A curriculum on Personal Finance is especially timely after the global economic collapse of 2008, which provided powerful evidence that traditional economic and economic-educational thinking had failed. Our students’ need for broad-based financial literacy has never been greater. In developing an understanding of how the pieces of our economic system work together, students should start with a deepened understanding of their own finances. The materials in Dollars and Sense use systems thinking and mathematical tools and exploratory computer simulations to challenge students and teachers to develop a realistic and personal understanding of the dynamics of the economic system in which we live. With their resulting knowledge and understanding, they should be better able to control their financial futures, minimize the chance for future pain, and maximize the chance for fostering a prosperous future.

Personal finance, at its core, involves relatively few working parts. However, managing our finances is hard, because change is ever present and none of those parts ever stay the same for long. With money flowing in and out, our funds grow or shrink at different rates, at different times, and for different reasons. Without observing, analyzing, and understanding the patterns of change in money accumulations over time and without recognizing the connections that exist between all the parts of the system, adults frequently pay a real and heavy price.

As teachers, we can help our students prepare to deal with that critical but ever-changing system of personal finance. The innovative tools of systems thinking and dynamic simulations presented in these materials offer young students (5th–7th grade) a unique opportunity to develop a better understanding of the mathematics of change; to learn constructively and collaboratively; and, over a lifetime, to successfully manage their personal finance. The activities in the seven lessons of this Module 1 utilize a series of computer simulations and their accompanying worksheets, which are designed to help young students explore how (and why) their personal finances change over time. As students explore the diverse set of financial situations, they will learn in four different ways.

- Learn by doing (constructivism): asking open-ended “what if’s” and using meaningful real-world examples.
- Learn by building a conceptual foundation that connects critically important mathematical tools (tables, graphs) and skills with a systems thinking conceptual framework that visually represents the dynamically changing financial systems (e.g., a personal savings account).
As spring approaches, the summer’s activities are starting to loom large on our horizon. Although there is no Creative Learning Exchange Systems Thinking and Dynamic Modeling Conference this summer, there are ample opportunities for learning. One of the most exciting ones is Camp Snowball in Tucson, July 21-25. Sponsored by a broad coalition, including both the CLE and the Waters Foundation’s Systems Thinking in Schools project, it will be an exciting week filled with fascinating keynotes, including Peter Senge and Michael Fullan, as well as systems thinking, system dynamics, and education for sustainability workshops to develop capacity to shape the future. See www.campsnowball.org and page 11 of this newsletter for further information.

Other opportunities include the annual International System Dynamics Conference in Washington D.C., July 25-28, as well as numerous regional workshops. The CLE is sponsoring a workshop in the Boston area, June 28-30. For more information, see the CLE website, www.clexchange.org and the article on this page.

The Waters Foundation is offering workshops in Portland and in Tucson (www.watersfoundation.org). I hope, as we transition into summer, many of you are able to join us at one or more of these learning opportunities.

As always, I welcome questions or comments.

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

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**Systems Thinking and System Dynamics Workshop**

Innovation Academy Charter School
Tyngsboro, MA

3-Day Workshop, June 28-30, 2011
8:30 am – 3:30 pm, lunch provided

**Presenters:**
- Greg Orpen (Innovation Academy)
- Rob Quaden (Carlisle Schools, Author of *The Shape of Change* )
- Alan Ticotsky (Science curriculum specialist, Author of *The Shape of Change* )

**Learn beginning principles and practice using the tools of systems thinking (ST) and system dynamics (SD):**
- Behavior-over-Time Graphs
- Word and Arrow Causal Diagrams (Connection Circles and Causal Loop Diagrams)
- Stock and Flow Maps
- Introduction to Computer Modeling

**Participate in games and activities you can use in classrooms.**

**Explore existing resources for potential use.**

**Create a plan to use ST/SD in your school for the 2011-12 school year.**

**Receive follow-up support in the 2011-2012 school year.**

**Cost:**
$250 per participant, $125 per participant in teams of 3 or more. Some scholarships are available. See www.clexchange.org for more information.

**FAQ’s:**
Where can I learn more about the workshop, the presenters, and System Dynamics?  www.clexchange.org.

What about PDP’s? Twenty-one Professional Development Points are available for participants (18 hours for workshop, 3 hours for follow-up).

Why is the cost so much less for teams? We encourage teams to join us because the most effective way for any school to foster innovation is to have a number of interested educators, preferably both teachers and administrators, working on the innovation together.

What do you mean by follow-up support in the 2011-2012 school year? We will structure follow-up support to meet the needs of the individual teachers and schools. If there is a team from a school attending, every effort will be made to have the follow-up support occur in the school. We will be available to provide classroom observation or help with lessons and lesson planning.
Dollars and Sense
continued from page 1

The core systems thinking building blocks that guide student understanding of the structure of change also drive the computer models underlying the simulations.

MY ACCOUNT

- Money accumulates in MY ACCOUNT (we call that a “STOCK”).
- An “inflow” into MY ACCOUNT—which can be wages, other deposits, or interest earned on the account—adds to that stock.
- An “outflow” from that stock—expenses—reduces or drains MY ACCOUNT.

- Learn by challenging preconceptions, and using computer simulations to discover that there is more than one right answer or way to successfully manage one’s finances.
- Learn by sharing, comparing, collaborating, and applying lessons learned to meaningful personal financial problems.

The core message for success: Spend less than you earn!

Sounds simple, but when money flows in and out in different amounts and at different times…it is not nearly so simple! Yet our experience shows that 5th to 7th graders, working with mathematical tables, graphs, and computer simulations, can (and do!) “get it!”

How Is This Module Organized?
Module 1 (Personal Finance) focuses on “saving” and “spending.” (Subsequent modules will deal with investment and credit.) As in each module, Module 1 is open-ended. It allows for and encourages students to create and share mathematical approaches, tables, and graphs in order to explain and discuss personal finance goals, plans, and choices with peers, teachers, or parents. These activities are supported by the worksheets provided here and by the simulations that are available on-line.

Module 1 includes seven lessons, each of which contains a computer simulation with at least one challenge. The lessons are organized into three sections, each section progressively building on the foundations of the earlier section(s).

Section 1: Introduction to Personal Saving and Spending
Section 1 provides an introduction to linear (constant) saving, linear spending, and simultaneous saving and spending. We STRONGLY RECOMMEND it as a prerequisite for subsequent lessons.

- Lesson 1: Can I Manage My Money and My Music?

Section 2: Extended Saving and Spending Illustrations
Section 2 moves the understanding of simultaneous inflows and outflows forward by guiding students in choosing their own personal financial goals, running a business, operating a public service, or helping a friend plan to purchase a car. We provide simulations of each of these four illustrative scenarios.

- Lesson 2: Can I Reach a Personal Saving and Spending Goal?
- Lesson 3: Can I Make Money with a Lemonade Stand?
- Lesson 4: Can I Successfully Run the Local Food Bank?
- Lesson 5: Can I Help a Responsible Teen Buy a Car?

Section 3: Growing Savings through Interest and Compounding
In Section 3, the lessons move into compounding growth (rather than linear growth) to explore the role of interest on savings. We provide an

Dollars and Sense continued on page 4
introduction to compound interest and then a more ambitious illustration of long-term planning that brings together earning, spending, and saving with compounded interest.

- **Lesson 6: How Does Interest Grow My Savings?**
- **Lesson 7: Can Compounding Interest Make Me a Millionaire?**

Each individual lesson offers:

1. An open-ended and meaningful question or problem for the students to explore or solve.
2. Support for that learning through a set of System Dynamics conceptual and simulation tools to help students structure, improve, and communicate their understanding of these issues and processes.
3. Encouragement to expand that understanding by identifying and exploring “better questions” and other contexts in which those dynamics also apply.
4. The challenge and the tools with which to address problems of students’ own creation.
5. Opportunities to share and communicate what they have learned with peers, teachers, and parents.

**Frequently Asked Questions**

**Will this be fun as well as educational?**

Students love this approach. It is fun to play hands-on games and learn through experience. Students can work in teams, share ideas, talk with and listen to each other, not just respond to the teacher. Often something surprising happens and discovering the reason is eye-opening.

When students are active, cooperating, and solving their own problems, their level of engagement is high and the learning sticks with them. In addition, students who have struggled with typical academic tasks often have a new opportunity to “show what they know” using new learning tools.

**Will this be complicated for me to teach?**

Teachers are provided with concise supporting materials that include an overview and context for the student activities. Each lesson begins with a brief summary so that teachers can see what is covered. Background information is succinct and procedures are laid out step by step. Student worksheets are at the end of each lesson, ready to photocopy.

**Can my students actually do these lessons?**

Although the activities in this book have been written with a focus on 5th–7th grade capabilities, they may be used with a wide range of student ages. Lesson 1 was designed to serve as a foundation for later lessons (2–6); those later lessons can be pursued in whatever way best suits the needs and interests of the teacher. Lesson 7 assumes the knowledge and understanding developed in Lesson 6.

**What benefits do the students get from these lessons?**

- Students acquire new learning tools and work independently and together to apply them. Each individual lesson fosters constructivist learning.
- Teamwork gives rise to better thinking through dialogue, motivation to tackle tougher problems together, mutual respect, and fun.
- All the lessons are structured to build cooperative learning.
- Finally, each lesson is designed to provide practical opportunities for students to experience by doing, by making different choices, and by comparing and evaluating relative outcomes.

**How do these activities interact with recognized 5th–7th grade content and standards?**

The challenges presented in these activities take on big ideas that are central to the 5th–7th grade curriculum and that are transferable to other topics.

1. Module 1 lessons align with the National Council of Teachers of Mathematics (NCTM) Content AND Process Standards.
   - Content standards include skills for Number and Operations, Algebra, and Data Analysis and Probability.
   - Process Standards apply to all areas (Problem-solving, Reasoning and Proof, Communication, Connections, and Representation).
2. The lessons also address several of the Economics Standards advocated by the Council on Economic Education (CEE), including concepts involving opportunity costs; incentives; supply; demand; and price, interest, and earnings.
3. Finally, the lessons support the National Science Teachers Association (NSTA) standards related to the following:
   - Systems, order, and organization;
   - Evidence, modes, and explanation;
   - Change, constancy, and measurement.

**Curriculum Connections**

The tool-sets and mind-sets developed here have application far beyond just an understanding of personal finance. As students use graphs to understand how money accumulations (STOCKS) change over time, they also find that similar patterns of behavior arise in
other places in the real world. And their practical application of the systems thinking tools taught here to represent change can be applied to a wide variety of “systems,” ranging from populations (of people, animals, plants, etc.) to resources and even to emotions about people and events. All of these systems in the real world are subject to factors that increase and decrease the overall STOCK in variable ways.

Meeting Standards
The simulations and worksheets that are part of each lesson are designed to use personal finance challenges to address age-appropriate CONTENT and PROCESS standards in Mathematics, as well as emerging national standards in Economics, the NSTA standards identified above, and the transferable tool- and mind-sets of System Dynamics that support wide-ranging critical thinking and collaborative skills.

Lesson 1: Can I Manage My Money and My Music?

Student Challenge:
Use a computer simulation to test different Saving then Spending plans to satisfy personal music needs: purchase of new Mp3 player and tunes over a 24-month period without running out of money!

At the Lesson’s End:
- Students will have completed a structured exploration of how Saving and Spending combine to control their ability to achieve a financial GOAL.
- Students will have designed and tested a variety of PLANS for achieving that GOAL.
- Students will have used tables, graphs, and systems thinking concepts to share their results with classmates by comparing successful (and unsuccessful!) PLANS, and exploring the different personal values that they brought to this challenge.

Managing personal finances at any age involves setting a GOAL and then devising and testing a PLAN with two elements: Saving and Spending. For young students this learning is most powerful when they are provided hands-on opportunities to explore a system of saving followed by spending; to recognize and question their pre-conceptions; to specifically identify the choices they make; and to evaluate the outcomes from those choices. These elements of learning are illustrated in the provided computer simulation, which gives students a way to explore and tailor several different PLANS. The two parts of the simulation’s Control Panel are reproduced below.

Inputs—Decisions

Can I Manage My Money and My Music?

You will need to make 4 Saving decisions for this simulation.

What is MY SAVINGS GOAL?
1) How much do I want to save BEFORE I start spending?
   - None
   - $100
   - $200
   - $300
   Click a push button to select a Goal. A Green Light will show which is Active.

What is my Saving PLAN?
2) How often will I put (deposit) money into my Piggy Bank?
   - Click a button below.
   Months Between Deposits
   - Every Month
   - Every 2 Months
   - Every 3 Months

3) How much will I deposit each time I set money aside?
   - Click a button below.
   Regular Saving Amount
   - None
   - $5
   - $10
   - $15

4) Do you wish to keep saving, after you reach your Savings GOAL?
   - If so, click Button.

Dollars and Sense continued on page 6
To more fully understand what is happening over time and why, these PLANS reflect the following system concepts.

1. Money (Saving) flows into the stock of MY SAVINGS, causing that stock to grow; and
2. Money (Spending) flows out of the stock of MY SAVINGS, causing the stock to decline.

Exploring Saving and Spending in Isolation (optional)

It can be difficult for some students to visualize money going in and out of their savings at the same time. Therefore, in this lesson we provide an option for students to explore the regular Saving and Spending elements in isolation, before combining them in the main challenge of Lesson 1. The isolated explorations are accessible from the simulation and are supported by Worksheet A, for Saving, and Worksheet B, for Spending. In these optional exercises, only a 12-month time period is used. The following Graphs from the simulation illustrate three saving plans and two spending plans.
A. Saving

B. Spending

Dollars and Sense continued on page 8
Dollars and Sense
continued from page 7

2. Making a Plan and Observing Outcomes—The Main Exploration

To engage students, Lesson 1 offers meaningful and open-ended questions for which there are many correct answers. Each student is asked the following in the simulation. What is your GOAL for satisfying your music wants? Can you devise financial PLANS for Saving and then Spending to achieve that GOAL? Finally, how do you choose your favorite PLAN?

Worksheet C records students’ decisions and their results as they explore different plans. The following Table illustrates some possible plans. A blank Table, ready to be filled in, is part of Worksheet C.

3. Recording at least TWO (or even three) Successful Plans

<table>
<thead>
<tr>
<th>PLAN #</th>
<th>GOAL ($) (100, 200, 300)</th>
<th>Months Between Deposits</th>
<th>Saving Amount ($5, $10, or $15)</th>
<th>Cost of MP3 Player ($50, $100)</th>
<th>Tunes Purchased Monthly ($1/tune)</th>
<th>Continue to Save After Reach GOAL?</th>
<th>Total Tunes Purchased</th>
<th>Final MY SAVINGS ($)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>200</td>
<td>1</td>
<td>10</td>
<td>100</td>
<td>15</td>
<td>N</td>
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<td>2</td>
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<td>110</td>
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<td>1</td>
<td>10</td>
<td>50</td>
<td>13</td>
<td>Y</td>
<td>182</td>
<td>8</td>
</tr>
</tbody>
</table>

4. Using Graphs and Tables

Students will work with Graphs and Tables to describe and communicate the patterns of change that they observe over time in their accounts (with those accounts first growing as savings accumulate to a GOAL, then falling with spending). Tables and Graphs can be printed from the simulation or created by the students themselves using Worksheet C. Tables and Graphs each have distinct strengths.

- The Behavior-over-Time Graph is designed to record multiple plans by focusing only on the changing amount of money in the account each month.
A Table records monthly changes in money saved (inflow), money spent (outflow), and money in one's account (MY SAVINGS, the stock). That corresponds to the important Systems conceptual frame described earlier. The Table below shows the result of Plan 3 (shown above in Section 3).

<table>
<thead>
<tr>
<th>Months</th>
<th>MY SAVINGS</th>
<th>Monthly Saving</th>
<th>Monthly Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>10.00</td>
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<td>50.00</td>
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<td>11.00</td>
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<td>13.00</td>
</tr>
<tr>
<td>Final</td>
<td>8.00</td>
<td>10.00</td>
<td>13.00</td>
</tr>
</tbody>
</table>

5. Putting the Pieces Together

Students now ANALYZE and DESCRIBE what happened and why. This involves three steps:

1. Using a Graph to compare different options, recognizing that each student can devise more than one successful plan;
2. Using a Table to describe changes over time;
3. Finally, working and communicating with other students to compare observations and to recognize that individuals may make different choices based on different values (reflecting different desires or needs or priorities).

Where and When Will Students Need Guidance?

“Playing” on computers is second nature to students. However, they are likely to require assistance in the following areas.

1. Recording Data. Computer games focus all too often on one dimension: “Winning.” But in this lesson, we are asking students to record PLANS and to record the consequences of those specific plans without focusing on discovering the one “right” answer.

2. Understanding WHYs. Here, it may be appropriate to slow students down, and ask them initially to focus ONLY on their Saving plan or ONLY on their Spending plan. This simulation offers students an opportunity to do so, and Worksheets A and B provide you with a means to follow and evaluate student progress or problems with each of those financial elements and then with their combination into an overall plan. Even then (Worksheet C), students save first, then spend, so that they are able to recognize how each process affects the overall health of their accounts.

3. Explanation of the structure of the tables produced by the STELLA® software. The best way to read these tables is to recognize that the MY SAVINGS values for each month represent the ending value for that month. So for the Table in Section 4, beginning with month 14, we see that at the end of month 14, we have $38 saved. We then save $10 and spend $13, so that at the end of month 15, we now have $35 saved, a net reduction of $3 during that 15th month.

Bringing the Lesson Home

How do the students set goals and define priorities—distinguishing NEEDS from WANTS?

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Dollars and Sense

continued from page 9

One of the most valuable lessons in a financial literacy program is helping the students to recognize the difference between NEEDS and WANTS. That difference is especially critical when resources are limited. This lesson focuses on students’ “wants.” Later lessons will bring in a greater consideration of “needs” and the balancing that “needs” and “wants” often requires.

What is the important student-learning from this simulation?

Appreciation of the importance of math in managing personal finance including the following:

- Ability to compare, discuss, and even (respectfully and constructively) disagree with each other on their choices.
- Realization that learning can be powerful when listening and learning from each other.
- Experiencing an open-ended opportunity for learning and discovering the empowering nature of such an experience.

Extending the Learning

By providing students with more open-ended opportunities to create their own problem(s), they can learn to see and apply what they have learned to a personal scenario. This application is, of course, the most meaningful of all options. Lesson 2 offers such an opportunity. The book of 7 lessons focuses on core saving and spending systems that shape the outcomes of personal financial decisions. Future modules will link these saving and spending concepts with other important elements of personal finance (investment, credit, debt, and human capital).

Funding for Dollars and Sense was made possible through the generosity of the Julis Foundation and the Gordon Brown Fund.

All 7 lessons of Dollars and Sense, including simulations, worksheets, and tables of standards, are available on the Creative Learning Exchange website. The book, with simulations on a CD, may be purchased from the CLE as well.

www.clexchange.org

New Playkit from the CLE:
Healthy Chickens, Healthy Pastures

Healthy Chickens, Healthy Pastures
Making Connections at Drumlin Farm and Beyond

Written by Linda Booth Sweeney and Renata Pomponi
Graphic design: Ann Jennings

This Playkit is a game to help students think deliberately about living systems in a farm setting and give students a mental framework to take home and apply in other contexts. Through this game, students explore the hidden interconnections and dynamics surrounding the “Egg Mobile,” a portable chicken coop designed for sustainable farming at Drumlin Farm in Lincoln, MA. Students will answer the

Healthy Chickens continued on page 12
Camp Snowball is a summer “camp” experience that brings together students, parents, educators, and business and community leaders to build everyone’s capacity for learning and leading in the 21st century. Teams and individuals from school systems and communities around the world are invited to learn how to enable youth to develop into “systems citizens.” Systems Citizens are members of a global community who strive to understand the complexities of today’s world and have the informed capacity to make a difference.

**PROGRAM HIGHLIGHTS**

- Practical systems thinking and sustainability education workshops for adults and students (entering grades 7-12) that can easily be applied in the classroom, the workplace, the community, or the home
- Leaders’ Forum for school, community, and business leaders co-facilitated by Peter Senge (author of The Fifth Discipline) and Michael Fullan (international leader on educational change)
- Opportunities to learn from and with experienced educators who have been implementing systems thinking and education for sustainability in their schools and classrooms
- A one-day Learning Festival featuring Peter Senge and Michael Fullan, showcasing successful local, national, and internal programs
- Case work and program activities drawn from the environment and culture of the Sonoran desert
- Sessions with young adults and current students who have benefited from the systems thinking instructional strategy in the Tucson schools
- Special guest speakers and facilitators who will challenge and provoke our thinking

**WHO SHOULD ATTEND**

Camp Snowball is designed for individuals and teams. We encourage communities and school systems to put together diverse teams that include: educators, students, parents, business and government leaders, staff and volunteers from youth-serving organizations. By building “critical mass” in a community, learnings from Camp Snowball can be reinforced and a local support system can be created that will substantially increase the chance of new approaches being adopted.

Teams are encouraged to engage organizations and businesses in underwriting their participation, as local support creates commitment to the work for the future. Some scholarships are also available. Apply at [http://www.campsnowball.org/](http://www.campsnowball.org/).

Bring your family, as this is vacation time for many of us. We have a great, relaxing location—the Westin La Paloma—and for kids entering grades 1-6, there’s Camp Sunshine, a summer day camp that integrates systems thinking with traditional camp activities. Games, songs, crafts, nature, adventures—you’ll get it here—with a twist. The Westin also offers a program for ages 6 months and up, and lots to do for accompanying adults who want some rest and relaxation.
Healthy Chickens, Healthy Pastures

continued from page 10

question: What’s the connection between the Egg Mobile and a healthy pasture?

The eight-page Playkit contains everything you need in order to play the Healthy Chickens, Healthy Pastures, “Making Connections” game. This includes a contextual introduction for playing the game, instructions for playing, and a set of Wikki Stix that can be pressed onto accompanying cards to represent causal connections.

Use this game to encourage your students to look for connections within the pasture, to see the people, land, and wildlife in and around farms, not as a set of interesting but disconnected parts, but as components of vibrant, living systems.

We created a Playkit curriculum guide to use with groups of students to help them think deliberately about living systems in a farm setting and to give them a mental framework to apply in other contexts. Through the discussions, system mapping activities, and games in this unit, students will explore the interconnections and dynamics surrounding the “Egg Mobile.” Concepts such as feedback loops, time horizon, and stocks/flows are illustrated through a study of the relationships between elements of a farm pasture: chickens, cows, soil, plants, manure, etc. The unit can include outdoor exploration if you have access to a local farm that raises chickens, or you can bring the farm into your classroom using photos, videos and the Internet.

For more information and to order The Playkit, go to www.clexchange.org.