MUSINGS ON SOCIAL STUDIES AND SYSTEM DYNAMICS: LINKING "STANDARDS" WITH "SYSTEMS CITIZENSHIP"
Jeff Potash

PRELIMINARY NOTE: This is the first of three articles that explores building system dynamics tools and perspectives into the K-12 social studies curricula. This article begins with a "big picture" perspective in identifying goals that are shared by the two fields and that suggest a natural alliance. A second article will focus more directly on the practical use of system dynamics tools within the social studies curricula, to develop a better understanding for places where these tools could help to more effectively address social studies goals. We hope these two articles will stimulate feedback, in the form of contributions to a third and final article, which will constitute a larger collaborative or "community" effort to brainstorm future efforts (both topical and, more generically, pedagogic) to further extend the benefits of system dynamics into the social studies classroom. Please feel free to send any thoughts or ideas stimulated by this piece to potashj@clexchange.org. Let's begin the collaborative process of planning where we go from here!

What exactly is "social studies?" The simplest definition conjures up Winston Churchill's famous description of Stalin's Russia as a "riddle wrapped in a mystery inside an enigma." At its most "basic" level, social studies encompasses a diversity of disciplines and their respective tools, including anthropology, archaeology, economics, geography, history, law, philosophy, political science, psychology, religion, and sociology. It focuses on the entirety of human experience; and it employs "lenses" or perspectives that run the gamut from local and regional to national and international, and from personal and cultural values to "universal truths."

While that definition would seem to unleash an infinite universe of pedagogic possibilities for developing K-12 curricula, the teaching of social studies can exhibit an overarching logic. The starting point for understanding social studies rests in its distinctive purpose. The National Council for the Social Studies' "Curriculum Guidelines" (http://www.socialstudies.org/positions/powerful/), echoed by many state curriculum standards, are impressive both for their brevity and clarity of purpose:

> "Social studies is the integrated study of the social sciences and humanities to promote civic competence…The primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world."

Promoting "civic competence" is both an admirable and an ambitious goal. But how is it operationalized? The challenge is really twofold: first, students need to develop a "capacity" or understanding for the issues, concepts, and tools that can assist them in framing "informed and reasoned decisions." But more than that, they need to be "motivated" or inspired to apply that knowledge in affecting changes that support "the public good." In the remainder of this piece I hope to develop the idea that system dynamics, with its conceptual tools that are particularly well suited to address contemporary issues and its "problem-solving" methodology that emphasizes actively managing change, can powerfully assist in operationalizing the goal of social studies.

Prior to considering the virtues of system dynamics, let's first examine how the social studies curriculum currently organizes and structures student learning. That rests with standards, or, most practically, with state standards. Standards provide a rigorous sequenced structure though which goals are incrementally set at specific grade levels to facilitate student achievement, and its measurement, over a twelve-year

career. Notwithstanding the all-encompassing definition of the social studies, pragmatism and time constraints necessitate a more limited content and disciplinary focus.

A selective review of several states' standards (Pennsylvania, Arizona, California, Washington, and Vermont) reveals that the focus of social studies education is consistently confined to geography, economics, history, and civics/government. The rationale for these choices clearly reflects the recognition that, both individually and collectively, these four disciplines provide a conceptual foundation for examining the overarching or most significant themes that underlie the purpose of social studies. In its presentation of the frameworks of social studies education, the state of Washington explicitly articulates the logic for developing students' "understanding" of the particular concepts underlying each of the four disciplines. Geography "help[s] students become aware of humans' impact on their environments and how geography impacts how we live"; Economics "help[s] students realize how decisions about scarce resources are made"; History "help[s] students become aware of the impact of history on the world around them"; and Civics "help[s] students become active, engaged participants in our democracy."

Embedded in these "understandings" is the recognition that each of these disciplines effectively constitutes a key building block in constructing a larger reality. And implicit in these understandings is the belief that the relationships/interactions between these variables account for many of the important dynamics of change that underlie the human progression from past to present and, even more importantly, inform the course of possible futures.

Let me switch hats here and introduce system dynamics. While I would suggest that an understanding of the conceptual foundations of each of the four disciplines is both desirable and "necessary," it may not be sufficient to address the NCSS' ambitious purpose. To begin, we might consider the NCSS' own recognition that "current civic issues – such as health care, crime, and foreign policy – are multidisciplinary in nature" and, as such, require a "multidisciplinary perspective." Knowledge in any single discipline may be useful for exposing some facet of the problem, but will unlikely, in isolation, be sufficient for effectively managing the problem.

That fundamental recognition was actually surfaced more than thirty years ago by the inventor of system dynamics, Jay Forrester, in his monumental 1971 essay, entitled "Counterintuitive Behavior of Social Systems." (http://www.sysdyn.clexchange.org/sdep/Roadmaps/RM1/D-4468-2.pdf). The vast majority of society's most challenging and enduring problems, he observed, persisted largely because policy makers misunderstood and subsequently mismanaged the behavior of social systems: The problem, he observed, derived from the fact that the ever-growing complexity of contemporary social problems (belonging to "the class called multi-loop nonlinear feedback systems"; this will become clearer shortly!) had vastly outstripped our mental capacity to address them. "Orderly processes in creating human judgment and intuition lead people to wrong decisions when faced with complex and highly interacting systems. Until we reach [or, as educators, develop in our students] a much better public understanding of social systems, attempts to develop corrective programs for social troubles will continue to be disappointing." [As an aside, it was gratifying that Jay chose, in his keynote at the CLE's 1994 *Systems Thinking and Dynamic Modeling Conference*, entitled "Learning through System Dynamics as Preparation for the 21st Century," to provide educators with powerful guidance on "how to" think about and advocate for using system dynamics with students to help them better recognize and subsequently to manage the counterintuitive behaviors of social systems. (http://www.sysdyn.clexchange.org/sdep/papers/D-4434-3.pdf)]

The challenge, then, in preparing students to address current "civic issues," is to provide them with more than a set of individual disciplinary tools or concepts. They also need tools that allow them to recognize and then to more deeply understand how relationships or feedbacks connect multiple "systems" and generate oft-times complex, non-linear behaviors. Rather than relying on traditional intuition-based tools

that imply immediate, linear cause and effect relationships between single variables within a particular disciplinary sphere (e.g, economics or government), we need to embrace the wisdom of Jay Forrester's mentor at MIT (and, coincidently, the "citizen champion" who introduced system dynamics to K-12 education when he delivered a copy of STELLA to the Orange Grove Middle School in Tucson, AZ in the 1980s), Gordon Brown, when he observed, "the message is in the feedback and the feedback is always interdisciplinary."

While the challenges of operationalizing this systems perspective to illuminate the non-linear behaviors of complex civic issues cannot be fully addressed in this brief piece, it is reasonable to at least initiate the conversation. My colleague, John Heinbokel, and I developed a generic three-sector feedback map as a conceptual tool to illustrate the possibilities (http://www.ciesd.org/pdf/loe-keynote.pdf). Our basic premise is that most developments of interest to social studies hinge *on the interplay between (1) dynamically changing populations* (whether they be local, regional, national, or global in scale) *and (2) resources as mediated through (3) beliefs, perceptions, or attitudes.* This conceptual framework helps to visualize the interconnections between the disciplines as they inform "real world" problems or events. At their core, the disciplines of politics and economics revolve around institutional structures, rooted in beliefs and attitudes that organize how finite resources are accessed and distributed. At the same time, these same processes are influenced by changing geographic factors (involving the availability of those resources, for instance, land or food) and/or dynamically changing populations. Critically important, as any one element in the system changes, that change will reverberate through the other sectors before feeding back on itself. These feedback dynamics are illustrated in Figure 1.
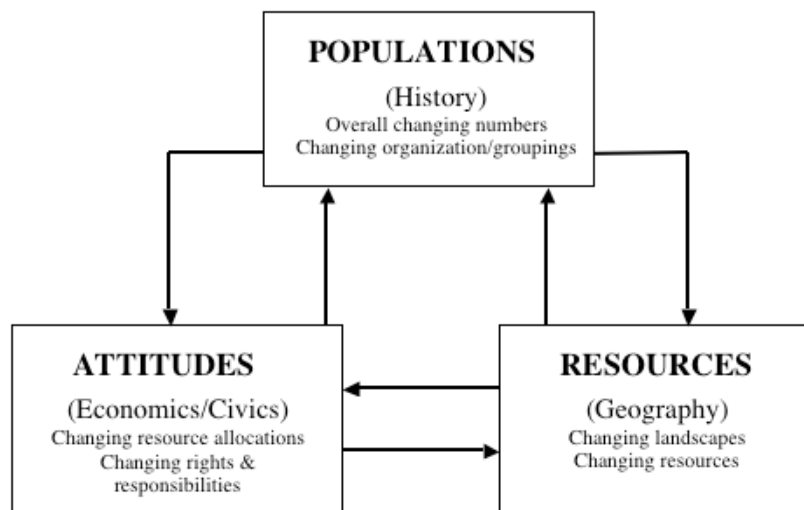

Figure 1. A Three-Sector Feedback Map Depicting the Dynamic Interplay Between Social Studies Disciplines

In its most generic form, this three-sector feedback map permits us to explore dynamic processes of change rather than single discrete facts and processes that are within single sectors. Does an event—war for instance—emerge solely out of a single short-term political issue? Or is it more likely to be an outgrowth of longer-term evolving disparities involving changing populations and/or resources where causes and effects are blurred by the closed circular nature of feedback loops? Alternatively, how do changing economic, political, or socio/religious attitudes factor into the equation, either contributing to or being affected by these dynamic populations and geographic landscapes? And to what extent can we make the critically important unintended consequences of actions more comprehensible to us than to

those actors in the past who lacked a systems perspective? In tracking the causes and effects of change over time, social studies becomes an active process of defining then connecting the feedback loops.

But let's not lose sight of the "standards" as they frame student learning. The connections with standards would seem to be a natural for developing conceptual and deeper thinking. Systems tools provide a method for real world problem solving; however, the standards ultimately define the important problems or issues for students to master. The key, then, is in linking systems and standards. Start with a problem or issue posed by a standard, and then connect that standard into a network or web of important interacting feedbacks or relationships.

Consider the possibilities for deepening student learning with an illustration. One of Vermont's geographic standards stipulates that students understand "human interactions with the environment over time"; another "how and why cultures continue and change over time relative to geography"; and still another, "the interaction/interdependence between humans, the environment and the economy." Is this not a perfect opportunity to begin to craft "feedback" thinking? To what extent, for instance, is cultural change relative to geography an "effect" of changing attitudes, resources, and/or populations as well as a "cause" of change in any one of those areas? And, assuming we can identify ongoing feedback dynamics between sectors, can we begin to think about the relative rates of change and/or the influence of delays as each informs non-linear patterns of behavior? And might these patterns further help us to develop a better understanding of some of the "counterintuitive" processes in history that underlie the textbooks' "great events" (e.g., recurring patterns of war, including the Revolutionary, Mexican, Civil, Spanish-American wars; technological breakthroughs; political and social changes)? And, most importantly, might our deepened understanding of these processes have applicability for better understanding the problems of the contemporary world?

This is simply one of a number of opportunities for rethinking how and where the linking of multiple standards with system dynamics can facilitate a deeper understanding for real world issues and problems while still doing full justice to the original standards. A single competency, as in the case of Washington's economic standard stipulating students' understanding "of the concepts of scarcity, choice, and incentives to explain the use of a resource" may be currently developed in a discrete economics lesson. That single standard, however, can be connected to other discrete social studies standards, to "analyze and evaluate positive benefits and negative consequences of people's different uses of the environment" and to use the insights generated to develop a better understanding for "how characteristics of economic systems may advantage or disadvantage particular groups of people." The resulting possibilities for students to more fully grasp the dynamic interplay between dynamic groupings of available resources, and economic/political/social attitudes (and institutions) generates an abundance of exploratory topics and real world learning opportunities to better understand structural causes of change.

The linking of standards with a "systems" perspective, as illustrated by our three-sector feedback map, offers a powerful opportunity to think about what historians J.R. and William H. McNeill called *The Human Web* (2003; Norton), the networks of relationships and structures that underlie the human experience. Played out in recurring patterns of war and peace, the ebb and flow of social movements, technological development, and economic cycles, among other patterns, these networks provide a critical foundation for developing in our students an understanding of the "multi-loop nonlinear feedback systems" whose behaviors Forrester found to altogether elude us.

Using our three-sector concept map will not unleash the full power of system dynamics for developing students' capacity to manage the great civic challenges or problems that stand before them. For this to happen, students (and teachers) will need to learn how, where, and when to use the full range of system dynamics tools, including behavior-over-time graphs, causal loop diagrams and/or stock/flow maps, and

computer models. In the next article in this set, I intend to offer some concrete illustrations, using our "Ladder of Engagement" model of learning (http://www.ciesd.org/pdf/loe-keynote.pdf), for how social studies teachers might use these tools to enhance student understanding.

Before concluding, I need to close one final loop. At the outset, I mentioned the importance of building both "capacity" and "motivation" in our students. We have addressed the potential for system dynamics to provide a deeper conceptual framework for building knowledge. But there still remains the willingness or motivation to be engaged in making decisions "for the public good."

Here, I am reminded that system dynamics is not simply an intellectual tool but an instrument for managing change and for engaging stakeholders in that process of change. The challenge of mobilizing knowledge and understanding to foster positive change was the focus of Barry Richmond's concluding keynote address delivered at the 2002 CLE Conference in Durham, New Hampshire, shortly before his untimely death (Powerpoint slides from Barry's presentation are available at http://www.clexchange.org/conference/cle_2002conference.htm). In this presentation, Barry coined a new term that in many ways captures the spirit of the NCSS Guidelines: "systems citizenship." A passionate believer in (and role model of) the principle that system dynamics was not only about thinking differently but acting differently, Barry insisted that the personal acquisition of intellectual skills imparted through systems thinking (which he characterized as "filtering," "representational" and "simulational" skills) should not be pursued as ends in and of themselves. Rather, mastery of these skills should be linked to a powerful awareness of what he called "systems being." Integral to that "being," Barry observed, were four attributes: expanded self-boundary, deep empathy, excellent communication, and respect. Supporting students in appreciating that the true measure of a skilled systems thinker rests in their "being," or their motivation to actively apply or exercise understanding toward some common good, was for Barry the proper means to develop "systems citizens."

In concluding these musings, I suggest that social studies and system dynamics share a common purpose: bolstering people's capacity and motivation to address contemporary issues and manage them for "the public good." Our challenge is to knit the language of social studies standards with the capacities and attitudes developed in system dynamics to cultivate the deeper learning needed to achieve this ambitious goal. When students develop the capacity for and the interest in understanding the powerful role of dynamic feedbacks between populations, resources, and attitudes in the past and, more critically, when they can see the relevance of that learning when applied to their own world, we will have truly made progress in our efforts to bring social studies to the level of creating systems citizens.