THE STORY OF CHARLES
Introducing Systems Thinking Tools to the Harris School

Robert Kalman

Autobiography in Five Short Chapters

CHAPTER ONE

I walk down the street.
There is a deep hole in the sidewalk.
I fall in.
I am lost… I am helpless.
It isn't my fault.
It takes forever to find a way out.

CHAPTER TWO

I walk down the same street.
There is a deep hole in the sidewalk.
I pretend I do not see it.
I fall in again.
I can't believe I am in the same place.
But it isn't my fault.
It still takes a long time to get out.

CHAPTER THREE

I walk down the same street.
There is a deep hole in the sidewalk.
I see it is there.
I fall in…it's a habit…but my eyes are open.
I know where I am.
It is my fault.
I get out immediately.

CHAPTER FOUR

I walk down the same street.
There is a deep hole in the sidewalk.
I walk round it.

CHAPTER FIVE

I walk down a different street.

Portia Nelson
There's a Hole in my Sidewalk

Introduction

In school year 1998-1999 at the Harris School in upstate NY where I am principal, a third grader named Charles successfully diverted incalculable amounts of professional time, energy, and attention towards himself. Charles re-fused to be educated within the conventional structure of our conventional elementary school.[1]

Strategies and interventions of all kinds were initiated and implemented. Some lasted months, others only hours. In the end, none of them met Charles's social, emotional, or cognitive needs; he

Charles *continued on page 7*

[1] Tracy Kidder (1989) expresses this phenomena in *Among Schoolchildren,* "It is remarkable how much of the time of how many adults in a school one child can command simply by being difficult."

Six Billion and Counting Model
Les Skillings, Jr.

The United Nations has determined October 12, 1999 to be the day the world's population reached 6,000,000,000 people. I thought it would be good for my Systems class to read about and build a model of the world's population over the next 101 years, starting with the last year of the present century, the year 2000.

In class we have been learning to use STEP FUNCTIONS in our models, so this assignment has two step functions. The first step function occurs in 2025 with a 0.005 rise in the DEATH FRACTION. The second step function takes place in 2050 with a drop in the BIRTH FRACTION of 0.005. These two fractional changes lead to ZPG (Zero Population Growth) after 2050. This may or may not happen. Both of these changes are an attempt to model what may be the resulting impact of HIV/AIDS in Africa's population over the next century.

Along with this modeling assignment, I have given my students an article to read from the September/October *World Watch* magazine, written by Lester Brown and Brian Halweil, entitled "Breaking Out or Breaking Down," pages 20-29. The first six pages of the article are devoted to the AIDS issue and what it is doing to the 20-45 age group in many African countries. Approximately 20-

6 Billion *continued on page 4*

UPDATES, etc…

Chelmsford Public Charter School
Chelmsford, MA

Chelmsford Public Charter School's mission is to teach students through project-based, interdisciplinary instruction. The CPCS students learn similar content to most traditional schools, but the methods and format for learning differ. Subject areas are incorporated into teacher created units that are based on the Mssachusetts Curriculum Frameworks.

In 1997-1998, the school's second year, each of the four 5/6 classrooms became a medieval kingdom, where, through role play, simulation, research, demonstration and performance, the students were immersed in the 15th century. This multi-week project incorporated the subjects of language arts, social studies, math, history, and art. Skills taught were writing, speaking (presenting), research, reading comprehension, literature analysis, and computation.

During the same time, the 7/8 team devoted the spring term to the study of world hunger. World geography, economics, politics and government, language arts, and science (nutrition and health) were incorporated into this unit. Academic skills such as writing, graphic presentations, mathematics (ratio, computation, and conversion) were included. Students studied the causes and effects of world hunger in numerous nations with the additional support of systemic/system dynamic modeling. The culminating event was the planning and orchestrating of a Hunger Banquet. The banquet was a visual and graphic representation of the world's population and the percentages of people's food and water intake per day. The students charged admission to the banquet, with all proceeds ($800) donated to the Chelmsford Food Pantry.

EDITORIAL

As New England's cold weather and Y2K approach, the New Year bodes to be an active and exciting one for system dynamics in K-12 education. In addition to the successful SYmBowl, now in its fifth year in Portland, Oregon, there will be an exposition of student work, grades 5-12—DynamiQue*ST*—on the East coast. DynamiQue*ST* will be held May 19-20, at Trinity College in Burlington, Vermont.

Every other year is conference year at the CLE. This year's Systems Thinking and Dynamic Modeling Conference for K-12 educators will be held on the West coast, near Portland, Oregon. The first official announcement and registration are in this newsletter.

As the holiday season approaches, may the Peace of the season extend to you, your families, and your students. We hope to be hearing from many of you as well as seeing you next summer.

Lees Stuntz *<stuntzln@tiac.net>*

As these interdisciplinary projects neared completion, parents, staff, and students were impressed by the quality of the work, the depth of the material covered, and the very high level of student motivation and productivity.

Sue Jamback, Chelmsford Public Charter School, Chelmsford, MA 978-250-8815, Fax 978-250-5975 <sue.jamback@cpcs.chtr.k12.ma.us>

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Here is a poem I wrote. This might be useful as an example of how to engage language arts teachers in systems. *Richard_Turnock@pgn.com*

Natural Causes
by Richard Turnock

Horizontal sunlight, with an edge,
slants through forests in Oregon. A tree
falls when a storm blows hard enough.
Time lets the Carpenter Ants find it.
The next spring, they become food for the Pileated Woodpecker.
For no reason, cavities appear in standing trees.
The next spring, birds nest in cavities.
They eat insect pests like Spruce Budworm and Tussock Moth.

Horizontal sunlight, with an edge,
slants through forests in Oregon. A tree
falls when a storm blows hard enough.
Men assign a value to the fallen tree and
a logger removes it to earn
money to feed his family. Later,
the Spruce Budworm and Douglas Fir
Tussock Moth eat the forest.

COMING TOGETHER AND MOVING FORWARD

Call for Presenters

Are you interested in presenting at the 2000 conference, June 25-27, near Portland, Oregon?

The theme of next summer's conference, "Coming Together and Moving Forward," will emphasize the learning gained from the last 8-10 years of work in K-12 systems education, and our thoughts for incorporating more people while moving forward positively. This includes the following topics:

♦ Getting this progressively less wrong—how have we done it, what are the markers of our failures and triumphs?
♦ Case studies approach—where is/has SD made a difference both in education and in the world?
♦ Many people enter systems education through various doors. How do we create paths from those doors? What paths have worked, have not worked?
♦ How does SD create better questions?
♦ System Dynamics as a vehicle for collaboration
♦ Tools for understanding the real world

Please consider presenting a session at next summer's conference if you have something to say on any of the above themes or if you:

♦ Have an effective piece of curriculum to present.
♦ Have a story about your progress as a systems educator.
♦ Have an administrative application of systems tools and techniques.
♦ Have a progress report on a plan to get systems education implemented in your classroom, school or school district (or all three).
♦ Have examples of learning achieved by students through systems education.
♦ Have students who are willing to share insights into their learning through the use of systems.
♦ Have created a sequence of curricula which seems to work for your grade level in teaching systems concepts.
♦ Have insights into assessing systems learning.
♦ Have tools for assessment.
♦ Have an overview of how systems education fits into a curriculum for a certain grade level and/or discipline.
♦ Have used systems techniques to create learner-centered learning.
♦ Have used systems techniques to create interdisciplinary cooperation and curriculum.
♦ Have an effective way of introducing systems to neophytes.
♦ Have a good training session for more advanced participants.

Sessions will be approximately one-and-one-half hours in length. Special exceptions for appropriate long sessions (3 hours) will be considered, especially for introductory material or games such as Fish Banks.

Process for submitting presentations for sessions:
♦ **Feb. 1, 1999** – Submission of an abstract which includes the context and history of the topic of the session and the level (introductory or experienced) of participant is due.
♦ **Mar. 1, 1999 –** All submitters will be notified of acceptance.
♦ **June 1, 1999 –** A final outline/presentation/paper due for incorporation into the conference CD.

The Systems Thinking and Dynamic Modeling Conference will be held June 25-27, 2000, at Skamania Lodge in Stevenson, WA, just 45 minutes east of the Portland, OR International Airport. More information and a registration form is included in this newsletter.

Six Billion and Counting Model continued from page 1

25% of this age group in many countries in Africa have AIDS or are HIV positive. The article states there are 7-8 million AIDS orphans in Africa as a result of the disease. A growing number of children are being born with AIDS, and their life expectancy at birth is two years.

The modeling assignment below attempts to reflect these disease aspects taken from the article. The model is built in Vensim PLE.

World Population 2000-2100

To "celebrate" world population reaching 6 billion on my birthday, October 12, 1999, I thought it would be good to build a basic world population model. Here are the basic facts for the model.

Title: World Population 2000-2100
Stock: population (initial value 6,000,000,000)
BIRTH FRACTION – 0.025
DEATH FRACTION – 0.015
Initial time – 2000
Final Time – 2100
Units – year
Comments: Write comments explaining what you are doing in the equation phase of the model building. Indicate whether you are dealing with **a stock, a flow** or **a constant.**

Answer the following questions as you build your model and modify it.

1.) What does the World Population look like in 2100? _____ For the exact figure, look at the table icon on the left side of the screen. Call your first run of the model **Population Baseline** by changing **current** to this.

2.) What if the death rate goes up in 2025(time) by 0.005(height)? (Put in a STEP FUNCTION.) STEP FUNCTION is located in the *equation dialog box* in the center right hand side next to variables. Pull this down until you find STEP and click on it. Your cursor should

be next to the DEATH FRACTION. It will ask for height and time. Input those numbers where they are asked for. Also, a STEP FUNCTION requires a "+" between it and whatever it is modifying. Also, take care with internal signs between the parentheses (). No sign means positive. Call your second run **Rising Death Rate.** What is the effect of this small change? _____ (See table for exact numbers.)

3.) What if the birth rate falls by 0.005 in 2050? (STEP FUNCTION in BIRTH FRACTION)Repeat the instructions in #2. Watch your signs. Call this **Falling Birth Rates.** Now what does world population look like in 2100? _____ (see table)

4.) Graph all three runs by double clicking on your stock. What do you see?

5.) What type of feedback loops do we have in this model? Balance/ reinforcing loops.

6.) Add additional comments for each change you make in the basic model. I will be reading them.

7.) Has this modeling exercise helped you think about exponential growth, the dynamics of very large numbers, and the effect of small changes? Explain.

World Population 2000-2100
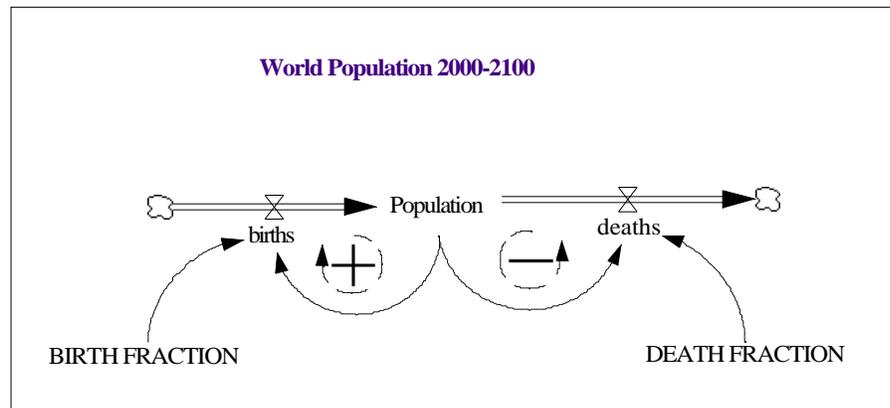
These are the graphs of the three runs called for in the assignment sheet. The Causes Strip Graphs on the model show the STEP FUNCTIONS clearly.

Graph for Population
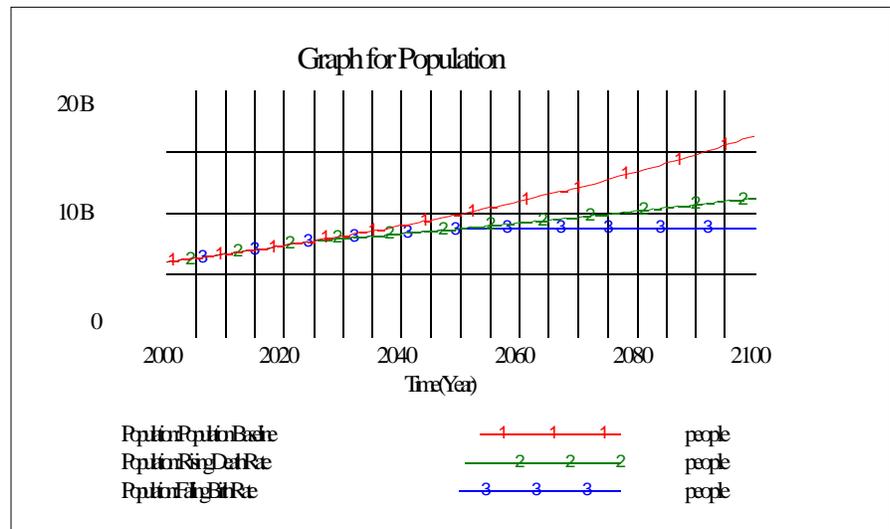
In the initial run of the model the STEP FUNCTIONS are not in play. Separate model runs should be used for each STEP FUNCTION when it is added. It should be titled appropriately.

The table function will help the student obtain exact number for the answers to the assignment questions.
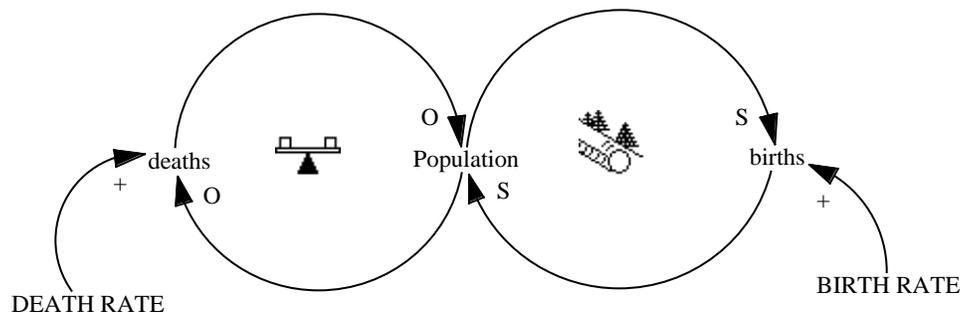

Putting the Pieces Together— Modeling Assignment *with Answers*

1. What are the two simple elements that all complex systems have in common?

Positive Feedback Loops
Negative Feedback Loops

Note: Add **s** or **+** = the same direction and **o** or **-** = the opposite direction to all the diagrams in this handout.

2. What has been the effect of **death control** on human population? Explain. Briefly, explain three impacts of lowering death rates around the world. Give examples and support your points.

A. *Increase in total population, which increases the resource demands of the population on the planet.*

B. *Increase in Life Expectancy. On average the population will live longer.*

C. *A larger total population will result in a larger birth population as more individuals survive and reproduce.*
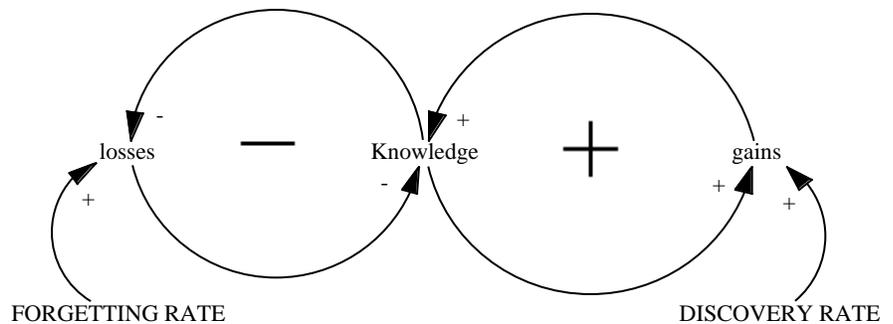
3. Relate the Capital Investment loops to school purchases of large numbers of any major piece of equipment, like computers, typewriters or televisions.
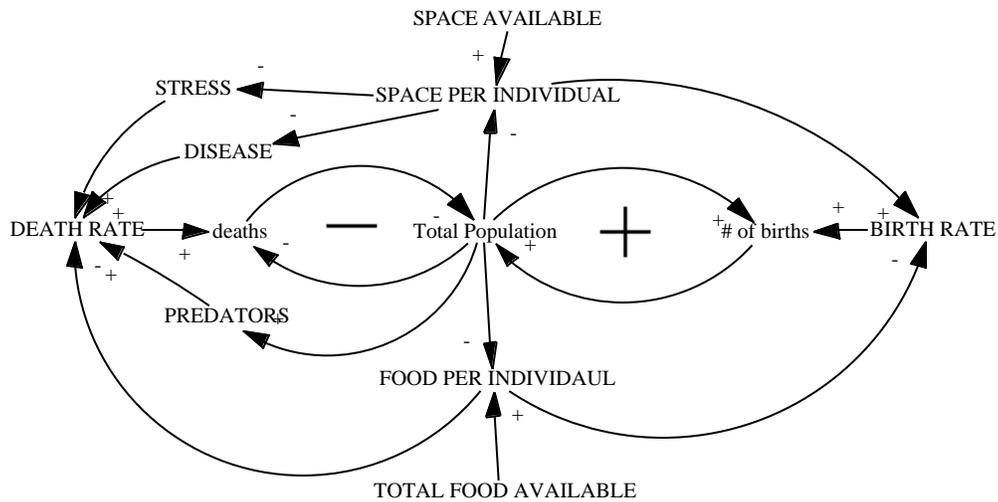
The DOE should be purchasing equipment on a regular schedule of de-

Model Runs	2025	2050	2100
Population Baseline	7.694 B	9.867 B	16.22 Billion
Rising Death Rate	7.694 B	8.716 B	11.18 Billion
Falling Birth Rate	7.694 B	8.716 B	8.716 Billion (ZPG)

Basic Population Model

deaths — Population — births
DEATH RATE · BIRTH RATE

Knowledge Model

losses — Knowledge — gains
FORGETTING RATE · DISCOVERY RATE

preciation according to the specific equipment in question.

4. Can we de-couple death and birth control, or is this a fool's journey? What's the message for human population?

You can not de-couple the system over the long-term because new limits or old limits will appear at higher levels. This will lead to other problems which we have not thought through.

Complex Population Causal Loop

SPACE AVAILABLE

STRESS   SPACE PER INDIVIDUAL

DISEASE

DEATH RATE   deaths   —   Total Population   +   # of births   BIRTH RATE

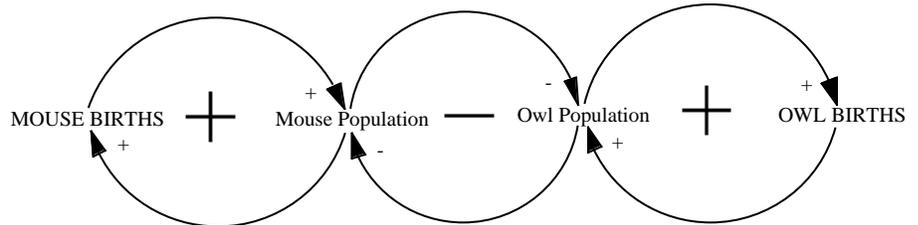PREDATORS

FOOD PER INDIVIDAUL

TOTAL FOOD AVAILABLE

5. Have we changed + and - relation-ship in human population? *Yes*

Can this last?

Not in the long-term

6. What would you expect to see in a reference graph of the owl/mouse popu-lation? Draw and label your reference graph below.

Owl and Mouse Model

MOUSE BIRTHS   +   Mouse Population   —   Owl Population   +   OWL BIRTHS

7. What is the effect of buy outs and mergers in the auto industry?

> *The consumer has less choice and, over the long-term, higher prices for autos.*
> *The consumer loses competition between auto companies.*

8. Which of the auto companies have survived?

> *Toyota, Volkswagen, Chrysler, Ford and Mercedes*

    A. Which ones were bought out and which ones merged and with whom?

> *Chrysler bought out American Motors and Jeep, and then Mercedes bought out Chrylser to form Daimler/Chrysler.*

    B. Which ones changed their name?

> *Datsun*

To what? *Nissan*

11. If the **owls are totally successful** what happens? *They fail.*

12. Does competition really lower the price of goods or is this a common myth of our economic system?

> *Myth!*

13. Isn't our economic model really an effort to raise limits or remove negative feedback loops? Look at agribusiness.

> *Yes, it is.*

14. What is the limit facing industrial agriculture today? Explain your answer.

> *Arable land, water for irriga-tion, and sunlight.*

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The Story of Charles continued from page 1

managed to reject our every effort to help him access his education. In the end, all we were left with was a close-of-the-year referral to the Committee on Special Education, and the hope that somewhere a better program for meeting Charles's needs existed.

After reading about and studying the concepts of systems thinking, I firmly believe that systems thinking tools would have helped us ask better questions regarding how our traditional system could have responded to help Charles as well as other children. Systems thinking tools would have allowed us to move in more productive, useful directions.

While Charles may or may not be attending Harris School as a fourth grader this coming year, I am determined, as principal, to initiate the concept of systems thinking tools to the faculty. It is essential that we stop falling into the same holes year after year. It is time to stop blaming children for presenting behaviors to us that our school system's structure helps to create.

In our desire to reach all the children we serve, we all need to become better thinkers.

The Story of Charles

Charles was a third grader last year at the Harris School. He was a member of Mrs. Proctor's class.

While Charles had a reputation for being somewhat of a "behavior problem," the year started uneventfully as he, along with the rest of his classmates, settled in to their new grade level.

Sometime in October, Mrs. Proctor began reporting to me that Charles was experiencing difficulty learning in the classroom. She described episodes of his refusal to work despite her encouragement and her adjustments in his instruction. One morning in early November, Mrs. Proctor sent Charles to

the office for being rude to her. The specifics of that first incident were not recorded, but it was the beginning of a sustained pattern in Charles's behavior: When frustration built because work got too difficult, he would be provocative by calling an adult names ("You're an idiot"), swearing ("What the hell are *you* looking at?"), and/or by being impertinent ("You can't tell me what to do!"). Inevitably, he would be sent to see me.

My typical response to youngsters when they are sent to the office is to process their behavior by asking them a series of questions. The proverbial bottom line is to help them establish a plan of action so that, when a similar situation comes up again, the child makes a better behavioral choice.

I am certain I processed with Charles on that first morning, although I do not recall exactly how I handled the situation. I could tell, however, it was not likely to be the last processing session for us. Charles insisted, actually demanded, that I change his teacher. His complaints about Mrs. Proctor were that she "yelled" at him and that she didn't explain things so he could learn them.

It is fair to describe Mrs. Proctor as a veteran teacher with a lot of successful classroom experience on which to rely. She has skill in working with children's cognitive behavior and their social behavior, and it works for her most of the time. She also has a mental model which includes the belief: "Charles cannot be treated differently than any other child. He needs to learn like everyone else." Although she could express empathy for Charles ("I truly *feel* for this little boy," is something she repeated to me quite often), she did not have a way to modify her own behavior in order to influence Charles's behavior in a different way.

Charles returned to Mrs. Proctor's classroom that day of the first major episode, and over the weeks that

followed there were further outbursts as well as incidents of his striking out at other children. By the third incident, the school psychologist, Mrs. Cooper, was fully involved and consulting routinely with both Mrs. Proctor and me.

In an effort to help Charles stay in better control of his anger, a plan was devised to permit him to leave the classroom for a "time out" whenever he knew he was "going to blow." When this was not totally successful, the plan was changed, and Charles had permission to seek out either Mrs. Cooper or me in order that he could de-escalate.

By December, there were daily conversations about Charles. He had changed some of his strategies to avoid doing schoolwork (which he obviously could not do). He would insist to the nurse that he wasn't feeling well and demand to be sent home. He also continued his strategy of being as provocative as possible, and engaged in full blown verbal battles with virtually every adult with whom he came into contact. Inasmuch as Charles is skillful at this, I have speculated that Charles experienced great gratification from these battles because he was good at it, and thus received consistent reinforcing feedback. I believe I was able to have more success in working with Charles because I accepted his state of anger and assisted him in shifting to a different state.[2] I never confronted him as other adults did. Unfortunately, I was unable to influence other adults to use this strategy.

Meanwhile, Charles's mother, who was also a significant player in this story, was kept fully informed of all of these episodes. His behavior towards her was similar, and she experienced the same disappointment as the rest of us.

_____

[2] In fairness, I should point out that I never had to teach him in an academic setting. Chances are I would have made out no better than any of his teachers.

The Story of Charles

Charles's anger and acting out reached the limit in February, when, in a rage, he threw a book at his teacher and physically lashed out at several children in his class. I suspended him from school,[3] and we had yet another discussion about how to work with Charles's needs.

A Child Study Team comprised of Mrs. Proctor, Mrs. Cooper, Charles's mother, the special education teacher, and me convened. It was decided that, temporarily, Charles would spend most of his day with the special education teacher, Mrs. Marks, in the learning center. In the meantime, a referral would be made to have Charles tested for a handicapping condition.

Initially, Charles began to make academic progress under Mrs. Marks' approach, and she was able to give him the support and attention he needed to be successful. The provocative behaviors virtually disappeared, and we thought we had turned a significant corner. We reasoned that Charles obviously needed a special education type setting in order to access his education. We convinced ourselves that we had created a solution.

And then, in early May, Charles's frustration began to return, and with it all of the undesirable behaviors. A controversy swirled throughout the building over a decision I made to permit Charles to participate in a major field trip to the state capital. Mrs. Marks wound up rejecting Charles ten days before the end of the school year, resulting in Charles literally having no classroom in which to learn. He spent much of the final two weeks sitting outside my office,

given seatwork to do, which he had no motivation to complete. And, on the next to last day of school, I wound up having to suspend Charles for cursing at his gym teacher.

Retrospective

In retrospect, we had many formal and informal sessions to come up with a plan that would work for Charles. At the time, I intuitively recognized that the structure of our school's system was contributing to Charles's behavior, and I, working along with the other professionals, attempted to modify the structure of the system. Often, as might be expected, those efforts were met with resistance.

I realize now that basically what we accomplished was to implement a number of fixes that failed, along with several shifts of the burden. We also routinely managed to blame Charles for what was happening, rarely acknowledging that each of us collectively and independently was significantly influencing his behavior.

I am aware that creating behavior-over-time graphs would have given us a better perspective about the patterns in Charles's behavior. Behavior-over-time graphs would have permitted us to develop a story-line, allowed us to more productively discuss what his behavior might have meant, and given us a better direction to find ways to alter it. Instead, we were caught up in the moment of each event, and while we could articulate "Hey, this is part of a pattern," we had no tools to evaluate or make sense of that pattern. Too, we recognized the need to seek out the causes of Charles's changing behavior, but were frustrated for lack of relevant tools. Our typical response to searching for a cause was to suggest having him evaluated for the presence of a handicapping condition.[4]

The Problem

Charles's story is an extreme example of a child's inability to learn within the school's existing system. It seems obvious to me that the system's structure caused Charles's unacceptable behavior. It was not obvious to anyone else, however, with the possible exception of the school psychologist.

Nevertheless, many children continue to experience frustration and failure as participants in a system that remains unresponsive to their learning needs.[5]

I believe it is the responsibility of the principal to initiate a process that will nudge the system into a different direction and towards a different, collective mental model. I further believe the means toward achieving that end begins with the introduction of systems tools to the faculty.

The Desired Outcomes

- Using systems thinking tools, all of us at Harris School will become better thinkers. "Better thinkers" means we will:
  - understand the interconnectedness of teaching and learning,
  - understand that each of us is an active part of a system,
  - understand that our behaviors influence others, as we are concurrently influenced by the behaviors of others.
  - understand that *we* are the system.

- Becoming better thinkers will permit us to examine problems more produc-

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[3] It is interesting to note that Charles went into a rage when I told him he was being suspended. *"What are you going to do if I come to school, anyway?"* he asked defiantly. (And this was from a youngster who was spending a good part of his day figuring out ways to get out of school). My answer to him was, *"That's a good question. I have no idea. I guess I'll figure out what to do when you get here."* He did not show up.

[4] Ironically, having a child tested shifts the burden of what "causes" a child's difficulty. If a child is deemed to have a handicapping condition, it lets

everyone off the hook: the child can't "help" the way s/he is; the classroom teacher, not being a *specialist*, cannot be faulted for not having met the child's special learning needs; the parents cannot be blamed for doing a poor job of parenting.

[5] See critique of *Steve's Dilemma*.

tively because we will be asking better questions and we will be working together. We will gather information more effectively, develop deeper insight into problems, and produce systemic, rather than symptomatic, solutions.

• Determining systemic solutions, and implementing those solutions, will promote feelings of satisfaction, which will reinforce our use of systems thinking tools…

[What follows is my first foray into creating a causal loop diagram. It is intended to illustrate the relationships enumerated above. It also underscores my intention to visually represent systems concepts for eventual presentation to my teachers.]

The Game Plan for Introducing & Implementing Systems Thinking Tools

Phase I – First Faculty Meeting in September

Building Awareness of Systems Tools through Practical Use

• Introduce concept of systems thinking. Use NASA Iceberg Diagram to explain and illustrate. Use original CLD [below] on Using System Tools at Harris to further illustrate.

• Introduce concept of behavior-over-time graphs as a problem-solving tool. Introduce five to six examples involving real situations with children. Emphasize that use of this tool may ultimately benefit both children and teachers. Teach how to set up and use a BOT graph.

• Provide copies of *Steve's Dilemma* for teachers to read and discuss.

• Invite and encourage use of BOT graphs when referring a child to the Child Study Team. At this point, make BOT graph use voluntary.

Phase II – Child Study Team Meetings

The Current Format

Child Study Team meetings are held twice a month to assist teachers who are experiencing problems. The problems are usually regarding children who are experiencing difficulty learning.

The Team is made up of the principal, the school psychologist, the speech/language therapist, a general education teacher, a special education teacher and the child's teacher. Sometimes the previous year's teacher attends.

The meeting generally runs like this: The child's teacher presents the problem anecdotally; group members ask the teacher questions; group members either make recommendations to the teacher about trying different strategies or the group reaches consensus about providing the child with intervention services (such as remedial reading) or it is decided that the child should be tested for the presence of a handicapping condition.

Revised Format Using Systems Thinking Tools

• Teachers will be asked to prepare for the meeting in a different way:

Figure 1. Causal Loop Diagram: Using System Tools at Harris School
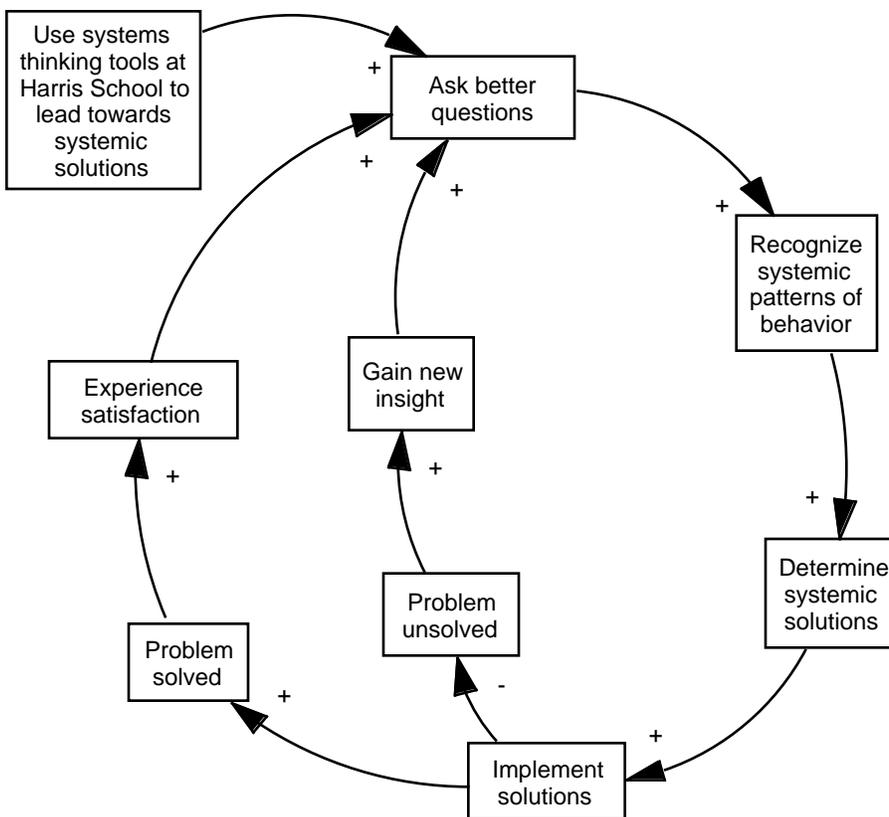
The Story of Charles

1. What is the presenting problem? What is the problematic *behavior?*
2. Describe what's been done to solve the problem.
3. Graph the problematic behavior over a minimum of two weeks.

- Members of the Child Study Team will be asked to respond to the presenting problem in a different way:

1. Discuss the pattern of the behavior recorded on the graph.
2. Brainstorm a list of reasons as to what is causing the behavior to change. Engage in a search for causal relationships.
3. Ask questions about the relationships.
4. Decide as a group what are the likely leverage points.

<u>Phase III</u> – <u>Enlarging the Toolbox</u> — <u>Beyond Year One</u>

As teacher interest in systems tools evolves:

1. After school workshops will be scheduled to introduce:

- STOCK and FLOW diagrams
- Causal Loop diagrams
- System Archetypes

2. Articles and lesson plans about teaching systems thinking to children will be disseminated. Teachers will be encouraged to begin introducing systems to students.

3. Teachers will be encouraged to attend regional conferences and workshops on systems thinking.

Conclusion

Working with Charles last year was a challenging experience. Working with the "system of Charles" was even more challenging.

High Performance Systems, Inc. Millennium Modeling Contest

T he new millennium is a good time to look at where "modeling" has been and where it will go in the future. The Millennium Modeling Contest aims to help us chart a new, highly productive direction for modeling in the new millennium.

In the past, "modeling" has been pretty much an isolated endeavor. One person, or sometimes a group, labors to build a model. After completing the work, often some effort is made to share it with others—either by communicating recommendations that have arisen out of analyzing model simulations, or by sharing the model itself (dynamic behavior and/or structure).

For those who are not a part of the modeling process, the isolated modeling followed by the sharing of the model typically is a passive process. Those on the receiving end of the communication usually get "lectured to," or have to "read about," rather than actively discovering the "aha's" and insights that the original modeler/modeling team experienced. In the best case, it's a process of "stay awake and try to absorb the message." At worst, those on the receiving end will actively resist the recommendations and/or the model itself because they have not been "brought along" during the model development process.

In the future, we think, modeling may increasingly become a group process that is more organically integrated with the normal course of "doing business," whether that "business" is being done in a corporation or a classroom. However, no matter how large the group involved in the modeling process, there will always be many more people who have not been involved. This means that the task of sharing what's been learned remains as much a challenge as ever. It also remains true that learner-directed discovery will continue to be more effective than passive assimilation.

Our Millennium Modeling Contest is designed to advance the state of the art in learner-directed, discovery-oriented learning. In the new millennium, just building a good model won't be good enough anymore. If you cannot enable others to "re-discover" what you've learned—eliciting, testing, and enriching their mental models in the process—you lose! Actually, we all lose, because a potential for enriching understanding and deepening insight will have gone not fully realized.

Winners in the Millennium Modeling Contest will be those submitting "applications" that best embody the principles of effective learner-directed, discovery-oriented learning. A good model is a necessary component of any such application, but it is far from sufficient! Winning applicants will be those who develop an interface that allows learners to actively experience the model, and, in the process, learn something. The learner will be able to surface their mental model(s), compare it/them to one or more alternatives being put forth by the model, and, as a result, modify their mental model in some way. "Flight Simulators," which require a systems guru to debrief the experience, will not cut it! In order to construct a successful application, participants will need to draw upon their empathic skills, hopefully honing them in the process. Empathy—the ability to project your self into someone else's shoes—is, after all, truly a "systems" capacity. And that, in turn, is what we at HPS believe all of this modeling stuff is really about. Good luck!

Contest Rules

1. The contest is open to all registered **STELLA**® and *ithink*® software users, or to people making use of a registered copy of either piece of software in a Lab setting—except HPS employees, former employees, or next-of-kin of either. You may submit more than one entry (no limits).

DynamiQue*ST*

An exposition of student and teacher work in System Dynamics and Systems Thinking, Grades 5-12

Join us for an exciting, first time ever, fun-filled event.

May 19-20, 2000

Trinity College, Burlington, Vermont

This exposition will be a forum for students to
  • Showcase their work
  • Share their experiences
  • Educate others about their work in Systems Thinking/System Dynamics

The exposition is open to any 5-12 grade student. Students may enter any ST/SD related materials—utilizing any or all of the tools—for evaluation with the appropriate rubrics. Each student who achieves a standard of work in any of the five areas (Behavior over Time Graphs, Causal Loops, Stock-Flow maps, Computer Simulation models and Overall Understanding) will be recognized for meeting the standard. Judges will be working from rubrics that will be available to all teachers and students in the packet of information available in November.

There will also be the opportunity for teachers to share their current work utilizing System Dynamics and Systems Thinking to further understanding.

DynamiQue*ST* will kick off with an evening of getting acquainteed and participating in interesting, challenging group activities. Saturday morning, May 20th, there will be a showcase of student and teacher work, followed by optional trips and activities in the Burlington area. Meals and lodging will be provided for nominal cost at Trinity College.

This is a unique learning opportunity for students, parents and teachers. For more information (details, rubrics, etc.), e-mail Lees Stuntz <stuntzln@tiac.net> or visit <www.trinityvt.edu/waters/dynamiquest.html> or <sysdyn.mit.edu/cle/> after November 15, 1999.

DynamiQue*ST* Committee: Dan Barcan and Sue Jamback, Chelmsford Public Charter School; Alan Ticotsky and Rob Quaden, Carlisle Public Schools; Larry Weathers and Dick Maki, Harvard Public Schools; Will Costello, Waters Grant Project and Chittenden South School District; Steven Roderick, Lincoln-Sudbury Regional School District; Lees Stuntz and Deb Lyneis, Creative Learning Exchange

Millennium Modeling Contest

2. All entries received between 1/1/00 and 12/31/00 will be considered for prize awards.*

3. Applications remain the property of those who created them. Creators authorize HPS to use their applications, or parts thereof, for purposes of illustration (not for download on the site, but for examination and exercise by visitors to the site). All contest submissions will be returned to submittors via ftp upon completion of the contest, and before 3/15/01.

4. One $1,000 grand prize will be awarded in each of three categories: education (K12-grad school, except B School), business schools, and professional (corporations, non-profits, NGOs, government). One monthly prize, a choice from a selection of HPS product/service offerings, will be awarded in each category.

* All non-winning entries will roll over to the next month for submission. Visit our website for more details: <http//www.hps-inc.com>

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Newsletter Subscription Information

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

• On the web page at http://sysdyn.mit.edu/cle/
• As an attached file to an e-mail
• In paper via US mail ($15.00 outside the USA)

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

<milleras@cle.tiac.net>

The Story of Charles

Real change and growth will not take place in our school until we are able to acknowledge the patterns and interrelationships which are present. This, in turn, will point to the fundamental principles that create those patterns we want to understand. Then we will move beyond mere questions; we will move to a place of knowledge, and, ultimately, wisdom.

It is clear to me that, in order for a shift to occur in our school, it is up to me, the principal, who must be the catalyst. I must influence teachers' thinking about problems so they take on a different perspective. For, as Donella Meadows notes in *The Global Citizen,*

From a systems point of view leadership is crucial because the most effective way you can intervene in a system is to shift its goals….A single persuasive leader working directly on goals and values can shift the functioning of a massive system.

In order to make our school a significantly different place for Charles and for every child who enters the schoolhouse door, I must encourage each teacher who encounters a problem to reorganize her goal. I must use the wisdom of Portia Nelson, and encourage each teacher to use systems thinking tools in order to quite literally *"walk down a different street."*

Robert Kalman is the principal of an elementary school in New York state. The names of all the participants in the story, as well as the name of the elementary school, have been changed. Mr. Kalman has been an elementary school principal for twenty-three years. His e-mail address is <Larrynaga@aol.com>

This article is available from the CLE and the Web site catalogued as SE 1999-11StoryOfCharles.

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INTERESTED IN INVESTING?

If you would like to invest in our effort here at *The Creative Learning Exchange*, your contribution would be 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_____

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Thank you!

The Creative Learning Exchange, 1 Keefe Road, Acton, MA 01720