SYSTEMS THINKING FOR AN ECONOMICALLY LITERATE SOCIETY

MICHAEL F. REBER*

IN THE US A DISMAL TRUTH EXISTS about the citizenry's lack of understanding of economic fundamentals. Perhaps the best example which illustrates this point is the April 2010 US Senate Hearings into the financial crisis. JPMorgan Chase's Managing Director and Senior Economist James E. Glassman expressed in a memo his great frustration with the senators' shocking lack of understanding of free market principles, and writes, "The hearings exposed an unnerving ignorance of fundamental principles of market economics by folks who have a hand in remapping rules of finance that will be with us for a while" (Dumon 2010). Knowing this about US senators is indeed "unnerving" since the global community is now deep into the financial crisis, and economic experts such as Marc Faber say that this is just the beginning of the worst economic disaster in recorded history (Faber 2010). If there were any group of individuals in whom people should have some faith in a crisis such as this, it at least should be our political leaders. Unfortunately, this is not the case.

To compound the problem, documented research has found that university graduates are not as highly fluent in economics as non-university educated people (Buturovic and Klein 2010; Markow 2005). In a 2008 study conducted by Zeljka Buturovic and Daniel Klein for Zogby, nearly 5,000 American adults were polled about "real world" economics, and they found that "*for people inclined to take such a survey, basic economic enlightenment is not correlated with going to college*" (2010, 174; italics in the original). One of the explanations for this, they state, is that "going to college simply does not

*Michael F. Reber (reberconsulting@gmail.com) is vice-president of the Free Economy Institute and an adjunct faculty member in the Department of Value and Decision Science of the Graduate School of Decision Science and Technology at Tokyo Institute of Technology where he is actively developing systems design and systems thinking courses.

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surpass not going to college" (Buturovic and Klein 2010, 187), which means that one does not need to study at university to be savvy about economics. Another possible reason is that "being economically enlightened, or receptive to economic enlightenment, [could] make one less inclined to go to college, maybe because such bents make one more likely to enter the workplace or to forge ahead on one's own" (ibid.). Said another way, if people who are savvier about economics are the same people who are not attending university, then it is no wonder that fewer university students did as well on the survey. No matter what the causes may be, the fact remains that the US is in dire straits economically, and a university educated citizenry is no guarantee that such a class of people will steer us from ruin and toward prosperity.

This then leads one to ask, "What can be done to help people become literate in economics?" Perhaps the answer lies in the area of systems thinking, which is a "school of thought that focuses on recognizing the interconnections between the parts of a system and synthesizing them into a unified view of the whole" (Anderson and Johnson 1997, 130). In his seminal work, *Human Action*, Ludwig von Mises places the learning of economics within the context of systems thinking (874):

> It is certainly one of the tasks of university training to make students familiar with economic history in general and no less with recent economic developments. But all such endeavors are doomed to failure if not firmly grounded upon a thorough acquaintance with economics. Economics does not allow of any breaking up into special branches. *It invariably deals with the interconnectedness of all the phenomena of action* [italics added]. The catallactic problems cannot become visible if one deals with each branch of production separately.

Mises's emphasis upon "interconnectedness of all phenomena of action" is at the core of systems thinking, and the development of one's systemic thinking skills is vital to an economics education which he purports (ibid., 867–80). Therefore, I argue that in order to foster an economic literate society, it is necessary to incorporate systems thinking into the learning experience of children, youth, and adults since it is the centerpiece of a grounded understanding of economic issues.

In this paper I first give a cursory review of General Systems Theory (GST) as developed by Ludwig von Bertalanffy and extended by others in the systems thinking field to illustrate the confluences of thought among Mises and systems scientists. From this I argue the need for systems thinking and design in primary, secondary, and tertiary curricula and make reference to *non-prescriptive* teaching and learning applications for the fostering of economic

literacy. Let me state again since this is a very important point of my argument—I am advocating *non-prescriptive* teaching and learning. As Mises rightly observes regarding the tragedy of elementary and secondary education in modern society (2010, 876):

> Teaching at the elementary level necessarily turns into indoctrination. It is not feasible to represent to adolescents all the aspects of a problem and to let them choose between dissenting views. It is no less impossible to find teachers who could hand down opinions of which they themselves disapprove in such a way as to satisfy those who hold these opinions. The party that operates the schools is in a position to propagandize its tenets and to disparage those of other parties.

Furthermore, he contends, "tax-supported universities are under the sway of the party in power. The authorities try to appoint only professors who are ready to advance ideas of which they themselves approve" (ibid., 872). Therefore, it is vital that learning occurs within a student-centered-directed learning environment and not in one where the conditions are such which foster a totalitarian state.

I. Overview of General Systems Theory (GST)

It is generally accepted in the new and emerging field of systems thinking and design that Ludwig von Bertalanffy is the "Father" of General Systems Theory (GST) (Davidson 1983; Hammond 2010; Laszlo 1972, 1996), and not surprisingly, his systems view of the world as it relates to "interconnectedness" between social systems (Bertalanffy 1968) is commensurate with Mises' view (2010), as was already prefaced. Perhaps one could argue that because both were intellectual contemporaries, Viennese (as was F.A. Hayek), survivors of the Nazi Anschluß and later living a stone's throw away from each other in New York, and probably familiar with each other's work, that their confluent thinking was enhanced (Gordon 2004, 2009). Nevertheless, whatever the connection between Bertalanffy and Mises, it is without a doubt that Mises was a systems thinker (though not highly recognized in the field of systems thinking) and, as this author argues, part of a long tradition of systems thinkers.

Although Bertalanffy himself acknowledges in *General System Theory*, that he was the first to introduce the idea "prior to cybernetics, systems engineering and the emergence of related fields," he does, however, emphasize that he is standing on the shoulders of men greater than himself who developed the concept of "system" (1968, 11):

> The systems concept has a long history. Although the term "system" itself was not emphasized, the history of this concept includes many illustrious names. As "natural philosophy," we may trace it back to Leibniz; to Nicholas of Cusa with his coincidence of opposites; to the mystic medicine of Paracelsus; to Vico's and ibn-Kaldun's vision of history as a sequence of cultural entities or "systems"; to the dialectic of Marx and Hegel, to mention but a few names from a rich panoply of thinkers.

Though Bertalanffy only describes the concept of GST, Mark Davidson, a renowned Bertalanffy biographer, best defines it as a "holistic way of thinking based on an awareness of the behavior of systems in general" as well as a discipline that seeks and applies general systems laws (1983, 224–25).

The concept of GST first came to Bertalanffy when he was struggling with his research in biology. He noticed that the Cartesian-Newtonian scientific view with its emphasis on the "mechanistic scheme of isolable causal trains and meristic treatment" was unable to address certain theoretical problems regarding the essential aspects of the phenomena of life (1968, 11–12). This resulted in his development of what he called "organismic biology," that is, a conception of biology which "emphasizes consideration of the organism as a whole or system, and sees the main objective in biological sciences in the discovery of the principles of organizations at its various levels" (ibid., 12). This concept was soon advanced to other fields of study, such as psychology and psychiatry, economics, and education (ibid. 1968; Davidson 1983; Hammond 2010; Laszlo 1996). It was later referred to by Bertalanffy as "the idea of 'general system theory'" because of the structural similarity of models and their isomorphism in these other fields, particularly the problems associated with "order, organization, wholeness, teleology" which were "excluded in mechanistic science" (1968, 13).

As a result of the ubiquitous extension of GST into other fields of study, an organization of like-minded individuals was formed, the Society for General Systems Research (SGSR) which has now become the International Society for the Systems Sciences (Hammond 2003). The founders of SGSR included Bertalanffy, Kenneth Boulding, Ralph Gerard, James Grier Miller, and Anatol Rapoport (ibid., xi). As Bertalanffy (1968, 15) himself writes, the purpose of the society was to

> Further the development of theoretical systems which are applicable to more than one of the traditional departments of knowledge. Major functions are to: (1) investigate the isomorphy of concepts, laws, and models in various fields, and to help in useful transfers from one field to another; (2) encourage the development of adequate theoretical models in the fields which lack them; (3)

> minimize the duplication of theoretical effort in different fields; (4) promote the unity of science through improving communication among specialists.

Over the period that the Society worked to fulfill its purpose, a disciplinary matrix of GST developed. Ervin Laszlo (1972) describes this matrix in the following manner. Disciplinary in terms of GST means "the common possession of the practitioners of a particular discipline" and matrix means the discipline is "composed of ordered elements of various sorts, each requiring specification" (ibid., 4). Hence the Disciplinary Matrix of GST is not conventional. It does not treat just one particular subject matter. Instead, it is interdisciplinary, meaning that it is "a specialty traversing traditional specialties, and an open avenue toward general theory, linking and integrating the fragmented pieces of contemporary scientific thought" (ibid., 4–5). Furthermore, it is a "set of share presuppositions in the form of principles and conceptual approaches, to which the practitioners of this movement manifest a deep-seated commitment" (ibid., 5). Laszlo distills the GST disciplinary matrix into four components (ibid., 5–6):

1. Holism as a methodology, and even an ontology.
2. Interaction of scientific knowledge as an ideal with real possibilities of realization.
3. Unity of nature as a philosophical credo.
4. Humanism as a task and responsibility of science.

Within the context of the GST disciplinary matrix, a new concept of the person was developed, which Bertalanffy referred to as, "The Image of Man in Contemporary Thought" (1968). Mark Davidson summarizes Bertalanffy's image in the following manner: "We are systems. We are open systems. We are open systems with uniquely human qualities" (1983, 115).

The idea of humanity being systems means, as Bertalanffy states, "a holistic orientation" in all social arenas (1968, 193). For him, a system is a unified entity "consisting of parts 'in interaction'" or "'organized complexity'…circumscribed by the existence of 'strong interactions' or interactions which are 'nontrivial'" (ibid., 19). He further states that we are open systems, meaning that life, especially human life, "is not maintenance or restoration of equilibrium but is essentially maintenance of disequilibria" since "reaching equilibrium means death and decay" (ibid., 191). An open system is a system that is in a steady-state. A steady state, as Laszlo defines, is "a state in which energies are continually used to maintain the relationship of the parts and keep them from collapsing in decay…A dynamic state, not a dead and inert one" (ibid., 32). On the other hand, a closed system is one that

does not exchange energies with its environment although it may be affected by it (ibid., 33). Furthermore, openness means "the energy import activities of the system" (ibid., 32). As humans, we are open natural systems because "we are effectively embedded in the world of natural systems," biologically, ecologically, and socially (ibid.). Finally, as humans, we have uniquely human qualities, which in a manner of speaking, is our *reflective consciousness*, "the ability not only to perceive and feel things, but to know that one perceives and feels them and hence to order them in light of [one's] purposes" (Laszlo 1996, 66).

II. Fostering Economic Literacy through Systems Thinking Learning and Practice

Nowhere is Mises clearer in *Human Action* about the importance of economic literacy and citizenry than in his section, "Economics and the Citizen" (878):

> Economics must not be relegated to classrooms and statistical offices and must not be left to esoteric circles. It is the philosophy of human life and action and concerns everybody and everything. It is the pith of civilization and of man's human existence.

Furthermore, in returning to Mises' main point about the learning of economics—"It invariably deals with the interconnectedness of all the phenomena of action" (ibid., 874)—as well as the aforementioned cursory review of systems thinking, one can argue that to foster an economic literate citizenry, first and foremost society should find *non-prescriptive* ways in which to incorporate systems thinking into the curricula of primary, secondary, and tertiary learning.

Systems thinking, as defined by Daniel H. Kim, is "a way of seeing and talking about reality that helps us better understand and work with systems to influence the quality of our lives" (1999, 2). Virginia Anderson and Lauren Johnson characterize systems thinking into the following principles (1997, 18):

1. Thinking of the "big picture";
2. Balancing short-term and long-term perspectives;
3. Recognizing the dynamic, complex, and interdependent nature of systems;
4. Taking into account both measurable and non-measurable factors;

5. Remembering that we are all part of the systems in which we function, and that we each influence those systems even as we are being influenced by them.

Furthermore, Linda Booth Sweeney and Dennis Meadows describe a systems thinker as a person who (2008, 2):

- Sees the whole picture;
- Changes perspectives to see new leverage points in complex systems;
- Looks for interdependencies;
- Considers how mental models create our futures;
- Pays attention to and gives voice to the long-term;
- "Goes wide" (uses peripheral vision) to see complex cause and effect relationships;
- Finds where unanticipated consequences emerge;
- Focuses on structure, not on blame;
- Holds the tension of paradox and controversy without trying to resolve it quickly;
- Makes systems visible through causal maps and computer models;
- Seeks out stocks or accumulations and the time delays and inertia they can create;
- Watches for "win/lose" mindsets, knowing they usually make matters worse in situations of high interdependence; and
- Sees oneself as part of, not outside of, the system.

As long as educators develop curricula which translate the aforementioned systems thinking principles and skills into achievable student learning outcomes, then a plethora of learning approaches exist to design valuable learning experiences for economic literacy. However, as I emphasized earlier, I do not advocate a prescriptive approach to incorporating systems thinking into learning. I believe teachers should apply those approaches which are best suited for each student.

At the primary level of education, children need opportunities to interact with their immediate environment and to observe and understand

how it works. If a child were to ask me, "What is money?" and "Why do we use it?" I would use a hands-on activity to help him answer these questions. For example, I could teach him the difference between gold bars and dollar bills by making gold bars with cardboard boxes and showing him my one dollar bills. I would tell him that both gold and dollar bills are money. Gold is money that is taken from the ground, can be used anywhere in the world, and can be exchanged with people for their products. But it is difficult to carry many gold bars; so, instead of carrying gold, I can exchange my gold for dollars. I can then tell him that the dollar bills are printed money. Just like my printer, the US bank prints these dollars and gives them to other banks to give to people. To make my lesson more explicit and easier, I would use kinesthetic activities, props, and sounds to get him to touch, feel, and see money so the concepts of money and money circulation become understandable.

At the secondary educational level, young people need to begin understanding the sophistication and complexity of systems interactions. This means studying how the four spheres of society (political, cultural, economic, and environmental) interact with each other positively and negatively and to discuss how systems can be designed to interact with each other to create synergy. In terms of my own teaching, I use a teaching framework that makes explicit overarching understanding goals, generative topics, unit-long understanding goals, performances of understanding, and ongoing assessment for each of my courses (Blythe 1997). This framework also incorporates the Experiential Learning Approach (ELA) which I developed. It assists students with the aforementioned skills through the cyclical process of articulating presumptions through free-writing and discussion, acquiring and understanding new knowledge by attending lectures and collecting data, engaging in experiential learning exercises through critical thinking activities, reflecting on one's learning and synthesizing new ideas and concepts through journal and essay writing, and evaluating one's learning through professor-peer feedback (see Figure 1).

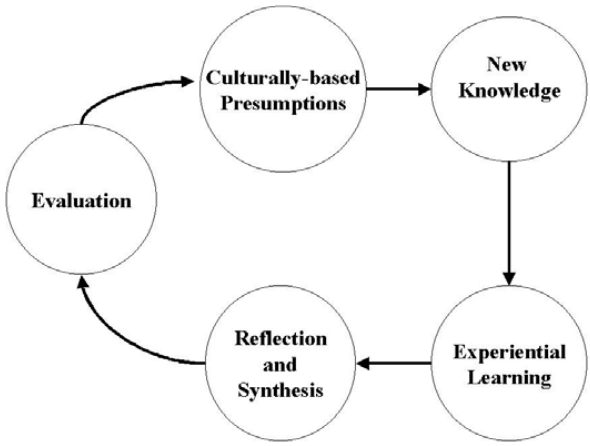

Figure 1. Experiential Learning Approach (ELA)

1. Culturally-based Presumptions: Students record in their journals their current understandings of the vital issue being addressed before engaging in the new learning experience.
2. New Knowledge: Students acquire new knowledge about the vital issue being addressed by attending lectures and gathering data on the issue.
3. Experiential Learning Exercise: Students engage in critical thinking activities to better understand a vital issue. Examples of activities include debate and presentations.
4. Reflection and Synthesis: After the experiential learning exercise, the instructor elicits student responses to the exercise. Next, students record in their journals their reflections on the experience and in what ways their perspectives changed on the issue. Journal entries are used as a "springboard" for a persuasive essay that addresses the target question of the vital issue.
5. Evaluation:
    a. Formal Assessment—Peers and the instructor use an essay criterion reference sheet or rubric to evaluate student essays.
    b. Informal Assessment—Students record in their journals their overall impressions about the learning experience and how their previous culturally based presumptions were challenged and overcome.

One application of my systems thinking approach for economic literacy is with Bettina Bien Greaves' high school focused book, *Free Market Economics: A Reader*, published by the Foundation for Economics Education. For my course, "Introduction to Austrian Economics," I use ELA to help students think systemically while at the same time understanding the basic concepts of Austrian economics, i.e., as Greaves states, to help them with the "study of the consequences of (1) individual choices which depend on the ideas individuals hold and (2) individual actions taken in the conscious attempt to attain the various goals held by the individuals concerned" (1984, 3). Furthermore, I distill Greaves' thirty "Questions to Determine Student Understanding" into five key questions or overarching understanding goals, such as "What is 'economics?'" (ibid., 7). These questions are then divided into individual units, and within each unit students then explore the five key questions and Greaves' thirty questions as they learn the principles of Austrian economics.

An ELA systems thinking activity addressing the question, "What is economics?" could be done as follows:

1. Culturally-based Presumptions: Ask students to write a 5-paragraph essay answering the question.
2. New Knowledge: Have students read Chapter 2 in the *Reader*. Ask them to reflect on this for homework. In systems thinking terms, ask them to answer the question as it relates to the four spheres of society. Then, give a mini-lecture addressing this question in terms of how Austrian economists might address it.
3. Experiential Learning: Provide students with an experiential learning activity to help them understand the concepts. For example, Greaves suggests students survey people they know, such as friends, relatives, or neighbors who have studied economics in school by asking them what they remember about the subject and if their study of economics was helpful (1984, 11). They would then give presentations using visual aids, such as Power Point, on their surveys.
4. Reflection and Synthesis: After the presentations, students would reflect upon their findings as a class in group or class-wide discussions.
5. Evaluation: These reflections could then be written informally in student journals as well as formally in essays that could be assessed by the teacher using a writing rubric.

Finally, at the tertiary level, students need to know how to design social systems so all members "mutually share their values, interests, ideals, and knowledge that is germane to the system to be created, and who, through participatory democratic actions, creatively design meaningful systems that are shared with the greater community toward the guidance of human evolutionary development and the direction of positive social development" (Reber 2003, 84). For example, at Tokyo Institute of Technology, I am developing a series of systems thinking courses that actualize this purpose. In my course, "Introduction to Systems Thinking," students demonstrate understanding of concepts of a system and systems thinking, systemic behavior, and complex systems using a variety of case-study activities. For instance, in Lesson 7 of Unit 2, students learn how to draw and apply causal loop diagrams (CLDs) and distinguish reinforcing and balancing processes for a business case study (Anderson and Johnson 1997, 65). The kinds of systems thinking questions that students are asked include (ibid., 65–66):

1. Considering just the [case study], and without listing variables or drawing BOT [Behavior Over Time] graphs, which kind of process—reinforcing or balancing—do you suspect was at play during Medicorp's *early* years? Explain your answer.
2. Do you sense a shift in process during Medicorp's history? If so, which kind of dynamic—reinforcing or balancing—prevailed near the *end* of Medicorp's story? Explain your answer.
3. Draw a simple BOT graph that shows just the pattern of the growth of Medicorp's customer base. Based on your graph, which kind of process—reinforcing or balancing—do you think describes the overall Medicorp story?
4. What do you think made Medicorp's growth hit a plateau?

It is only at a more advanced course level that students use these elementary concepts for the designing of social systems. In my "Introduction" course students learn the basics of systems thinking concepts as they apply to economic literacy, but at a more advanced level, such as in "Special Seminar and Workshop in Systems Design Architecture," students learn to apply systems design architecture (Banathy 1996) for the designing of social systems, such as a human resources professional development system (Banathy 1992). Hence, at this level students learn to apply systems design which helps them to better understand Mises' principle of economy—"Economics…invariably deals with the interconnectedness of all the phenomena of action" (2010, 874)—and the unintended consequences of government manipulation in free markets.

III. Conclusion

In conclusion, a well-grounded education in economics is vital to a sustainable and prosperous free market economy. Without an electorate who is enlightened about economic issues, the result is eventual tyranny and economic inefficiency as more and more government intervenes into everyone's lives. For this author, at least, the incorporation of systems thinking into the learning experiences of children, youth, and adults will foster an economic literate society and serve as the surest bulwark against tyrannical encroachments. In terms of the education of children, they require hands-on and direct contact with money and money circulation. For youth, they need activities which help them to understand the systemic interactions of free market economies on micro and macro-economic levels, especially within the context of a global free market system. Finally, for adults, it is essential for them to learn how to design social systems so that free market principles can be actualized for the benefit of humanity. Perhaps this can be best expressed and closed with a quote from Bela H. Banathy (1996, 13):

> We are at a critical juncture of societal evolution where unprecedented human fulfillment as well as a loss of direction, despair, and destruction, are equally possible. However, we are not at the mercy of evolutionary forces but have the potential and the opportunity to give direction to societal evolution by [systemic] design, provided we create an evolutionary vision for the future and develop the will and the competence to fulfill that vision in our lives, in our families, in the systems in which we live, in our communities and societies, and in the global system of humanity.

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