame for future research in the area of using stock/flow diagrams to increase communication in any dynamic system. In the face of rapidly growing diversities found in the classroom, researchers in education have an obligation to increase communal understanding of the many strata of cultures that students bring with them to the classroom.

This research also raised several new questions. Although use of a stock/flow diagram to reveal a dynamic, collective mental model of a system, such as a classroom, appeared to have initial positive outcomes, the question is whether it can be extended to create a dynamic, collective model for an entire school system. Conversely, will use of a stock/flow diagram to reveal a mental model between two individuals such as a teacher and a student or a student and another peer enable a teacher to ascertain areas of miscommunication and ultimately improve the communication? Can its use be extended to other problematic areas such as transportation and the escalating number of bus referrals? The nonconventional practice of one teacher's use of photographs instead of words gives rise to another question: Can the use of a stock/flow diagram be extended to students with limited or no English proficiency as an acculturation tool?

Clelia Scott

Ms. Scott's entire dissertation with all references is available on the CLE web site, clexchange.org.

Review of the June 2006 Systems Thinking and Dynamic Modeling Conference

About 130 educators, system dynamicists and advocates came together at the The Conference Center at Marlborough, Massachusetts to network, learn from many experienced practitioners, and hear fantastic keynote speakers. The pastoral setting, good food, and comfortable accommodations of the Conference Center contributed to a relaxed atmosphere. The opportunity to spend time sharing ideas and innovations with many old friends and new acquaintances energized participants.

John Sterman put the essential learning of stocks and flows, feedback, and delays into the context of global warming. He, as always, was a dynamic speaker who held his audience interested and, in the end, helped them become knowledgeable about why our students need systems thinking and system dynamics in K-12.

Our friends from the Netherlands, Jan Jutten and Guus Geisen built on the work of Michael Fullan and Peter Senge to effectively remind us that we were all at the conference and in education because we are passionate about our children and the education they receive. Jan and Guus were joined at the conference by eight others from the Netherlands who shared their experiences of bringing systems into education in that country.

Peter Senge wrapped up the conference with a Café session that drew expertise and experience from the audience. With his characteristic ability to create synergy, Peter made us all think about what were the important pieces and what we were going to do in the future.

Between the three powerful keynotes, there were an incredible assortment of learning opportunities, from a working session with the use of system dynamics and systems thinking in K-12 classrooms, to a beginning training in ST/DM, to a more advanced system dynamics training session.

This conference had a different format from others with one set of six-hour training/learning sessions and two sets of shorter sessions. The response was positive. Many participants enjoyed the longer sessions which gave everyone the chance to ponder and learn. They also felt that the networking at the conference afforded an opportunity to catch up with others and make contact with new people.

Our next conference will be held in June of 2008 and, if everything goes according to plan, will take place again at The Conference Center at Marlborough, Massachusetts.

Lees Stuntz

The Shape of Change and *The Shape of Change Stocks and Flows: A Beginning*

The Shape of Change
By Rob Quaden and Alan Ticotsky
With Debra Lyneis
Nathan Walker, Illustrator
The Creative Learning Exchange, Publisher © 2004
Price: $16.00
ISBN: 0-9753169-0-7

- Hands-on activities
- New learning tools
- Teamwork and dialogue
- Reflection
- Constructivism and inquiry
- High-level critical thinking
- Sophisticated content
- Learner-centered learning
- Interdisciplinary ties
- No prerequisites
- Easy preparation and directions

NEW companion volume to *The Shape of Change*:
The Shape of Change Stocks and Flows: A Beginning
By Rob Quaden and Alan Ticotsky
With Debra Lyneis
Nathan Walker, Illustrator
The Creative Learning Exchange, Publisher © 2006
Price: $6.00

Descriptions:

In *The Shape of Change* (2004), by Rob Quaden, Alan Ticotsky and Debra Lyneis, students engaged in games and other classroom activities to observe what was changing over time. They drew behavior over time graphs to examine how these things changed, and they related the patterns of behavior to other changes in their experience.

Now, with *The Shape of Change: Stocks and Flows* students build on the earlier lessons to understand why the changes occurred. Why did doubling cause the number of friends to grow exponentially? Why did the mammoths go extinct? Why did the boiling water cool to room temperature?

Step-by-step, students build stock/flow maps explaining each lesson activity. These stock/flow maps are tied directly to students' earlier behavior over time graphs and to the underlying causal loop structures that drive the changes. That way, students begin to build systems thinking skills—an understanding of how structure creates the behavior we observe all around us.

DynamiQUEST

ment for the relationships among trade, technology and the growth of civilizations.

- All eighth graders in Carlisle studied the problem of global warming in science class and developed a general causal loop diagram of the problem in math class. Each student then researched a possible solution and drew a causal loop diagram to explain it.
  - ⊙ Elise Ruan's project dealt with encouraging greater use of public transportation.
  - ⊙ Katie Hart used a causal loop diagram to support her argument that we should harness the ocean tides as an alternative electric power source.
  - ⊙ Jessica Li illustrated the economic constraints limiting the growth of energy efficient building construction.
  - ⊙ Alexander Sayde also looked at the dynamics that could encour-

age or discourage energy efficient building construction. As more people build green houses, a balancing loop eases environmental pressures, leading to less green construction.

Finally, tenth grader David Sterman came from Lexington High School. He built a Vensim model of an epidemic to test the effects of mass vaccination, routine prior vaccination and quarantines on a smallpox epidemic caused by a bioterrorist attack. His results showed that "the best way to prevent an epidemic is through preventive vaccination, because once the virus is released it takes massive campaigns to prevent catastrophe."

While the focus of DynamiQUE*ST* is on the students and their accomplishments, its success depends on the many system dynamicists and educators who generously share their time and expertise to coach students

and support K-12 system dynamics. This year, participants were: Jay Forrester, Robin Goldstein, John Heinbokel, Richard Karash, Hyunjung Kim, Debra Lyneis, Jim Lyneis, Greg Orpen, Dave Packer, Jeff Potash, Rob Quaden, Mike Radzicki, George Richardson, John Sterman, Lees Stuntz, Alan Ticotsky, and Larry Weathers. DynamiQuest 2006 was also supported by isee systems and Pegasus Communications, Inc. who donated books, t-shirts and software for students with lucky raffle tickets numbers.

At DynamiQUE*ST,* adults are always impressed by the poise and depth of curiosity and understanding shown by students. Students always enjoy and appreciate the serious interest the coaches take in their work. DynamiQUE*ST* 2006 again affirmed for everyone the value of K-12 system dynamics in helping students address complex problems.

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16th Annual Pegasus Conference
Leading Beyond the Horizon: Strategies for Bringing Tomorrow into Today's Choices
November 13-15, 2006, Waltham, MA (just outside of Boston)

It's not too late to register for this year's Systems Thinking in Action Conference! And as a friend of CLE you can receive a $100 discount off the registration rate in effect at the time you register between now and the conference! Join us at the 16th annual Pegasus Conference, November 13-15, 2006 in Waltham, Massachusetts.

Innovative practitioners from both the Florida and the Ohio education associations will be participating this year, along with a team from NEA, as close to 40% of this year's conference community will come from the education sector. Peter Senge and Dawna Markova — both passionate champions of future facing educational practices — will be among the keynote presenters guiding the inquiry into the theme Leading Beyond the Horizon: Strategies for Bringing Tomorrow into Today's Choices. Don't miss this opportunity to share knowledge and questions with other educators while gleaning ideas from business, government, and the nonprofit world as well. Download a brochure to learn more about the outstanding program.

To receive the CLE discount, simply use priority code STA06CLE when you call 1-800-272-0945 to register today.

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DynamiQUE*ST* 2007
May 11, 9am—3pm
Campus Center, Worcester Polytechnic Institute, Worcester, MA

Come join us for the eighth annual DynamiQUE*ST*!

The what and why…

Students (and teachers) are at various places along the road to developing proficiency with thinking systemically and employing System Dynamics/Systems Thinking (SD/ST) to address complex issues and increase understanding. We seek to encourage students and teachers to develop an understanding of the use of SD/ST tools. We also know that we need an environment, free from the "winner/loser" constraint, where kids can receive feedback from other kids as well as from teachers and professionals well versed in SD/ST. DynamiQUEST creates a venue for both celebrating what has been done and providing encouragement for all to continue!

In this spirit, DynamiQUE*ST* was launched in 2000. DynamiQUE*ST* 2007 will provide a venue for students in Grades 3-12 to showcase work in which they have employed the tools and method of system dynamics. This effort has several purposes:
- Provide a way for students to meet other students and see what they are doing
- Permit teachers from different schools to see evidence of student work in SD/ST
- Provide a venue for teachers and kids to network
- Have some fun and celebrate with your kids!

The how…

Simple! Have a place where students from around the country can bring their SD/ST work for others to see. Don't pit kids against each other, but hold their work accountable to a set of clearly defined standards (see DynamiQUE*ST* 2007 Rubrics). Give them (and their teachers) a chance to see "where they are" and "where they can go from here."

But, but…

"My kids are at different stages in learning and understanding the tools and method of SD/ST. Why would we make the trip just to bring our BOTG's?" Of course they are, and this is precisely why you should make the trip! The use of standards allows kids to see their work as a point in time along a learning continuum and see where they can go next. DynamiQUE*ST* 2007 provides rubrics for any combination of SD/ST tools from a simple (but powerful) BOTG to a full-blown, dynamic model. The 5th grader's BOTG is as valid as the 11th grader's functional model! Both represent vital stages in the development of a systems thinker/dynamic modeler. Let's take some time to see this work, have kids see each other's work, and celebrate where we are and where we are going.

What now…

Look over the guidelines provided on the CLE website. Begin to plan, with your students, what you will bring to DynamiQUE*ST* 2007!

Newsletter Subscription Information

The Creative Learning Exchange newsletter is available in three different formats:

- On the web site at www.clexchange.org
- As an attachment to an E-mail
- In paper format via US mail ($15.00 outside the USA)

Since we vastly prefer electronic distribution to paper because it is so much less expensive, please E-mail us at any time when you would like to have an electronic subscription.

milleras@clexchange.org>

The Shape of Change *continued from page 7*

This book is *A Beginning* because it presents stock/flow lessons for the first four lessons in *The Shape of Change*. The remaining lessons will appear in a later edition.

All of the lessons in these books are also available for download from the CLE website (follow the links on the side of the page). However, we find that the layout and the compilation of all the lessons in the book make them more useable.

To purchase either volume of *The Shape of Change:*
Order Online at clexchange.org
or *Purchase by Mail* from
The Creative Learning Exchange
27 Central St., Acton, MA, 01720

The K-12SD listserve

The K-12SD listserve is a wonderful way to make connections and find resources within the K-12 community, to share your experiences, and to ask for help. If you are not yet a member, please join us.

To subscribe to the K-12SD listserve, send an e-mail message to *listserv@sysdyn.clexchange.org* with the line "subscribe k-12sd first-name last-name" as the only thing in the message's body (no footer, no signature, etc.) The subject line is immaterial. "First-name" and "last-name" should be your first and last names; for example, "subscribe k-12sd Lees Stuntz" if you are Lees Stuntz. Remember that the quotation marks are not to be included in your message, just the words.

The list is not an overwhelmingly active one, unless there is a lively discussion going on. Bring your ideas and questions! Where else can you get answers from both experienced teachers and world-class system dynamics experts?

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