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Dick, W., & Wager, W. (1995). Preparing performance technologists: The role of a university. *Performance Improvement Quarterly, 8*(4), 34-42.

International Society for Performance Improvement (ISPI). (n.d.). What is human performance technology? *HPT Overview*. Retrieved on March 13, 2003, from http://www.ispi.org/

Stolovitch, H. D., & Keeps, E. J. (1999). What is human performance technology? In H. D. Stolovitch & E. J. Keeps (Eds.), *Handbook of human performance technology* (2nd ed.) (pp. 3-23). San Francisco: Jossey-Bass Pfeiffer.


**Section 2**

# Foundations for Systemic Change

## Societal Evolution and the Need for Systemic Change in Education

Jerrold E. Kemp

Society in the United States and in many other countries has moved from the industrial age into the information age. We are recognizing how new technologies affect transportation, communications, business, workplace operations and social changes that alter every aspect of our lives. The transformation to the Information age can be illustrated by a recent statement by a workplace employee:

> When I started working 20 years ago, to build a product there was a single operation for each worker. You only had to memorize the task and do it repeatedly. But today I do many operations at one time. For one thing, you have to think before randomly pushing buttons and pulling switches. My job has broadened to include equipment troubleshooting, debugging, and even simple computer programming, with responsibilities for quality that require taking the initiative in frequent decision-making and teamwork with other workers. We find our technologies now changing so fast that continued training is necessary to cope with new tasks as they arise.
>
> I know that behind these abilities are competencies in basic math, reading, writing and communicating clearly with other employees. I hope the schools will prepare their students for this new world better than I was prepared for it. [Adapted from Adler (1992).]

These changes place new needs on our educational systems. For students, they include the development of initiative, creativity and skills in critical thinking and problem-solving, mental and physical skills needed for productive work, using advanced technologies, engaging in group-processes and developing good habits for self-direction and personal growth.

Most people do not yet realize that the Industrial-age paradigm of being teacher-centered, with linear reasoning by students that requires rote memory and convergent thinking within a standardized educational format, is counter-productive for meeting many of the new educational needs. To accomplish information-age educational goals, major systemic changes are essential, in line with major changes occurring in other sectors as we

evolve into the information age: from standardization to customization, from top-down control to empowerment with accountability, from compliance to initiative and from compartmentalization to integration and process orientation.

Educators and trainers alike recognize that people learn at different rates, yet our educational and training systems try to teach a fixed amount of content in a set amount of time. Holding time constant forces achievement to vary, which was appropriate for the industrial age when the majority of jobs were manual labor and we needed to sort the laborers and the managers. However, as knowledge work is rapidly replacing manual labor in industrialized nations, we increasingly need an educational system that is focused on learning instead of on sorting students. Therefore, we need a different paradigm from one that holds time constant and forces achievement to vary. We need a paradigm that allows time to vary — that gives each learner the time he or she needs to reach the learning standards. This is true in all instructional contexts: corporations and non-profit organizations, as well as K-12 schools and higher education.

Therefore, changes like the following should be considered:

- Recognize student preparation, motivation, capacities and incentives for learning. Therefore, instruction should be designed that is more motivational and relevant to learners' needs and interests.
- Design learning-focused instruction by shifting the emphasis from teachers teaching to learners being more involved in directing their own learning.
- Help all stakeholders to evolve their mindsets about instruction.

Such systemic changes are as inevitable now as was the development of the present factory model of schools at the dawn of the industrial age, replacing the one-room schoolhouse that predominated during the earlier agricultural era.

It is important for all AECT members to understand the ways society is changing as we evolve deeper into the information age, and to recognize that these changes require a change in paradigm for our education and training systems to be most effective in meeting the needs of individuals and their organizations and communities in this new era.

The remaining articles in this section provide brief introductions to the major facets of knowledge that may be most helpful to AECT members. The next article introduces a learning-focused, learner-centered paradigm of education and training. Then come articles about systems theory, systems thinking and systemic change. The last article in this section addresses the relationship between ethics and systems thinking.

Understanding the principles, concepts and strategies associated with systemic change is essential for all educational and training professionals, and it is important for AECT divisions and members to take leadership to implement them.

## The Learner-Centered Paradigm of Instruction and Training

Sunnie Lee

If the current educational system is not appropriate for the information age, then how should our schools change? The changes in society as a whole reflect a need for education to focus on learning rather than on sorting students. A large amount of research has been conducted to advance our understanding of learning and how the educational system can be changed to better support it.

### How people learn

One area that gives us a solid understanding of how people learn is the work on brain research, which describes how the brain functions. Caine and Caine (1994) provide a useful summary of how the brain functions, with 12 "brain principles" of learning. These principles comprise the notion of brain-based learning. Brain-based instruction begins when learners are encouraged to immerse themselves actively in their world and their learning experiences. In a school or classroom where brain-based learning is being practiced, the significance of diverse individual learning styles is taken for granted by teachers and administrators (Caine & Caine, 1997). In these classrooms and schools, learning is facilitated for each individual student's purposes and meaning. The whole perception and concept of learning is approached in a completely different way from the current industrial-age classrooms that are set up for sorting and standardization. Research on brain-based learning reflects how important it is to change our mental models of learning in order to alter our educational system to meet the needs of learners in the information-age.

Another line of work was carried out by the National Research Council to synthesize present knowledge about how people learn (Bransford et al., 2000). A two-year study was conducted to develop a synthesis of new approaches to instruction that "make it possible for the majority of individuals to develop a deep understanding of important subject matter" (p. 6). The study emphasizes the importance of customization in instruction based on the prior knowledge of each individual learner, on self-regulated learners taking more control of their own learning and on facilitating deep understandings of the subject matter. They describe the crucial need for and characteristics of learning environments that are learner centered, knowledge centered, assessment centered and learning-community centered.

### Learner-centered paradigm of instruction

If research shows us that instruction should be learner-centered, then what *is* the learner-centered paradigm of instruction? There have been several attempts to synthesize the published knowledge on learner-centered instruction.

First, the American Psychological Association conducted a wide-range project to identify learner-centered psychological principles based on educational research (American Psychological Association Presidential Task Force on Psychology in Education, 1993). The report identifies 12 principles and presents the research evidence that supports each principle. It reveals four areas of psychological principles: 1) cognitive and metacognitive, 2) motivational/affective, 3) developmental and social and 4) individual difference factors that influence learners and learning. Principles in these areas provide a comprehensive framework for developing and incorporating new ideas about instruction for information-age schools.

McCombs and colleagues (Baker, 1973; Lambert & McCombs, 1998; McCombs & Whisler, 1997) address these new needs and ideas for novel instruction for the information-age. They identify two important features of learner-centered instruction:

> a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs) [and] a focus on learning (the best available knowledge about learning, how it occurs and what teaching practices are most effective in promoting the highest levels of motivation, learning, and achievement for all learners). (McCombs & Whisler, 1997, p. 11).

This twofold focus of instruction informs and drives educational decision-making processes. In learner-centered instruction, learners are included in these decision-making processes, the diverse perspectives of individuals are respected and learners are treated as co-creators of the learning process (McCombs & Whisler, 1997). Their synthesis of the research on the learner-centered paradigm of teaching gives us a clear vision of the kinds of changes schools should be implementing for information-age classrooms.

### Need for systemic change

As noted in the previous article, the loss of trust and dissatisfaction with schools that we are experiencing these days is a clear hallmark of the need for change in our school systems. The push for a learner-centered paradigm of instruction reflects the need for transformation in current school systems. Given this new direction for education, it is important that we AECT members help the transformation occur as effectively and painlessly as possible. We must help our educational and training systems move into the information age with a new paradigm that better meets the needs of individual learners, of their work places and communities, and of society in general.

## What is Systems Theory?

Daniel Pascoe

Systems theory was formally conceived in the mid 1900s by Bertalanffy, a renowned theoretical biologist and a prolific author in philosophy, sociology and psychology. He introduced the *General Systems Theory* and the existence of "systems laws" that manage the organization of the numerous entities of a system, whether biological, social, mechanical or other (Bertalanffy, 1968). The complex nature and organization of *systems* was addressed by Banathy, seminal systems theorist, who defined a system as "an assemblage of inter-related elements comprising a unified whole, [consisting] of components (or elements) which are connected together in order to facilitate the flow of information, matter or energy" (Banathy, 1992).

According to Banathy (1991), our study and application of systems can be approached from three different perspectives. Systems can be understood as a *philosophy*, a universal assumption about the purpose, relationships and productivity of the entities of a system, with a clear emphasis on the instrumentality of systemic values and beliefs for the sustainability and development of systems. Systems can also be understood as *theory*, or systemic claims we may have about the nature and behavior of the systems we study or in which we operate. Additionally, systems can be perceived as *methodology,* or possible concrete applications of systems theory to the constant challenges and opportunities of our particular systems, often in an attempt to facilitate systems design and/or systemic change (Banathy, 1991).

*Systems theory* is an interdisciplinary field with origins in the hard sciences, and has recently become a powerful tool in the social sciences and humanities. According to Bertalanffy, Banathy, Rapoport and other founding authors of the field, systems theory claims that: 1) most things, beings, relationships and processes exist and operate within a system, that 2) most systems interact and are interdependent with other systems (i.e., subsystems, sister systems and larger systems), that 3) a system is an evolutionary process rather than a tool or product and that 4) ignoring these systems theory claims could limit our perception, reaction or interaction with our things, people, relationships and/or processes of interest (Bertalanffy, 1968; Banathy, 1992).

Under these definitions, an educational or training organization is a system — a diverse group of people, entities and efforts interrelating and interdependent with each other, with its subsystems, its peer systems and its larger system. Banathy introduced an instrumental system's analysis theory that suggests studying systems through *three lenses*: a "still picture lens" that helps us understand all the parts and components of the system of interest, a "motion picture lens" that helps us understand the relationships, functions and processes of the system and a "bird's eye view lens" that helps us understand relationships between the system of interest and its suprasystem and peer systems (Banathy, 1992). This *systems theory perspective* allows for a new understanding of all its components, and what each of them continually and interactively input, transform and output as a whole, such as all the important entities and aspects of an educational or training system, with the exception of the causal dynamics that underlie activities

and changes in the system and its environment (Senge, 1990).

Systems theory was also explored by Senge in his introduction of the concept of a learning organization. In his best-selling book, *The Fifth Discipline*, he states that learning organizations are capable of assisting their members and teams in shifting their paradigms and thus persistently observing their organization as a complex system, rather than only its parts (Senge, 1990). This is why he views systems thinking as the most important of the five disciplines of organizational learning.

An understanding of systems theory can help educational and training professionals like AECT members to improve the value of their research and service. For instance, as professionals in AECT, we could opt to define, promote and conduct ourselves, our membership in AECT, our relationships and our performance as all existing and operating within complex networks of parts, processes and relationships in constant interaction and interdependence. This systems theory approach could help us better understand the nature of our systems and work, as well as facilitate our catalytic power to positively influence, promote and improve our systems of interest, including technology integration, instructional systems design, human performance improvement, teacher training and development and the various other activities in which we engage. As AECT members, we could consider who we are and what we do as an evolutionary process capable of eliciting research and practice that facilitate collaborative learning and provide leadership and intelligent adaptation to the changes in our context areas and society.

## Systems Thinking for AECT Members

Brian Beabout

An example given by Russell Ackoff (1974) gives an excellent introduction to systems thinking. The Standard Oil Company was having trouble making a profit from its gas stations located in poor urban areas. Instead of closing their stations, they hired a community-based organization to survey the local community and find out what they wanted in a gas station. After speaking with 800 residents, the group designed a prototype gas station that included: community ownership, an auto-parts store, a do-it-yourself auto-repair space, offices that could be rented by local businesses, a parking area that could be converted into a lighted basketball court and landscaping with park benches.

*Systems thinking* is the thought process that led Standard Oil to recognize the problems with their current design, and to come up with a new approach for planning a gas station. They recognized that their business wasn't simply about selling more gallons of gasoline or cups of coffee, but that their stations represented an important part of the communities in which they are located. Their attention to the needs of the environment is a key element of systems thinking. Systems must maintain a balance with their environment, or the environment won't give them the resources they need to survive. The attention that Standard Oil paid to its environment is the story of an organization trying to stay profitable by attending to the needs of its customers.

In essence, systems thinking takes the concepts of systems theory and applies them to real-world situations. This requires viewing problems in a decidedly different way than we are used to. In the 1990 movie *Mindwalk*, a politician (played by Sam Waterston of "Law and Order" fame), who is used to looking for individual problems and then legislating solutions to them, has a sort of re-awakening during an extended conversation with an "ex-physicist," who is an expert in systems theory. He begins to stop relying exclusively on his mechanical approach and adopts a more holistic view. The point is that, instead of simply looking for problems in an organization and making piecemeal changes to fix them, systems thinkers also examine the organization's environment and its internal functions and processes before making changes (Hutchins, 1996).

Here, Banathy's three systems lenses (1992), introduced in the previous section, play an important role. Using his "bird's eye view" lens, the systems thinker names the system that she is focused on, identifies other important systems in the environment and examines the interactions between the system and its environment. In the gas station example, this requires seeing the urban gas station as a system that has inputs (wholesale gas, convenience store items) and outputs (jobs for residents, gasoline and other car services and happy customers). Also important is seeing the gas station within the urban community that it serves. Once these system elements are seen, the necessity of meeting the community's needs becomes obvious if the gas station is to survive. The importance of looking at an organization's relationships with its environment cannot be stressed enough (Reigeluth, 1993).

Using Banathy's "still picture lens" helps the systems thinker to identify the important components in an organization and how they function to meet the system's goals. Using this lens, the executives at Standard Oil noticed that their previous gas station design, with its poor lighting, minimal services and uninviting landscaping, served a narrow conception of generating profit for the company. The system did not have in place the components it needed to serve the additional goal of meeting community needs.

Finally, using Banathy's "motion picture lens" allows the systems thinker to see the flow of communication, goods and services, and people, as the system operates. This lens allowed Standard Oil to see that having only one office on the site limited the number of potential customers who visited, and that inviting community members to use the space in the evenings would engender good-will from the community and perhaps cut down on the crime experienced at their urban stations.

Once we are able to apply systems thinking to problems, we can focus both internally and externally to

see the systems at play in a given problem. We might see, for example, that a K-12 technology integration problem might be related to the systems of teacher education, class scheduling and state-wide assessment — and not merely to resistance on the part of teachers. Systemic thinking often generates more questions than answers, but it helps ensure that the solutions that *are* selected will be more effective.

## Systemic Change and Systems Design

William Watson

The first blurb in this section pointed out the need for systemic change in our systems of education and training. The second blurb provided an indication of the nature of an information-age system (learner-centered) in contrast to the industrial-age systems we typically have today. The last two blurbs gave an indication of the power of systems theory and systemic thinking to help us all transform our systems to better meet the needs of learners, the systems that help them learn and the "systemic environments" of those systems. This blurb discusses the emerging knowledge base about how to foster systemic change through systems design. Systemic change refers to the process of transforming a system from one paradigm to another through the application of systems theory and systems thinking. Systems design is the process of determining what characteristics a new or transformed system should have.

While the term "systemic change" is becoming more commonplace in education, it has different meanings for different people. Squire and Reigeluth (2000) identify four different meanings for educators: "statewide, districtwide, schoolwide, and ecological" (p. 143). The ecological meaning, endorsed by Banathy, Fullan, Reigeluth and others, encompasses the other three meanings and pays attention to relationships with superordinate, coordinate and subordinate systems. This conception more fully implements the concepts of systems theory and systems thinking by embracing the organic, interconnected nature of systems, and it is the meaning we use here.

An effective way to understand systemic change and systems design is to contrast them with their traditional alternatives. Systemic change, which is holistic, contrasts with piecemeal change, which focuses only on a part of the system. Systemic change takes into account the interrelationships among the parts of the educational system, recognizing that a fundamental change in one part will make it incompatible with other parts of the system and, therefore, that changes must be made simultaneously to those other parts (Reigeluth, 1994).

Systems design can likewise be contrasted with a systematic approach to design. The design process, especially in the educational technology field, typically entails using a step-by-step, linear approach to determining the characteristics of the various parts of a new system in relative isolation from each other. In contrast, systems design utilizes a dynamic, creative and iterative approach that begins with a holistic, "fuzzy" vision of the new system, and proceeds to elaborate all parts of that vision in cycles of progressively greater detail and clarity. Systems design approaches to systemic change incorporate a systems view, and they create and evaluate potential design solutions which move the system closer to an ideal design. These traits are illustrated by Banathy's (1996) examination of several systems design models.

Banathy's own Social Systems Design model (1996) has four design spirals. The first spiral, formulating the core definition, begins by defining the mission of the system in terms of how the system will serve stakeholders, both current and future, as well as society as a whole. This mission is an ideal vision of the system, and its core values are also defined. These definitions are then tested and revised, a process that continues throughout the spirals, reflecting the iterative nature of the model.

The second spiral, developing specifications, identifies such things as who the clients of the system are, how the system will serve their needs and how the system will relate to other systems.

The third spiral, selecting functions, identifies the key functions which must be performed in order for the system to achieve its mission within the specifications. These functions are further broken down into sub-functions that will work together.

The final spiral, designing the enabling systems, designs three components: (1) a management system for guiding the functions, (2) the subsystems for carrying out each of the functions and (3) changes in the environment surrounding the system.

These four spirals reflect the iterative, holistic nature of a systems design process, as a fuzzy, but ideal, vision of the system is designed and evaluated and the process creates a progressively more specific design for the desired system. The resulting design is a model of the system, described by Banathy's three lenses, which together capture a comprehensive view of the system.

Banathy's model represents a general framework that can be used to create specific change processes. Section 5 presents some specific approaches to systemic change. Ultimately, a systems design process for implementing systemic change will help to ensure a flexible, ever-evolving change process which constantly monitors and improves itself.

## Systemic Change as an Anchor Point for Professional Ethics and Action

Stephanie Moore

> "It's not the technology that's scary. It's what it does to the relations between people, like callers and operators, that's scary." — Pirsig, 2000

When one of the first educational technologies — writing — was introduced into education in Greece, Plato (1990) wrote a dialogue, *Phaedrus*, that formed a

scathing critique of writing and its role in the learning and teaching process. The infusion of this new innovation (or *techne*), imported from Egypt, posed a threat to quality of thought and to the relationship between the teacher and the student, argued Plato. A disruption to that relationship, to that particular system, could have cataclysmic results, he continued to argue, for if education were tainted with this base technology, it could dilute the process by which Greece formed its future leaders. The subtitle to *Phaedrus* is "Or the ethical, or beautiful." That subtitle is significant, for it situates the debate over the infusion of technology into the educational system as a debate over ethics. While this critical discussion seems to have disappeared over the centuries, it has been gaining new life in recent decades.

Within the past 50-60 years a significant change has been occurring across many organized disciplines to address ethics in a more specific and applied manner — what has come to be known as "practical ethics." Rather than a philosophical sort of discussion, practical ethics focuses on the ethical responsibilities of a given profession and how those relate to professional standards and behaviors for members of that profession (Davis, 1999; Dean, 1999). The primary driver behind this recent shift has been public backlash when major failures or scandals involved professional negligence (Davis, 1999).

Education and educational technology are in line for critical public backlash, if they are not already facing it. Reports like *A Nation at Risk*, debates on efficacy of technology to reform education (Cuban, 1986, 2003; Healy; 1990; 1999; Reigeluth, 1999) and attention at the federal level on the numbers of dollars poured into these efforts (WestEd, 2002) make our profession ripe for revolution in the area of professional standards and ethical practices. Our profession can take an additional history lesson from other disciplines; we can either lead the discussion on professional ethics ourselves or be pushed into the discussion by external stakeholders because society will demand that we demonstrate how our profession and practices contribute to society (Brethower, 2005; Davis, 1999; Frankel, 1989; Kaufman, 2000).

The study of systemic change is one key facet of our profession that positions us to lead the discussion about practical ethics internally and demonstrate our own value-added to society. Systemic change is concerned about the parts of a system, the whole system, the relationships in between and the people involved throughout (Banathy, 1994). Dean (1999) states that one of the important aspects of our profession is recognizing how a solution implemented at one level will affect the whole system. Systemic change, when conceived as an applied ethic in design, leads to designs that consider and benefit every part and person in a system. Furthermore, key principles of systemic change, such as stakeholder involvement and whole-system impact, map directly with many of the ethics an age of technology demands, such as participatory democracy and environmental protection (Barbour, 1993).

Finally, the systemic perspective as applied ethics can actually lead to a clearly defined desired result and a means for measuring whether the effort has been worthwhile. Evaluation that is systemic in nature asks what the impact of an action or product is on the larger sphere. Perhaps nowhere is the need for crystalline definitions of desired end results greater than in the area of public education. Education is a subsystem of the larger system of society, and the successes and failures of the educational system ripple through the economy, through national policy, through social programs and even through national security. Kaufman (1996) asserts:

> what the schools accomplish is of concern to those who depend upon the schools, those who pay the bills and those who pass the legislation. We are not in a vacuum, and our results are seen and judged by those outside of the schools – those who are external to it. (p. 112).

If we are going to achieve these results, we have to think and plan towards them, toward the system (Kaufman & Watkins, 2000). Most educational technologists do not currently perceive the profession as having direct systemic (i.e. societal) impact (Guerra, 2001; Moore, 2005), but awareness of systemic impact can become a critical anchor in our collective professional conscience.

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Adler, P.S. (1992). *Technology and the Future of Work*, Oxford University Press.

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American Psychological Association Presidential Task Force on Psychology in Education. (1993). *Learner-centered psychological principles: Guidelines for school redesign and reform*. Washington, DC: American Psychological Association and the Mid-Continent Regional Educational Laboratory.

Baker, F. (1973). *Organizational systems; general systems approaches to complex organizations*. Homewood, Ill.: R. D. Irwin.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn*. Washington, D.C.: National Academy Press.

Caine, R.N., & Caine, G. (1994). *Making Connections: Teaching and the human brain* (rev. ed.). Menlo Park, CA: Addison-Wesley Publishing Company.

Caine, R. N., & Caine, G. (1997). *Education on the Edge of Possibility*. Alexandria, Virginia: Association for Supervision & Curriculum Development.

Lambert, N. M., & McCombs, B. (Eds.). (1998). *How students learn: Reforming schools through learner-centered education*. Washington, DC: American Psychological Association.

McCombs, B., & Whisler, J. S. (1997). *The learner-centered classroom and school: Strategies for increasing student motivation and achievement*. San Francisco: Jossey-Bass Publishers.

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Bertalanffy, L.V. (1968). *General system theory.* New York: George Braziller.

Banathy, B.H. (1991). *Systems design of education: A journey to create the future.* Englewood Cliffs, NJ: Educational Technology Publications.

Banathy, B.H. (1992). *A systems view of education. Concepts and principles for effective practice.* Englewood cliffs, NJ: Educational Technology Publications.

Reigeluth, C.M. (1999). *Instructional-design theories and models. A new paradigm of instructional theory.* Volume II. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Senge, P. (1990). *The fifth discipline: The art and practice of the learning organization.* New York: Doubleday.


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Ackoff, R. (1974). *Redesigning the Future*. New York: John Wiley & Sons.

Banathy, B. (1992). *A Systems View of Education*. Englewood Cliffs, NJ: Educational Technology Publications.

Capra, B. A. (1990). *Mindwalk*. USA.

Hutchins, C. L. (1996). *Systemic Thinking: Solving Complex Problems*. Aurora, CO: Professional Development Systems.

Reigeluth, C. M. (1993). Principles of Educational Systems Design. *International Journal of Educational Research, 19*(2), 117-131.


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Banathy, B.H. (1991). *Systems design of education: A journey to create the future*. Englewood Cliffs, New Jersey: Educational Technology Publications.

Banathy, B.H. (1996). *Designing social systems in a changing world*. New York: Plenum Press.

Reigeluth, C. M. (1994). The imperative for systemic change. In C. M. Reigeluth, & R. J. Garfinkle (Eds.), *Systemic change in education* (pp. 3-11). Englewood Cliffs, NJ: Educational Technology Publications

Squire, K and Reigeluth, C.M. (2000). The many faces of systemic change. *Educational Horizons* (Spring).

Toffler, A. (1980). *The third wave*. New York: Bantam Books.


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Banathy, B.H. (1994). Designing educational systems: Creating our future in a changing world. In C. Reigeluth & R. Garfinkle (Eds.), *Systemic change in education* (pp. 27-34). Englewood Cliffs, NJ: Educational Technology Publications.

Barbour, I. (1993). *Ethics in an age of technology: The Gifford Lectures, Volume Two*. San Francisco: Harper Collins.

Brethower, D. (2005). Yes we can: A rejoinder to Don Winiecke's rejoinder about saving the world with HPT. *Performance Improvement Journal, 44*(2): 19-25.

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920.* New York: Teachers College Press.

Cuban, L. (2003). *Oversold and underused: Computers in the classroom, 1980-2000.* Cambridge, MA: Harvard University Press.

Davis, M. (1999). *Ethics and the university.* London: Routledge.

Dean, P. J. (1999). The relevance of standards and ethics for the human performance technology profession. In H. Stolovitch and E. Keeps (Eds.), *Handbook of Human Performance Technology* (2nd ed., pp. 698-712). San Francisco: Jossey-Bass.

Frankel, M. (1989). Professional codes: Why, how, and with what impact? *Journal of Business Ethics, 8*, 109-115.

Guerra, I. (2001). *A study to identify key competencies for performance improvement professionals.* Unpublished doctoral dissertation. Florida State University.

Healy, J. (1990). *Endangered minds: Why our children don't think.* New York: Simon & Schuster.

Healy, J. (1999). *Failure to connect: How computers affect our children's minds — and what we can do about it.* New York: Simon & Schuster.

Kaufman, R. (2000b). *Mega planning: Practical tools for organizational success.* Thousand Oaks, CA: Sage Publications.

Kaufman, R. & Watkins, R. (2000). Getting serious about results and payoffs: We are what we say, do, and deliver. *Performance Improvement 39*(4), 23-32.

Moore, S. (2005). *The social impact of a profession: An analysis of factors influencing ethics and the teaching of social responsibility in educational technology programs.* Unpublished doctoral dissertation. University of Northern Colorado.

Persig, R. (2000). *Zen and the art of motorcycle maintenance: An inquiry into values.* New York: HarperCollins.

Plato. (1990). *Phaedrus*. In Patricia Bizzell and Bruce Herzberg (Eds.), *The Rhetorical Tradition: Readings from Classical Times to the Present* (pp. 113-143). Boston: Bedford Books.

Scharff, R., & Dusek, V. (Eds.). (2003). *Philosophy of technology: The technological condition, an anthology*. Malden, MA: Blackwell Publishing.


**Section 3**

# Influences of Suprasystems on Systemic Change

## General Influences of Suprasystems on Systemic Change

Charles M. Reigeluth

Section 2 of this issue addressed the nature of, and need for, paradigm change in our systems of education and training as we evolve from the industrial age into the information age. That section also identified systems thinking's emphasis on understanding relationships of all kinds as essential to the success of any systemic change effort. Those relationships include ones between a system and its suprasystem(s), its peer systems, its systemic environment in general and its external stakeholders, as well as relationships within the system — relationships among its subsystems and its causal dynamics. This blurb