Guest Editor’s Notes

Charles Reigeluth

Introduction to the Special Issue on Systems Thinking and Systemic Change for Education and Training

The purpose of this special issue on systems thinking and systemic change is to be tailored to AECT members’ needs and interests. Sections 1 and 7 are particularly targeted toward this purpose. Also, we are trying a novel format to serve this purpose. The intent is to introduce many diverse ideas and lines of work through short (one page or less) articles we call “blurs.” The idea is to provide enough information for you to decide if you are interested, and then provide links or references where you can find more information.

The systemic change team at Indiana University – which includes Judy Bardonner, Omer Delialioglu, Fang Fang, Pam Green, Nichole Harlin, Pall Kang, Sunnie Lee, Emmanuel Okafor, Daniel Pascoe, Sari Pascoe, Charles Reigeluth, Kurt Richter and Bill Watson – brainstormed the seven sections and input on the concept was sought from all members of the Division for Systemic Change. Also, an invitation was sent to all members of the division to contribute to this special issue.

Section 1 addresses how systems thinking can help AECT members in their work, and how they can contribute to systemic change in whatever their context area may be. There is a blurb for each division, authored by the president of the division, as well as a blurb for the Association as a whole, authored by its president.

Section 2 addresses the need for systemic change, followed by foundational concepts and theories: the learner-centered paradigm of instruction, systems theory, systems thinking, systemic change and professional ethics.

Section 3 discusses the influences of suprasystems and their policies on systemic change. A blurb on general influences of suprasystems in all context areas is followed by blurbs devoted to the public education sector, including federal policies, state policies, NCLB and charter school legislation. There is also a blurb on influences of suprasystems in an Asian country with a more centralized educational system.

Section 4 describes actual experiences in systemic change in public education (school-level, district-level and state-level efforts), corporate training and an international context (Eastern Europe).

Section 5 introduces a variety of approaches to the process of systemic change in public school systems and corporations.

Section 6 describes several “new systems” that have emerged from systemic change efforts in public education, teacher education and corporate training. It also presents a general vision of an information-age educational system.

Finally, Section 7 addresses what AECT members can do with the ideas presented in this special issue. These suggestions are organized by kinds of work that people in AECT do.

We hope you find systems thinking and systemic change exciting and useful to your everyday work. Please let me know what you think of both the content and format of this special issue!

Charles Reigeluth, Guest Editor
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AECT and Systemic Change

T. Weston Miller

For the past thirty years [educators] have been trying to up the ante in getting the latest innovations and policies into place. We started naively in the 1960s pouring scads of money into large-scale national curriculum efforts, open plan schools, individualized instruction and the like. ... We have never really recovered from the profound disappointment experienced when our expectations turned out to be so far removed from the realities of implementation. (Fullan, 1993, p.1)

Like many who enter the teaching profession, AECT members want to make a difference ... in the lives of others, in society, in the world. Providing leadership in systemic educational change is a role we — both as individuals and, more importantly, collectively — can and should undertake. However, it is a formidable challenge to apply an ISD systems approach and couple that with systems thinking that encompasses both a wider view of the interlocking systems that have an impact on what we do and an understanding of the systems dynamics that enhance our ability to foresee the “unanticipated consequences” of actions.

Michael Fullan (1993) noted: “The school is not now a learning organization. Irregular waves of change, episodic projects, fragmentation of effort, and grinding overload is the lot of most schools.” (p. 42). Too often educational changes/innovations still are instituted in isolation (a course, a classroom, a school), failing to take into account the relationships between the part being changed and the larger system in which the innovation is being instituted. Instructional Technologists can have an impact on this through our ability to work collaboratively and taking a wider systems view.

By working together differently the goal is to produce quality ideas and practices on an ongoing basis, and to inspire collective effort to the extent that it becomes possible to achieve breakthroughs never before experienced. The best system produces a culture in which it becomes easier to accomplish more by moving beyond dependence on the heroic or martyr-like efforts of a few (which in any case does not produce sustainable reform). (Fullan, 2004, p. 6)

Education and change are both journeys, not necessarily destinations, and we can choose to be passengers or drivers. Which will you be? If you want to be a driver, this special issue should be very helpful to you.

The Design & Development Division and Systemic Change

M.J. Bishop and Alison A. Carr-Chellman

Learning more about systems thinking can help all Design and Development members to understand:

- the external relationships between an instructional system and the larger system that houses it, for those relationships influence the success of design activities
- the internal relationships among design processes, for they enhance the success of resultant products
- the causal dynamics and links between design processes, interventions, products and the larger context
- the importance of engaging stakeholders and users in the creation of their own systems of learning, and also engaging in more participatory and developmental forms of leadership to ultimately enhance the adoption rates of designed innovations

Systems thinking and change are what D&D members do. The nature of system elements can really only be understood by looking at how they function in relation to the whole and to one another. As we work through the design process, systems thinking gives us the tools we need to understand the context, our influence on that context and the influence of that context on our instructional system. We also come to see the interconnections and interdependencies between parts and recognize that changes in one part will necessitate changes in other parts as well.

We see that the instructional systems we design are relatively “closed” subsystems of the larger educational system in which they function, and we recognize that in order for our interventions to have the intended results we must help bring about changes in the larger systemic environment (Banathy & Jenlink, 2004). Nonetheless,
many instructional designers feel daunted by the bigger task of systemic change. We can contribute to the systemic change movement, however, by developing a deeper understanding of the larger social systems of which we are part and designing from that broader perspective. In addition, we can identify and offer up specific skills we have as designers that are needed to bring about broad systemic change and begin contributing more effectively toward the design of new systems of education.

This special issue is an opportunity for D&D members to learn more about systemic thinking and systemic change as a step toward more effective practice.

The Distance Learning Division and Systemic Change

Vance Durrington and Richard West

In developing this short piece, one of the authors recalled taking a course on systems analysis and design as an undergraduate that introduced him to a systems approach for addressing projects. Unfortunately, the course was not offered by the College of Education, and he never encountered an education course that took a systemic perspective until graduate school. Educators too often take a reactionary approach and then determine how to make that reaction work in the current system. This is equivalent to designing the system without giving proper attention to the crucial phase of analysis, or even worse, to letting the system design itself without an objective-driven vision.

With the increasing role of distance learning in K-12 and higher education, the need for systemic thinking about how to implement distance learning (DL) effectively is critical. In examining a distance learning system, it is important to keep in mind that distance learning is a subsystem of the associated educational institution, and the mission of the institution should drive the design of the distance learning system. With that in mind, there are a number of areas where systemic thinking and change will lead to proper analysis and design of a distance learning system, including the following:

- Systems thinking can help DL administrators identify the standards that should qualify credible DL programs/offeringas, as well as bridge the current chasm between DL and educational accreditation.
- Systems thinking can help the DL community identify and understand the needs of learners in order to develop DL programs that meet their needs and enhance their opportunities for success.

As distance learning technologies continue to evolve, we will need to “pick up our feet” as distance educators and instructional designers so that our DL designs can keep pace with current trends. Keeping a systems perspective will help us stay anchored to what our design and instructional goals should be in order
to best capitalize on the exciting opportunities growing increasingly more available in distance education. This special issue should be very useful to DL members.

The International Division & Systemic Thinking

Amy Bradshaw and Sung Pil Kang

The International Division seeks to “facilitate communication among educational technology professionals and students worldwide” and to promote “interactions that transcend international boundaries and cultural lines by mentoring and fostering educational endeavors, and coordinating communication with sister associations around the world.” Adopting systemic thinking can assist these efforts — particularly if we understand and consider the underlying framework, systems theory — because it can help us identify important interdependencies, be more effective in collaboration and consensus-building and broaden our abilities to develop beneficial and appropriate solutions.

Change interrupts the flow of a system and has unintended consequences — positive, neutral and negative. Unsatisfactory or harmful outcomes can result from failing to recognize important components within a system and the interdependence and interrelatedness of components. Also, beneficial aspects of a system can be lost as a consequence of the change. Systems theory and systemic thinking offer a guiding framework to reduce or avoid such problems, and are especially useful in efforts involving cross-cultural collaborations and development. A systemic change process provides general guidelines for identifying, considering and accommodating all the factors involved in a system undergoing change.

While searching for one-size-fits-all solutions can be tempting, systems theory’s emphasis on interconnected relationships within individual contexts cautions us to resist formulaic and generalized solutions. The difference in implication from imposing change versus facilitating change is critical. Facilitating change indicates full participation by insiders. Systems theory’s emphases on participatory leadership and decision-making, and input and feedback from stakeholders throughout the system, facilitate more meaningful consensus-building, as it provides mechanisms for seeking and valuing multiple perspectives, reflecting on ethical dimensions and developing solutions that are responsive to the needs, values and traditions of insiders.

Systems theory fits well with the International Division’s core values of mutual respect and equal participation among all members and is useful in our efforts to share, apply or adapt knowledge and information from research and practice across cultural and national boundaries. We invite you to take advantage of this opportunity to learn more about systemic change and consider how drawing on it can help facilitate our division’s efforts and interests.
The Management Division and Systemic Change

Ken Harmaning and Kyle Peck

The Management Division is an eclectic mix of professionals, including managers of media distribution and production, members who work in faculty development and curriculum development and K-12 library media specialists. With this diversity of membership, the focus of the division has become a search for tools that will assist in the developmental and decision-making processes in these diverse settings.

Systems thinking provides a set of tools that is useful to the members of our division — professionals in the trenches. Systems thinking helps these professionals understand the decision making processes in their workplaces and where to influence those processes with the least effort and disruption. It also helps them understand and anticipate the otherwise invisible dynamic forces that threaten success, and helps them attend to these forces and adapt accordingly. This stealth influence is only possible because of the models developed by systemic change proponents.

Projects consume much of our members’ time and energy. Systems thinking provides the structure and analytical tools to develop, implement and evaluate not only the end product, but the incremental processes as well. Unlike many structures, systemic structures are flexible and adaptable as additional information and requirements impact design parameters. Systems thinking also helps define the end product so that the projects do not take on a life of their own and unnecessarily absorb large amounts of scarce resources, and systems thinking helps our members decide whether a project should even be attempted.

The Management Division contributes to the systemic change process by serving as a real-world test bed for developing concepts and models in systemic change. The diverse members of the division are able to apply and test the concepts and provide valuable feedback to researchers. Such situated investigation of applied systems thinking will be valuable to the members of the Management Division, providing insights and tools that can be directly applied in our important work. We believe that Management Division members will benefit greatly from exploring the topics in this special issue.

The Multimedia & Production Division and Systemic Change

Anthony Betrus and Omer Delialioglu

The Multimedia and Production Division is the center of a good deal of energy and effort right now, especially in the area of instructional simulations and games and advanced web development. As a newly formed division, our mission and the identity of our membership are still evolving. There is a new generation of academics that grew up playing games. They see the use of games in instruction as natural and necessary, an idea that is becoming more and more widespread as this game generation grows. Often the most exciting web productions include games or game-like elements.

Multimedia production is a complex process because there are many interdependent factors that need to be taken into account throughout all of the phases of production: analysis, design, development, implementation and evaluation. Systems thinking helps us to identify and understand those interdependencies. Whether we are talking about games and simulations or advanced web sites, most multimedia production processes have reached a level of complexity which can hardly be understood or managed effectively without systems thinking. Also, an integral part of all of our production efforts is to understand the broader contexts in which our products are being used. This is a prime example of systems thinking.

Furthermore, our products can add to systems thinking and systemic change efforts because our products have, in a very real sense, a transformative effect on instruction, making it truly learner centered. Therefore, we are creating the tools and products that are used to make systemic changes in instruction.

While some of our members are specialized in multimedia production or game development, most of them are members in other AECT divisions as well, and maintain a broader view, indeed a systemic view, about how our products fit into the bigger picture. In sum, systems thinking is important to a successful multimedia production process and it is central to the transformative effects our products have on instructional environments. We strongly encourage all our members to explore ways this issue can be useful to our endeavors.

The School Media & Technology Division and Systemic Change

Carol Brown and Sunnie Lee

Every year, I ask my graduate students who are teachers in K-12 schools, “In your school, what are the characteristics of both a successful and an unsuccessful collaborative project?” The overwhelming response always includes discussion of whether or not the projects are based on a shared vision or goals. These responses reflect that people work well together when their passions are aligned and their goals are congruent. Systems theory and systemic change offers us valuable guidance for building a common vision for everyone.

We media and technology specialists are considered key leaders in the schools. Our influence begins with each individual in the system and extends to administrative decision-makers who rely on our input. Therefore, we can play a powerful role in building a shared vision and fostering systemic change in our schools. To do so, systemic change
literature advises that we help stakeholders to identify the common values within a system. For example, one value is striking a balance between learning the context and learning to think and solve problems. What is really important and which direction should the scales tip? Teachers are constantly under stress to teach all the facts needed for standardized tests, while simultaneously developing young minds for higher-level thinking processes.

As media and technology specialists, we will be on the front line of any systemic change process, since we are responsible for the technology that can help our schools become learner centered. Working with others, we will be responsible for providing the resources to help our students pursue their unique learning goals. Furthermore, our advice will help administrators to choose technology that can store curricula and track and report on individual student achievement across the entire system.

By understanding the systemic change process for K-12 schools, media and technology specialists will be able to play a more effective role in building consensus that brings about the changes needed to best use media and technology to help all students succeed. We strongly encourage all Media & Technology Division members to read this special issue to learn more about how systemic change can help us help teachers and students to be more successful in learning.

The Research & Theory Division and Systemic Change

Steve Harmon and Sunnie Lee

The Research and Theory division has a different focus than other AECT divisions. Our interests cut across all areas of practice. For this reason, the potential impact of a systemic perspective in R&T can be profound. We see three broad areas in which a systemic perspective can benefit research in the field.

The first is for further development and adaptation of General Systems Theory (GST) for educational research. While there has been work in this area over the years, we've not seen the broad and concerted effort with general systems theory that we've seen with many other research frameworks. We might realize significant advances in the field if, for example, we devoted the same research efforts to GST as we do to, say, Constructivism. Although some research has been done with a GST perspective, more recent developments in systems theory, such as chaos and complexity theories, remain largely unexplored in our field.

The second area is continued and expanded work in implementing systemic change in education. If we had a generally accepted model of an educational system (a sort of unified field theory), and all educational research projects were developed with systems theory as a part of their theoretical framework, then it might be possible to integrate all research studies in a meaningful way.

The third area is helping researchers identify what kind of questions to investigate. GST can help researchers to recognize what areas of education need more inquiry and examination. It can also help researchers think about the nature of the methodology of educational research, and encourage us to conduct research within its systemic environment. For example, design-based research and formative research are two methodologies that are influenced by systems theory.

In an age where increasing specialization has become more than the norm and almost a mandate, the general systems theorist faces a somewhat daunting task. Even though faced with exponential change in the rate of increase of the body of scientific information, the general systems theorist must develop enough expertise in a wide variety of areas to achieve the synergies made possible by their fusion. We are winning some battles; GST can help us win the war.

The Teacher Education Division and Systemic Change

Julie Moore

As a teacher educator, I am often frustrated by the disconnect that frequently exists between teacher education and schools. Even within the university, our students have a fragmented experience that does little to truly prepare them for the complexity of teaching. I sometimes wonder if we can really impact teaching and learning at all.

Systemic change gives us a chance. Through systemic change, we can break through traditional barriers — both seen and unseen — to create new relationships and structures to impact teacher learning and development. Systemic change allows us to understand fully the relationships and factors (both internal and external) that impact our work. By understanding such factors, we can better understand how they influence one another, giving us insight into where we can have the most significant impact. More importantly, the systemic change process is one that values and includes the voice of all stakeholders, resulting in products and programs that are more likely to meet the needs of all involved.

Teacher educators are uniquely situated to be the catalyst for systemic change. Our understanding of research on best practices, our ability to design motivating and impactful learning environments and our knowledge of how to use new technologies to support new forms of teacher learning make us invaluable resources in systemic change efforts. More importantly, our unique placement in the education system gives us legitimate entrance into most of the important systems that impact teachers. Teacher educators can be the central hub bringing together people from a variety of systems (teachers, future teachers, policy makers, arts and sciences faculty and teacher educators) to work together. It is only by building such bridges that we will be able to envision new strategies and structures.
to improve teacher education and thus, student learning. Project work, grant writing and implementation, and professional development schools all provide avenues in which we can utilize systemic change.

Systemic thinking and change give teacher educators a great avenue to truly impact teachers and teaching. I encourage you to read this issue with an eye towards how you can utilize systemic thinking and change to help you be that catalyst in your own setting.

The Training & Performance Division and Systemic Change
Cynthia Conn and Pamela Green

Systems theory plays a key role in the practice of training and performance consultants. Human Performance Technology (HPT) is rooted in general systems theory (Stolovitch & Keeps, 1999). It provides training and performance practitioners with a framework to examine or investigate the whole situation and look beyond the symptoms of an issue. HPT definitions, operational models and frameworks (Dick & Wager, 1995; International Society for Performance Improvement, n.d.; Stolovitch & Keeps, 1999) include a specific step that directly applies systems thinking by seeking performance-gap factors related to environment, skills and knowledge, and emotional/political issues.

When they are knowledgeable about systems thinking, training and performance practitioners can contribute to systemic change by working with management and clients to redefine projects so as to ensure that root causes and issues and systemic interrelationships are being addressed, and to assist with implementing goals and strategies for change. For systemic thinking to have an impact on training and performance, a systemic framework that encourages an open dialogue among teams must be developed. This open dialogue creates an environment for instructional designers, performance consultants, trainers and managers to reflect together on the collective learning and work strategies that they use to perform their jobs. In addition, an open dialogue creates the foundation for being able to discover and address the root causes of training and performance problems. Systems thinking promotes collaboration, and by participating in the resulting open dialogue, training and performance professionals can avoid the pitfalls of misunderstanding or misinformation.

Systems theory allows performance practitioners to facilitate discussions and propose alternatives to help ensure the successful implementation of projects. Keeping a systems perspective provides a firm foundation that can assist instructional designers, performance consultants, trainers and managers in capitalizing on unrealized resources. Given the connections between human performance technology and systems theory, training and performance practitioners should find the articles in this special edition useful and valuable.

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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, background, talents, interests, capacities, and needs)
- 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).

System 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 *technē*), 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.

**Author Information and References for Section 2**

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


**The Learner-Centered Paradigm of Instruction and Training**

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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 blur
addresses the powerful influences of a suprasystem on any system which we may want to help engage in systemic change.

It is important to understand that system relationships can range from very tight coupling to very loose coupling, based on the degree of independence the system has from its suprasystem(s). For example, a store that is owned by one national chain may have all of its policies, products and procedures dictated by the national headquarters. On the other hand, a store that is owned by another national chain may have great independence to decide on its own policies, products and procedures. Similarly, a school in one school district may have its policies, curriculum and programs (or methods) dictated by the central office, while a school in another district may have considerable independence in making its own decisions.

The tighter the coupling between a system and its suprasystem, the more a systemic change effort must bring about changes in the suprasystem, as well as the system of interest. In the current industrial-age paradigm of education, a school and its school district (central office) tend to have a relatively tight coupling. This explains why many school-wide reform efforts that have attempted fundamental changes have consistently reverted back to the industrial-age paradigm over time, such as the participating schools in the Eight-Year Study, the Dalton Plan and the High Schools of Tomorrow (Tyack, 1995) and more recently the Saturn School of Tomorrow (Bennett, 1991). This is why a number of systemic change experts advocate that systemic change in education must be district-wide rather than just school-wide (Duffy, 2000; Duffy, 2002; Jenlink, 1998).

Of course, school districts are also influenced by their state educational system (primarily the state department of education) and the federal system (primarily the U.S. Department of Education and the various laws it administers, such as No Child Left Behind). While these suprasystems are more loosely coupled to an individual school, they can still exert powerful influences over a school's ability to transform to an information-age, learner-centered paradigm of education in which learners are no longer "prisoners of time" (http://www.ed.gov/pubs/PrisonersOfTime/index.html). Similarly, the community in which a school district is located can have a powerful influence over the success of a systemic change effort.

In higher education, a university is typically loosely coupled with its suprasystems, but its various schools or colleges tend to be tightly coupled with the university, as are departments with their respective schools or colleges. Similarly, in the corporate sector, a training department is typically tightly coupled with the company management system. Of course, the strength of coupling can vary considerably within any type of system or context area and therefore needs to be assessed.

The central point of this discussion is that relationships between a system and its suprasystem can have a large impact on the success of a systemic change effort. Therefore, it is important to identify both the nature and strength of the relationships at the onset of an effort, and to plan for ways both to capitalize on the facilitative aspects and minimize the inhibitory aspects of that relationship. It is a general tenet among systems theorists that, if you want to help a system to change, you have to also foster supportive changes in its suprasystem (Banathy, 1991), or at very least seek exclusions, waivers or other arrangements that will remove impediments to systemic change. The concept of coevolution in systems theory indicates that a system and its suprasystem must always change together (Banathy, 1996). If one evolves to be incompatible with the other, the resulting evolutionary imbalance puts both at peril, and the tighter the coupling, the greater the peril.

The remaining blurbs in this section discuss the influences of suprasystems and their policies on systemic change efforts in public K-12 education in the United States and Korea.

**Influences of Federal Policy on Systemic Change in K-12 Education**

Susan Patrick

Uncle Sam, tear down the walls of the education system; a revolution is underway! The federal government can be a strong facilitator for systemic change. The Office of Educational Technology, the Office of Innovation and Improvement, Star Schools and Enhancing Education Through Technology programs provide numerous examples of the federal government facilitating fundamental change. For example, the Florida Virtual School program was initiated through support from a federal grant and solid state-level leadership. The federal government facilitated systemic change by: 1) creating a report on the design of an innovative school to help guide education leadership, "Prisoners of Time" and 2) providing funding for the new model of virtual schooling. This brought student-centered, any time, any place, any path, any pace learning to life. The result — the Florida Virtual School is now providing online courses to thousands of students and is a nationally-recognized example, highlighted in the National Education Technology Plan 2004, "Toward a New Golden Age In American Education: How the Internet, the Law and Today's Students Are Revolutionizing Expectations."

Despite those successes, the federal government constrains systemic change by focusing on the current system to the exclusion of providing vision, planning and implementation metrics for what the system should be. In 1994, the "Prisoners of Time" report was released, citing:

By far the most important part of this Commission's charge relates not to time but to student learning. ... As witnesses repeatedly told the Commission, there is no point to adding more time to today's schools if it is used in the same way. We must use time in new, different, and better ways.

Twelve years later, federal programs are still largely continuing to fund models that maintain our students as
prisoners of time in their schools. Federal policies that focus funding on research-based practices exclude sorely needed support for developing and improving learner-centered models that use time and technology in new and better ways.

The federal government should stop funding antiquated, time-based models of education and instead fund new models that focus on learning, rather than on sorting students. Federal funding should work as a catalyst to move to a powerful new paradigm, not a crutch to prolong an obsolete one. Until we change the paradigm of education, adding on innovations will only create additional tensions in an outdated, overworked system. The federal government's primary role should be to sponsor research on new paradigms of education at all levels. This should include:

- Drive a vision for systemic change. This begins with a serious understanding of what systemic change is, how it happens and what can be done to facilitate it.
- Convene a wide array of stakeholders to connect, collaborate and think about how instruction can best foster individual student growth and how schools of the 21st century might look with blended models of online learning and information technologies embedded in learner-centered instruction.
- Support research and development (R&D) on a new paradigm of assessment whose summative component produces an "inventory of attainments" for each student rather than norm-based grades, and whose formative component provides information to guide instruction, and that thereby better informs students, parents, teachers and school leaders of how successful their programs are.
- Support R&D on new models of curriculum and assessment focused on 21st century needs and skills, such as those identified by the SCANS report.
- Support R&D on new forms of instruction that freed from the shackles of time and customized to each student's needs and talents.
- Require applications for federal grants to illustrate how they move toward transformation and systemic redesign.
- Train teachers and administrators for the information age. This entails fostering a major shift in mindset or worldview about education, as well at training in the use of specific technologies and learner-centered methods of instruction. There needs to be a very different physical concept of how a modern school works and looks.

Using federal investments to support these kinds of activities would do much to facilitate dramatic improvements in meeting the needs of students and their communities in the information age. We are addicted to a model of living history in our own memories of what school looks like. Education needs its own twelve-step program to shake that addiction. The federal government needs to take a deep dose of systems theory and begin to redesign schools into the future of our modern world.

Influences of NCLB on K-12 Systemic Educational Reform

Gerardo M. Gómez

Growing concerns about America's ability to compete globally led Republicans and Democrats alike to rally behind what became known as the No Child Left Behind Act of 2001. The central goal of NCLB is to close the achievement gap between high and low-performing children, especially gaps between minority and non-minority students and between disadvantaged children and their more advantaged peers, to ensure that every child is proficient in reading, math and science by 2014. To achieve this goal, the NCLB requires a series of assessment and accountability measures designed to increase the number of states adopting subject-area content standards and tests linked to those standards. If students in any of a number of demographic and income categories fail to make adequate yearly progress (AYP) toward proficiency in the subjects tested, the schools and school districts they attend must institute corrective measures or face sanctions, including the loss of Federal Title I funds.

While enjoying significant bipartisan support initially, as it approaches the first reauthorization deadline of its 12-year timeline the NCLB has come under increasing criticism by both federal and state officials. Though the first step in the process of reauthorization will be a thorough assessment to determine what portions of the law might need modification, lawmakers already have introduced scores of legislative changes and several states have launched legal challenges claiming the law is an unfunded mandate and an intrusion into state rights. Writing for the TC Record, Sunderman and Kim (2005) identified three factors contributing to the growing dissatisfaction with the law; namely the Administration's approach to federalism, the states' limited capacity to meet the law's requirements and the fiscal constraints facing state governments. In 2006, for example, the federal appropriation of $12.8 billion for Title I school districts is only slightly more than half the NCLB authorized amount of $22.8 billion.

In addition to the national criticisms about the political, capacity and resource implications of NCLB, some educators have also expressed concern that the emphasis on standardized testing to measure results has led to a narrowing of the curriculum and “teaching to the test” at the expense of other more learner-centered forms of teaching. Such a consequence is often seen as a barrier to an information-age paradigm of education where a student can learn at his or her own pace and results are measured by attainment of individualized, performance-based knowledge. Others argue that an absolute standard of proficiency and disaggregating AYP test results are necessary to measure progress toward the NCLB goal of having every child achieve at high levels in core subjects. An emerging compromise position approved by the U.S. Department of Education for piloting in several states is the “value-added” approach to measuring knowledge gains.
Though NCLB is silent on the forms of instruction needed to achieve these goals, it is clear that Congress intended for schools and school systems to adopt "scientifically-based" practices and be held accountable for results.

In a ten-year examination of the standards-based movement upon which NCLB is based, Education Week concluded that to date the results are both heartening and sobering (Education Week, 2006). For example, through a series of analyses using NAEP data, the report concluded that there was a positive relationship between states’ efforts to implement standards-based reforms and gains in student achievement. Improvements for math in grades 4 and 8 were statistically significant, while more modest, but positive, effects emerged for reading. Moreover, after controlling for states’ initial NAEP performance, preliminary analyses revealed no relationship between state resource and equity indicators. In conclusion, Education Week suggested that, while standards-based education and its implementation are far from perfect, they can contribute to improvement in American schools.

Clearly, NCLB is having a transformative effect on the nation's educational landscape. The number of states embracing content standards and other provisions of NCLB is steadily increasing, and early results of student achievement measures are showing modest progress among all demographic groups. Many questions about the law's impact still remain, however. Among others, the issue of whether NCLB enhances or constrains performance-based knowledge not generally measured by standardized tests remains an unanswered question. Whether reauthorization would lead to greater flexibility and a renewed commitment to provide the support needed to sustain systemic school reform also remains open to debate. Regardless, NCLB has sharpened the focus on the need for data to inform educational decisions and has presented educational practitioners and scholars with an unprecedented opportunity to impact national policy through research.

Influences of State Policy on Systemic Change in K-12 Education

Kathy Christie

State policies can have a profound impact on facilitating or impeding systemic change to learner-centered, customized education on the district and school levels. This blurb identifies a few such policies that can strongly influence such systemic change.

Time-based vs. competency-based
Students today are largely permitted to progress only by meeting seat-time requirements, which means that students who learn faster than average are expected to sit through a class for longer than necessary, while students who learn slower than average are penalized for not learning the required information within an arbitrarily set time limit.

States could facilitate the transformation to customized education by allowing students to test out of courses and to make course completion contingent on demonstration of competency. For example, Utah passed a bill in 2004 (http://www.leg.state.ut.us/~code/TITLE53A.htm#53A01020.htm) that requires the state board to set high school graduation requirements that use competency-based standards and assessments. The legislature defined competency as "a demonstrable acquisition of a specified knowledge, skill, or ability that has been organized into a hierarchical arrangement leading to higher levels of knowledge, skill, or ability." The bill also defines competency-based education as an "education approach that requires students to acquire a competency and includes a classroom structure and operation that aid and facilitate the acquisition of specified competencies on an individual basis wherein students are allowed to master and demonstrate competencies as fast as they are able." Gain score is defined as "the measured difference of a student's score at the beginning and end of a time period." The state board is required to assist school districts and charter schools to develop and implement competency-based education and to use gain scores.

Cultivate students’ strengths
Just as some students have stronger skills than others, students may have strengths in some academic areas, while having difficulty in others. Truly customized education would take this into account while allowing the student to progress. State policies can foster systemic change by providing options on high school exit exams that allow for demonstrated proficiency in all areas but one, or that allow students to provide proof of their understanding in an alternative way. For example, Maryland requires passage of end-of-course assessments in four areas for graduation. Beginning with the class of 2009, students may meet the requirement by either (1) achieving the passing scores previously approved; or (2) meeting a minimum score on each test that is lower than the previously set passing score and achieving a combined score on all four exams that is equal to the sum of the previously approved passing scores. So students who cannot do well on one or more tests may compensate by exceeding passing scores on other tests.

Data to customize learning
Correctly collected and applied student data can help meet individual students’ needs. State policies can facilitate this transformation by (1) providing sufficient state support for data systems that allow teachers direct, easy access to real-time assessment results, (2) providing support for common technology systems that meet specified components of student information systems (see: http://www.ecs.org/html/IssueSection.asp?issuieid=28&is=Other and http://www.ecs.org/html/issue.asp?issuieid=2&subissuesid=91), (3) providing support for computer-adaptive assessments that save time and allow for more accurate above-grade and below-grade specificity and that allow instruction to build on student strengths rather than
targeting deficits, (4) providing support for training in collecting and using data correctly (for principals, teachers, support teams) and (5) providing support for intervention specialists to assist students who are behind. In contrast, state policies can impede such transformation by: (1) requiring standards that are not subject to review and modification, (2) mandating assessments that take too much time away from instruction and (3) providing insufficient state support for classroom materials and supplies (see the ECS issue site on assessment: http://www.ecs.org/html/issue.asp?issueid=12).

Other policies

Other state policies to foster systemic change in school districts include: (1) ensure that students are not locked into instructional tracks, (2) provide incentives for immediate intervention services, (3) provide support for alternatives that allow and encourage acceleration of student learning, particularly for those students not performing at grade level and (4) support professional development and job redesign (with the emphasis on instruction) for principals. For example, see “The First Ring Leadership Academy” (at http://www.ecs.org/clearinghouse/65/66/6566.pdf). This brief, supported by MetLife Foundation, examines a leadership academy that has achieved remarkable success with the “homegrown” approach to school leadership preparation in an area with challenges traditionally faced by inner-city districts.

Influences of Charter School Policy on Systemic Change in K-12 Education

Irene Brock

Forty-one states and the District of Columbia now have charter school laws, according to The Center for Education Reform, http://www.edreform.com (January, 2006). These pieces of legislation have allowed nearly 3,600 charter schools to open in the U.S. (U.S. Charter Schools, http://www.uscharterschools.org, January 2006). The charter school movement is clearly enabling many students, parents and teachers to seek another avenue to meet needs that are unmet by traditional public schools.

Because of the freedoms that charter schools have from regulations, one might expect to find radically different curricular, pedagogical and organizational designs in these schools that are unavailable in traditional schools. Upon inspection, however, it is readily evident that charter schools tend to look curiously like traditional public schools, with an occasional magnet-school-like program dotting the charter landscape. If a major intent in the launch of the charter school movement was to enable and foster innovative educational designs for the information age, why is there so little of it? Does the opportunity not genuinely exist?

The most accurate answer is, “It depends.” A quick analysis of the collective body of states’ charter laws revealed that there are several supportive factors. Charter schools are self-governing and free to design their own curricula, instructional approaches, hours of operation and student grouping structures. There are typically start-up funds and technical services available. In some states, the public per-pupil funding flows directly from the state to the school. What, then, is impeding systemic change?

If we assume that learning in the information age means discovery and development of one’s strengths, interests, aptitudes and ambitions, as well as continuously enlarging and expanding the skills and tools of learning and advancing the ability to think and problem-solve at increasingly complex levels, then we now have radically different purposes and goals, and we need radically different school structures to achieve them — structures that are customized to individual student needs. Yet state charter laws require charter school students to achieve the same standards adopted for all public schools, and they must be evaluated by the same state-specified standardized test. Worse, within those standards are specific grade-level standards and indicators, forcing all students to learn the same things at the same time and pace. There is no acknowledgement of the decades of research demonstrating that the learning rate, mode, pathways and purpose of students vary dramatically. Being limited to the same set of academic expectations and timelines set for regular public schools, charter schools will never be able to produce the needed transformation to truly learner-centered, customized education for a society in which knowledge work has replaced most manual labor.

Will charter schools get us where we need to go in the information age? It's not likely. While they are granted various freedoms lacking in other public schools, in no state are charter schools currently free from the two controls that matter most — mandated state standards and assessment systems. Very few people have the expertise to design schools that meet the demands of this industrial-age paradigm and that of the information age simultaneously. State legislators and other officials must relinquish these two controls before charter schools will be able to change systemically to a more effective and appropriate paradigm of education.

Do charter schools hold any promise for systemic change? The major obstacle is that those who believe in the promise of charter schools have yet to realize that the most significant problem with current schools is not so much the schools themselves, but the paradigm, including the nature of the broader administrative and governance systems in which they must function. The charter school concept does hold promise, but it cannot fulfill its potential to produce the systemic change needed to move public education into an information-age paradigm until state legislatures recognize and are willing to act upon at least these five things: 1) that better teachers, standards, curricula, assessments and schools are not the answer, while a new and different paradigm is; 2) that more than a decade of research informs us about how young humans learn best; 3) that more time, money and facilitative resources are required for organiz-
ers to design an information-age paradigm of schools; 4) that teachers and parents really can make good decisions about the educational needs of their students and 5) that there are no quick fixes to a quality educational system appropriate for life in the Information Age.

State leaders of all stripes must be far-sighted and strong enough to weather the short-term storms necessary to produce the substantial long-term gain in learning that charter schools could achieve.

Influences of National Policy on K-12 Education in an Asian Country: The Korean Case

Hongsoo Lee

The Korean educational system

The current education system in Korea is much more centralized than in the United States. It operates in a top-down manner from the Ministry of Education (MOE) to each of the provincial offices of education, then to principals, to teachers and finally to students. The system has produced graduates who are not well suited to the challenges of today's fast-paced information society.

The suprasystem's impact on the schools

The policy-makers in the MOE recognize the need to provide students with higher problem solving abilities and foster creative and critical thinking for their future work and life. Consequently, the MOE launched various educational reform efforts around 1997. However, the speed of change in the schools seems frustratingly slow due to the absence of substantial support from the government. Without practical support from the top, it is impossible to change a centralized system which means that the role of suprasystems is very important in systemic change.

Change from the top

When government officials want to change on the national level, changes do not always happen in all schools. Because of the importance of stakeholders' mindsets and the required resources, changes might not happen even on the top level. Let's look at the experience of the Korean educational system. To prepare for the information-based and globalization era, the MOE has launched various reform efforts. For example, the MOE has set forth a new national curriculum focusing on learner-centered education and distribution of multimedia hardware and software to schools. The curriculum has emphasized constructivist inquiry and cooperative learning as teaching approaches and performance-based, authentic portfolios as assessment approaches. And recently the MOE has tried to develop systems for evaluating teachers' effectiveness with assessment by students, parents and principals. However, those initiatives generally were not driven successfully.

In the classrooms students are still doing sedentary work, listening to teachers and participating in recitations. The situation in classrooms prohibits students from feeling emotionally involved, thinking critically and being stimulated mentally as they are expected to do in the new system. For example, the introduction of a computer education curriculum for the information-based society brought unexpected negative effects. The application of computers and electronic musical instruments in music classes brought about decreasing emotional appreciation of music itself in students. Schools are only clinging to the "technical use" of technology rather the ethical and social issues related to problem solving and making informed decisions. The newly implemented assessment approaches that were to measure students' individual differences and abilities based on continuous, performance-based, portfolio-based multiple measures also failed to serve their true purpose, leaving teachers to implement traditional assessments that measure students' ability to recall selected knowledge. Consequently, the MOE had asked teachers to teach the subject matter with the new teaching and assessment approaches, but in the traditional environments.

These kinds of failures are due to the top-down process in implementing policy. The MOE did not succeed in providing a shared vision among the stakeholders and failed to provide scaffolding and substantial support for a positive teaching environment that is needed for the transformation of a school system. The MOE did not provide enough scaffolding to enable the teachers to adopt beliefs and values consistent with a new paradigm of education. There were very few efforts to help teachers prepare and plan for a reformed curriculum. Moreover, parents and community members were not ready for the change, and remained in the traditional mindset of a time-based educational system. Without the shared vision of all stakeholders, these change efforts are fruitless.

Without practical support to schools and teachers from the top for implementing a fundamental change, it is impossible for the change to succeed. In the decision-making process for educational transformation, the government officials, subject matter experts, parents, community members and schoolteachers should develop shared ideals, purpose and vision of education for the future. It should be an opportunity to combine top-down and bottom-up approaches to change the educational system and to discover more appropriate scaffolding and substantial support for implementing the new policy. It is also important that the stakeholders in the educational system collaboratively select the appropriate model of the new system as well as their systemic change process (with expert input). The MOE alone should not develop a new system or select from a few models.
Author Information and References for Section 3

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University of California College Prep Online http://www.uccp.org
Florida Virtual School http://www.fvs.net
High Tech High http://www.hth.org
Virtual High School http://www.govhs.org
Illinois Virtual School http://www.ivhs.or
Kentucky Virtual School http://www.kvhs.org
Michigan Virtual High School http://www.mivhs.org


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North American Council for Online Learning http://www.nacol.org
National Education Technology Plan http://www.nationaledtechplan.org
Partnership for 21st Century Skills www.21stcenturyskills.org
Generation Yes http://www.genyest.org
NetDay http://www.netday.org
iEarn http://www.inearn.org
Pew Internet Project Study http://www.pewinternet.org
Keeping Pace with K-12 Online Learning http://www.ncrcl.org/tech/pace
Experiences in Systemic Change

Reculturing Norfolk Public Schools
Scott Thompson

Between 1998 and 2005 the organizational culture of Norfolk Public Schools (NPS) was transformed, leading to dramatic increases in student performance outcomes and significant narrowing of achievement gaps that had widely separated groups and subgroups of students. The district serves 37,000 students in 49 schools, and the majority of those students (68%) are African American and qualify for free and reduced-priced lunches (63%).

Change process
The overarching process in the systemic improvement of NPS has been reculturing. Organizational culture can be defined as the underlying shared beliefs, history, assumptions, norms and values that manifest themselves in patterns of behavior. Reculturing, then, is fundamentally altering the invisible factors that influence behavior and thus transforming the organization’s culture.

In Norfolk, reculturing has been accomplished through the following strategies:
- Establishing a “no excuses” philosophy. Denise Schnitzer, who was Norfolk’s interim superintendent in 2004-05, says that before John Simpson became superintendent in 1998 the district had “an excuses mentality” — poverty and race were seen as an excuse, if not an outright justification, for low academic achievement of some students. Simpson brought a “no excuses” philosophy that now pervades the central office and schools.
- Developing a widely owned philosophy of teaching and learning. In group dialogues, facilitated by Panasonic Foundation consultants, NPS stakeholders talked through questions and issues of teaching and learning and developed a full-page statement of the system’s Philosophy of Teaching and Learning, including descriptions of responsibilities for administrators, teachers, students, parents and community members.
- Building trust and encouraging risk-taking. According to John Simpson, when he arrived in the district in 1998, the culture was one in which “trust was not seen as a high value,” and people did not feel free to take risks. Cabinet member Linda O’Koneck says, “We had to build trust among ourselves and with the schools through our actions and through our words.” Sharon Byrdsong, a middle school principal in the district, confirms the change: “I don’t think we’re afraid to take risks in our building, because the culture is so supportive.”
- Shifting the focus of central office from monitoring schools for compliance to active support of schools. Through most of the 1990’s, the system had separate departments of professional development and curriculum and instruction. As part of the reculturing, these departments were merged in a new department called Leadership and Capacity Development. Whereas the members of the old departments spent little time in schools, LCD staffers spend 70 percent of their time in schools conducting workshops and responding to needs.
- Basing decisions on data, not favoritism or politics. With the old culture, promotions sometimes resulted from who knew whom on the school board. In the recultured system, positive results are rewarded, and programs that have no data to back up their claims are eliminated.
- Establishing a system of shared accountability focused on results. With assistance from the Center for Performance Assessment, the district developed a data-based, shared accountability system, where everyone from the school board to the superintendent to central office departments to schools is held publicly accountable for results. In Norfolk, technology directors and food service directors, not just principals, must report on their endeavors to improve student achievement.
- Engaging the business community in leadership development. District leaders in Norfolk worked with Greater Norfolk Corporation, an alliance of business executives, to develop a highly individualized school leadership development program that is, in large part, delivered by participating corporations.
For an in-depth description of the change process and outcomes in Norfolk Public Schools, see the December 2005 issue of Strategies (volume 11, number 1), which can be accessed on line at http://www.aasa.org/publications/strategies/index.htm.

New system
The NPS change process has fundamentally altered the relationship between the central office and schools around teaching and learning. Now the district’s Leadership and Capacity Development department takes each school’s data-rich accountability plan and determines what assistance each school needs, which means that the focus and content of professional development often varies dramatically in different schools.

Results
The most important results of Norfolk’s thoroughgoing reculturing are the dramatic increase in student achievement at all grades levels and in all subject areas. For example, the percent of students passing third-grade
history and social studies increased from 28% in 1997-98 to 82% in 2003-04.

In July 2005, Stephen Jones arrived in Norfolk to assume the Superintendency. Around the same time, two senior cabinet members left. This transitional period represents a test of the durability of Norfolk's transformation process and an opportunity to extend and deepen it.

A Systemic Change Experience in the Chugach School District
Jo Clem and Wendy Battino

The Chugach School District won the 2001 Malcolm Baldrige National Quality Award for creating a successful performance system using input from schools, communities and businesses and allowing all students to meet with success and take ownership of their educational careers. This systemic change was created by Chugach beginning in 1994 through a process that involved four distinct components for systemic transformation of education: shared vision, shared leadership, standards-based design and continuous improvement.

Shared Vision is a collective purpose derived by gathering input from all stakeholders (students, parents, community members, education staff, administrators, business people, elders, etc). Developing a shared vision was an essential part of the Chugach change process for real systemic reform, because it encouraged participants to explore new paradigms. Stakeholder input came from answers to questions concerning what stakeholders wanted for students and schools. The shared vision drove the entire systemic change process, including district planning, training, policies and budgets. To establish a shared vision, Chugach used the Onwards to Excellence (OTE) process. Community, school and business partner meetings were held on a regular basis. Input from all of these stakeholders held five common threads, which became our Organizational Performance Goals (OPG).

Shared leadership was crucial to sustain the shared vision in Chugach, and everyone had to take responsibility to be a leader and then cultivate leadership in others. To be effective, leaders considered the contribution that every member could make to help education and the change process. Leadership was grown at all stakeholder levels.

Standards-based design provided the roadmap. Therefore, a major focus of the systemic change process was on conducting standards-based design, which included standards, instruction, assessment and reporting. This kind of design used the “best of the best” practices and encouraged innovative thinking, teaching and effective instruction.

Continuous improvement processes were put in place to consistently evaluate and refine district practices through research and benchmarking in order to improve and address changing needs.

Due to the publicity generated by the Malcolm Baldrige National Quality Award, a multitude of schools and communities have sought guidance and support for engaging in a similar kind of effort. Consequently, the Re-Inventing Schools Coalition (RISC), a non-profit foundation, was established. Now, additional districts are replicating the processes used by Chugach, now known as the Re-inventing Schools Model (RSM). Their systemic change experiences with the RSM have met with encouraging results.

The RSM brings communities together to redesign their schools to better serve students of all ages, abilities and ethnicities. Proven best practices combined with ground-breaking approaches have enabled schools and districts to change their systems in new and meaningful ways.

Since its inception with the Chugach School District, RSM has been formalized from the Chugach processes by RISC and has been replicated in 15 districts and over 200 schools. RISC, in partnership with Chugach, has kept current with schools using RSM, maintaining fidelity of its use, providing quality training and support and using a critical eye to examine the results of RSM efforts. The processes used to nurture the four components (mentioned above) have been researched and acclaimed, namely through the prestigious Malcolm Baldrige Award and by education expert Dr. Robert Marzano (2005), who said:

As far as I can tell, the Re-Inventing Schools Model, as implemented by Chugach and other districts in Alaska involved with RISC, is the most comprehensive and well articulated approach to standards-based reform in the entire country.

RISC recently conducted an analysis of the implementation of the RIM and student performance results in the 15 districts that have taken a systemic approach to this innovative reform. What we found is extremely encouraging. Through external evaluation, a positive correlation was found between implementation and student performance, with district four-year trend lines of student performance showing significant gains in student achievement.*

More information about this reform process, including the “Guide to Re-Inventing Schools,” is available at the RISC website, www.reinventingschools.org, or call us at 907-522-3132. We look forward to hearing from you and of your success!


A Systemic Change Experience in Decatur Township
Kurt Richter and Charles Reigeluth

In January 2001 the Indianapolis Metropolitan School District of Decatur Township (referred to henceforth as
Decatur and Indiana University entered into a long-term partnership for systemic transformation of the entire school district (see http://www.indiana.edu/~syschang/decatur/index.html). Decatur is a small, partly urban and partly rural, school district on the southwest side of Indianapolis (see http://www.msddecatur.k12.in.us/).

**Decatur's change process**

The systemic change process in Decatur is informed by the Guidance System for Transforming Education (see GSTE blurb in Section 5). In Phase I, "Initiate a systemic change effort," the initial co-facilitators (Charles Reigeluth and Roberto Joseph) assessed four school districts' readiness for systemic change and entered into an informal agreement for a long-term partnership with Decatur.

Central to the GSTE is the formation of a relatively large Leadership Team (about 25-30 highly respected leaders of all stakeholder groups) to provide the major engine and political support for the systemic change effort. Prior experience showed that such a large team often takes on a culture and dynamic that are not conducive of systemic change. Therefore, Phase II, "Develop a Starter Team," entailed helping each of the major stakeholder groups to select a key leader to be on a small Starter Team. Five people were selected: the superintendent, a prestigious principal, a parent leader (PTA president from one of the elementary schools), the president of the teachers' association and a new school board member.

The main purpose of the Starter Team was to develop a culture of shared leadership, stakeholder empowerment, consensus-building, trust and collaboration, and an understanding of systemic thinking, paradigm shift in society and the systemic change process in education. The Starter Team engaged in a retreat in June of 2001 and met bi-weekly to study readings, develop an agreement for systemic change and assess the district's capacity for systemic change (see Joseph, 2003, for details).

When the Starter Team reached a sufficient level of development (culture and understanding), it initiated Phase III, "Develop a district-wide framework and capacity for change." First, it expanded itself into the Leadership Team, and Starter Team members helped it develop a similar culture and understanding. Soon, the Leadership Team felt that too much time was being devoted to learning and not enough to action. It was decided that the Leadership Team's development should be done in the form of just-in-time learning as they developed a district-wide framework of information-age vision, mission and ideal beliefs about education.

The major obstacle encountered during this phase was the difficulty of finding enough time for the Leadership Team to do its work. Consequently, in December 2004 the Leadership Team created subcommittees to speed up their progress.

In December 2005 the Leadership Team formed a Central Support Team comprised of the superintendent's entire Cabinet (12 members) to be its "executive arm" in facilitating formation and support of school-based teams, conducting workshops, fostering broader stakeholder ownership of the Framework and in other ways assisting the Leadership Team.

In January 2006 the Leadership Team and Central Support Team helped each school to form a Self Assessment Team to assess and enhance its readiness to redesign their school in a way that embodies the Framework.

**Results**

To date, the Leadership Team has developed the district-wide Framework, including mission, vision and ideal beliefs about education. This Framework represents a radical move from a sorting-focused educational system to a learning-focused system that is founded on research-based, learner-centered psychological principles and true customization to greatly accelerate learning for all students. It will be used to guide schools as they attempt to design a new paradigm of education. The Leadership Team has developed, throughout the district, a culture of collaboration, trust and consensus-building. It has cultivated a style of leadership that empowers all stakeholders to be leaders. It has also developed considerable enthusiasm to transform from an industrial-age system to the information-age system represented by the Framework. An indicator of the value of the accomplishments to date is that the superintendent received the Indiana Superintendent of the Year award in 2005.

The barriers to systemic change are many and varied, but "the ease or difficulty of transcending the existing system depends a great deal on our attitudes toward change" (Banathy, 1996, p. 117). This is a problem of mindset change, and our experience in Decatur points to this as an ongoing and entrenched problem that must be addressed throughout the process. The scarcity of time, money and resources allocated to the effort is also problematic. Systemic change does not come easily, and the products of change will take years to show fruition, but the end result promises to be well worth the effort.

**A Systemic Change Experience in the Ditmas Educational Complex**

Marcelle Doll

For the past five years, Co-nect has worked with IS #62, The Ditmas Educational Complex in Brooklyn, NY, around accelerating the integration of technology into teaching and learning. Ditmas has a diverse student population with 50% African American, 24% Hispanic, 17% Asian, and 9% Caucasian students. 17% of its students are recent immigrants. Almost all of the students qualify for free or reduced lunch.

As one of the first 1:1 schools, financed through JP Morgan Chase, each family receives a desktop computer for their home, once parents are trained. The ON_DEC (Our Neighborhood-Digital Education Community) goal was to bridge the Digital Divide between urban and suburban
students. The principal, Dr. Nancy Brogan, wanted to build a collaborative atmosphere that emphasized the sharing of ideas as teachers learned new technology skills to help students bridge the digital divide.

The change process

Co-net support includes a professional development process, based on the National Staff Development Council Standards. In the beginning, teachers were surveyed on their technology skills and their ability to integrate the technology into teaching and learning. Co-net provided support to the school as they:

- Mapped technology training to student achievement goals and instructional priorities which provided teachers with new ways to link technology and student achievement
- Facilitated faculty study groups to ensure teacher collaboration and classroom application
- Aligned the use of software, the Internet and other technologies with academic standards
- Helped teachers use technology to build students' higher-order thinking skills.

Based on the results of the technology survey, teachers were initially introduced to Co-net's Exchange, which offers a comprehensive online source for professional development and best-practice instructional ideas. The Exchange provides:

- The Project Library — an award-winning library of more than 800 field-tested, standards-aligned projects covering a wide range of disciplines and grade levels.
- The Student Center — an online center for teachers to share classroom activities and initiatives with students and families.
- Professional Development Modules — "bite-sized" online training on topics such as literacy, mathematics, family engagement, assessment and technology.

A technology team was formed at the school to continuously address the needs of the teachers in Math and Literacy. The team, made up mostly of teachers and with the full support of the administration, provided leadership at the teacher level and served as technology leaders. The professional development was regularly adjusted, based upon school walkthroughs.

The new system

With Co-net, technology isn't a mere enhancement — it is a means to change the way students learn. Co-net helped the teachers realize new educational uses of technology. The major goals for Co-net's work at IS #62 were to increase instructional technology leadership capacity, build a professional learning community and use data effectively to improve professional development and technology resource allocation.

What has changed at IS #62?

More teachers are included in the support and implementation of the systemic reforms, and this has facilitated full-building ownership and desire to increase technology integration. Teachers regularly meet to discuss the issues and challenges of technology and share with each other the work they do in classrooms with technology. Classroom instruction has moved from the traditional teacher directed model to more hands-on engaging instruction where students are guided to produce work with real-world implications. These authentic experiences include tele-collaboration with schools around the world to enable a cultural exchange of ideas, building websites to make the work the students do around Math and Literacy public and allowing students to embark on virtual field trips to learn about the world outside of their neighborhood in Brooklyn.

Evaluation

Each year, Co-net conducts a review of the services that have been provided. Based on the most recent walkthrough, the teachers at IS #62 were actively and successfully using a range of different technologies to extend and enrich teaching and learning in educationally important ways that would not otherwise be possible. According to an independent report prepared for the district, Co-net has had significant, positive impact on teaching and learning in School 62. The evaluators found that Co-net's work with teachers had resulted in

... greater understanding of how to harness technology to support classroom instruction, more effective use of teacher-pretime, renewed enthusiasm for teaching, and the development of more engaging and effective teaching reflecting the use of best practices and teacher collaboration. [And] ... students have provided evidence of increased technological skills, higher levels of social and cognitive learning, increased ownership of learning, and more investment in their learning process. (Barlin & Nash, 2002, p. 16)

A State-Level Systemic Change Experience: The Georgia Systemic Teacher Education Program

Julie Moore

The Georgia Systemic Teacher Education Program (GSTEP) has been a 6-year effort to reconceptualize teacher education in the state of Georgia. GSTEP is a collaborative effort of three universities (including both Arts & Sciences faculty and College of Education faculty), eleven school districts and all state agencies to develop a cohesive and coherent network of teacher support. As an example of systemic change at the higher education level, GSTEP underscores the value of relationship development and stakeholder participation in building a successful change
effort. Interestingly, our success has also led to a dilemma of an "unsystemic" nature.

**Change process**

Funded by a Teacher Quality Enhancement Partnership Grant in 1999, GSTEP began by creating several project teams to address teacher education at key stages. Early Experience Teams, Curriculum Development Teams and Induction Teams each developed a variety of initiatives within their respective areas. Each of the teams consisted of equal numbers of teachers, Arts & Sciences faculty and College of Education faculty — ensuring the inclusion of all these stakeholder groups in the process. Beginning Teacher panels were also formed, providing the voice of beginning teachers to a variety of GSTEP projects. As GSTEP began, project members quickly realized that they did not have a common understanding about what it meant to be a quality or accomplished teacher. Thus, one of the first activities of the Induction Teams was to find a common language about what it means to teach that could be utilized throughout a teachers' career.

With iterative rounds of focus groups and writing, over 400 educators from around the state and a 14-person cross-institutional writing team helped craft two critical documents — the GSTEP Principles (http://www.coe.uga.edu/gstep/documents/principles072803.pdf) and The GSTEP Framework for Accomplished Teaching (http://www.coe.uga.edu/gstep/documents/gstep_framework0603.pdf). The Principles articulated the shared values that guided the rest of the work of GSTEP. The Framework provided a common language about good teaching that could be utilized both within Arts & Sciences and Colleges of Education, as well as across the lifetime of a teacher's career.

**Change products**

The GSTEP Principles and the GSTEP Framework for Accomplished Teaching, while foundational, were only two products of the GSTEP initiative — there were many more. The Early Experiences Teams helped draft and institute new College of Education policies requiring that all applicants to the teacher education program first have an approved early experience in an educational setting. Additionally, they created and supported teams of Student Ambassadors that represented the College of Education and they sponsored panels on teaching for prospective students. The Curriculum Teams created dual-degrees in several areas and refined university courses to address state and national standards. The Induction Teams created not only the above documents, but also a living, growing articulation of the Framework — a web-based system called the BRIDGE (Bridging Resources: Induction and Development for Georgia Educators) which brings together teacher-developed or suggested resources around the GSTEP Framework. The BRIDGE will also host and support cross-community, teacher learning communities (groups made up of pre-service, in-service and university faculty) (http://www.teachersbridge.org). Additionally, teacher self-assessment and student-teacher observation tools have been developed to match the framework. Lastly, Induction Teams raised the awareness of the importance of induction to local school districts to a point where each district now has induction programs in place and are actually sharing data on teacher turnover and retention.

Perhaps the most important products of the GSTEP project are the relationships that have been built within the College of Education, between the College of Education and Arts & Sciences, with local school districts, across universities in the state and with a variety of state agencies.

Our success “dilemma”

One of the signs of the success of the systemic process is the acceptance of the GSTEP Framework for Accomplished Teaching. Now re-titled the Georgia Framework for Teaching, it has been adopted by all major state agencies and is serving as the foundation for a new teacher assessment system under development. While we couldn't be more thrilled that our work has been so well received, it creates a dilemma from a systemic perspective. Systemic change efforts on the scale of GSTEP can be more accurately described as “representatively systemic.” That is, representatives of various stakeholder groups are involved, but not entire stakeholder groups. Thus, what has been developed systemically for us, will now, because of state-level adoption, be top-down for others. Hopefully, knowledge of the systemic process used to develop the Framework will enhance its acceptance by teachers throughout the state. It's an interesting dilemma that we are excited to tackle.

**Systemic Change in Sun Microsystems**

Janet Hoo

Working in a large company like Sun Microsystems is much like working in a large school system. Policies and procedures are often dictated from a corporate office with little say from the departments or individuals actually impacted by the change. In an international company with over 30,000 people worldwide, directing a change in policy is very difficult. Many departments make individual improvements to their areas without realizing the impact to other groups or the business as a whole. In this article, I discuss the systemic changes which were critical in making the Education Department a core part of doing business.

When I joined Sun nine years ago, Education was treated as a separate business unit from the rest of the company. Education was charged with the design, development and deployment of all internal and customer training. Decisions regarding which classes were to be run and their frequency, size and locations were made by Education. Since Education was a standalone business unit, it was very common to see other groups outside Education also developing training. This resulted in multiple groups within Sun developing training on the same products at the same time for the same audience. This duplication of
effort was very costly to the departments and to the overall business. Individual groups would meet to discuss plans and procedures to implement change, but it never lasted. Direction changed, policies changed, and the result was confusion and more duplication of effort. Duplication was not limited to training — it was occurring in Sales, Marketing and Manufacturing. The only solution to this problem was to implement a systemic change.

The first change was in the management structure. The existing corporate structure was a CEO with individual Vice Presidents all running their own lines of business or "vertical silos."

The vertical silo structure resulted in limited inter-departmental communication, and departments had no one with the authority to direct a change in policy. Before starting to implement change, a survey was sent to all employees at Sun to determine what was working and what was not. Management realized that if change was to be successful, the people asked to implement and support the change must have a stake in that change. Sun changed the management structure to a single line of business with all related departments reporting to the same Vice President. Education was transformed from a standalone department to a key component in the product lifecycle. The education group was reorganized with a director who reported into the Vice President of Support. Training was also partnered with a group that reported to Human Resources.

The second corporate-wide change was to implement change tools. Following the direction of GE and other large companies, Sun adopted the use of a hybrid version of Six Sigma, called "Sun Sigma," which is a process that assists in directing change. Education began using Sigma to step through a systemic change process. The first step was to talk to all the groups within Education to determine major issues. The second step was to interview stakeholders; both internal and external. The change in corporate structure to a single, high-level management reporting hierarchy simplified the task of identifying roles and responsibilities. Additionally, by identifying Education's charter with all departments and the benefits that Education could provide to them, Education was then able to drive change.

The third major change was that Education was given the resources to manage the change process for their department. This was done by allowing Education to form and run Sigma teams when they identified an issue that required change. Running a Sigma team gave Education the ability to pull in members of other departments who would either impact or be impacted by the change. Education members also led other Sigma teams when training issues were identified. This gave each department a stake in solving the problems they identified and ownership in the solution.

Using a systemic change process for Education changed the entire scope of its business. The educational process no longer exists in a vacuum. Education has a direct line of communication with each of the business areas and is able to provide input into the overall direction of the corporation. Weekly meetings with stakeholders, team members and employees involved with the flow of the training development or delivery process, such as the editorial group, are now common.

Education is now seen as a critical part of a larger system, and it impacts the entire corporation at all levels. Within Education each member is a critical part of the system, empowered to direct and impact change.

An International Experience in Systemic Change: Azerbaijan
Larissa V. Malopinsky

For many developing countries, change in their educational systems and integration of innovative pedagogical methods represent a critical path toward achieving competitive economic advantage and becoming a part of the global community (Chapman et al., 2005; Kozma, 2005). Since gaining its independence from the Soviet Union in 1991, Azerbaijan has been working on developing a framework for educational reform within the context of fundamental changes in social, economic, political and government structures. The focus has been on providing access to quality learning resources throughout the country and developing democratic educational strategies (Asian Bank Study, 2004).

The country's changing economic and political landscape requires new approaches for educating an information-age workforce (Bagirov, 2001). Distance education (DE) is viewed as an opportunity to bring change to the traditional teaching and learning practices that evolved within the local socio-cultural context during the Soviet period, and introduce learner-centered pedagogy (Azerbaijan National Human Development Report, 2003).

A three-year partnership project between Indiana University, the Azerbaijan State Economic University and the Azerbaijan Research and Education Network Association, has been focusing on both developing online teaching capabilities in Azerbaijan and introducing a shift in pedagogical paradigm by growing change agents who can assist Azerbaijani faculty with implementation and justification of new pedagogical concepts in online teaching.

The project started in 2003 with the analysis of faculty readiness to teach at a distance and examining technological capabilities. Although many Azerbaijani universities developed sufficient technical capabilities for establishing online education, the only distance form offered to students has been correspondence education that allows limited interaction and no collaboration. The conclusion was drawn that the development of distance education in Azerbaijan was less of a technology issue and more a need for: a) defining a new paradigm of pedagogical approaches that would be effective in an online environment, b)
designing and delivering online curricula and c) managing and evaluating the online learning process.

In order to fulfill this need, the following strategy was developed by Azerbaijani and American partners:

- Prepare local experts in the new paradigm of online instruction through the Indiana University certification program.
- Establish an e-learning center providing instructional design support and consulting to Azerbaijani universities.
- Design an online curriculum for Azerbaijani faculty, offering problem-based courses focused on distance teaching and course management.
- Develop a demonstration online course for a specific discipline.

The process has been rewarding but difficult due to a number of epistemological, cultural, communication and administrative barriers. The most challenging aspect has been a difference in beliefs about the role of teachers and students in the instructional process and the role of collaboration in achieving individual learning goals. The industrial-age, teacher-centered pedagogy accepted in Azerbaijan and the lack of team-work experience made it difficult for the Azerbaijani group to establish effective communication, manage their project activities and provide peer feedback. In every design task, the Azerbaijani group left all decisions to the American team and preferred to view the IU partners as authority figures. They also found it challenging to conceive instructional situations where learners take responsibility for their own learning steps.

A number of cultural issues impacted the process: different expectations regarding time management; high vs. low tolerance of ambiguous situations that characterize any design process; and low trust within the Azerbaijani group in regards to the work produced by the teammates. The project partners conducted multiple work sessions for addressing those issues and establishing the models that would be acceptable to all participants. Lastly, several administrative barriers have delayed implementation of the new mode of instruction. The most critical ones relate to the fact that the Azerbaijani legislature has still not approved the use of distance education for obtaining university degrees.

Despite these challenges, there has been tremendous progress over the course of the two years of the project. The change in how Azerbaijani partners view distance education and collaborative work is evident on many levels. They continuously take more responsibility for various project aspects. Evidence of change in pedagogical approach can be seen in the instructional products designed for Azerbaijani faculty. In collaboration with the IU team, the Azerbaijani group has developed the first course that utilizes problem-based methodology and emphasizes each learner's ownership over her learning path.

The systematic collection of written evidence, observations and informal discussions will contribute to development of understanding of barriers and opportunities for implementing a learner-centered paradigm of distance education in Azerbaijan and will assist in further facilitation of fundamental pedagogical change in this country.

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The Process of Systemic Change

Step-Up-To-Excellence: A Protocol for Navigating Whole-System Change in School Districts

Francis M. Duffy

Piecemeal change to improve schooling inside a school district is an approach that at its worst does more harm than good and at its best is limited to creating temporary pockets of “good” within school districts. When it comes to improving schooling in a district, however, creating temporary pockets of good isn’t good enough. Whole school systems need to be transformed in a sustainable way.

To transform an entire school system, change leaders in that system must know what a system is and how it functions, and they must be skillful in using a specially designed protocol to navigate whole-system change in their school districts. This article introduces readers to one example of a change protocol called Step-Up-To-Excellence (SUTE) (Duffy, 2003, 2004).

SUTE is a three-step process that is preceded by a Pre-Launch Preparation phase. (The original version of SUTE had 5 steps. In the spirit of continuous improvement, Steps 2-4 were combined to create Step 2 of the current version, thereby reducing the protocol to three steps.) After a period of change followed by a period of stability, change leaders recycle the transformation process to begin a new pre-launch preparation period, since school system transformation is a never-ending journey that moves a district ever closer to its idealized vision. The process proceeds as follows:

- Pre-launch preparation
- Step 1: Redesign the entire school system
- Step 2: Create strategic alignment
- Step 3: Evaluate whole-system performance
- Recycle to the next pre-launch preparation phase

SUTE was designed to create and sustain systemic change inside school districts. Because the term “systemic change” has different meanings, it is important to clarify exactly which meaning was used to design the SUTE protocol. Squire and Reigeluth’s (2000) concept of ecological systemic change guided the design of SUTE.

Ecological systemic change views school districts as systems with rich networks of interrelationships and interdependencies within the district and between the district and its “systemic environment” (the larger system of which it is a part, its peer systems within that larger system and other systems with which it interacts outside of its larger system). This perspective recognizes that a significant change in one part of a school system requires changes in other parts of the system. This view of systemic change is how “systems thinkers” view systemic change in organizations (e.g., Ackoff, 1981; Banathy, 1996; Checkland, 1984; Emery & Purser, 1996; Senge, 1990).

SUTE is also designed on the premise that there are three paths that must be followed simultaneously to create and sustain whole-system change in school districts (Duffy, Rogerson, & Blick, 2000). The three paths are: Path 1, transform a district’s relationship with its external environment; Path 2, transform a district’s core and supporting work processes; and Path 3, transform a district’s internal social “architecture” (which includes organization design, reward systems, organization culture, job descriptions, administrative policies and procedures and so on).

Presently, SUTE is being used in conjunction with Reigeluth’s Guidance System for Transforming Education (GSTE) in the Metropolitan School District of Decatur Township, Indianapolis, Indiana. The principles that underpin the SUTE protocol are also part of several whole-system change initiatives in school districts like San Diego Public Schools, Kent County Public Schools (Maryland), the Chula Vista School District (California) and the Baldrige award-winning Chugach School District in Anchorage, Alaska.

Readers are invited to visit www.thefmduffygroup.com for additional information about SUTE. Those who would like to receive a free quarterly report about whole-system change distributed via E-mail may contact Dr. Duffy at duffy@thefmduffygroup.com and request that their name be included on his distribution list.

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The Guidance System for Transforming Education (GSTE) is a process model that provides guidance to a facilitator helping a K-12 school district (never just a single school) to engage in systemic change. The GSTE does not provide any indication of what changes should be made in the district; that decision is left to the district's stakeholders. It was originally developed by Jenlink, Reigeluth, Carr and Nelson (1996; 1998) and has undergone further development through its use in a systemic change effort in Decatur, a township in Indianapolis (see Section 4). The GSTE is comprised of:

- a set of core values about the change process,
- some "continuous events," which are activities that must be addressed continuously throughout much or all of the change process, and
- some "discrete events," which are a chronological series of activities for engaging in systemic change.

Some of the values upon which the GSTE is based include: caring for children and their future, systemic thinking, broad stakeholder ownership, process orientation, participant commitment, dialogue, consensus-building, disclosure, respect, collaboration, organizational learning, vision, flexibility, culture and a neutral facilitator who has experience in district-wide systemic change.

The continuous events must be constantly monitored and addressed by the facilitator and other participants in the change process. There are currently 18 such events: evaluate and improve the change process, build and maintain political support, sustain motivation for change, develop and sustain appropriate leadership, build and maintain trust, evolve mindsets and culture, secure necessary resources, develop skills in systems thinking, allocate necessary resources, develop group-process and team-building skills, build team spirit, engage in self-disclosure, engage in reflection, develop design skills, communicate with stakeholders (2-way), build and evolve community, foster organizational learning and build an organizational memory.

The discrete events for the systemic change process fall into the following five phases.

Phase I. Initiate a systemic change effort.

The facilitator assesses and enhances his or her level of readiness to guide a systemic change effort in a school district. The facilitator begins to establish a relationship with a school district, and determines whether the district is at a sufficient level of readiness for a systemic change effort. If both the school district and the facilitator are at a sufficient level and are committed to working with one another, then they negotiate a formal agreement that stipulates expectations for all stakeholders involved, including the role of the facilitator.

Phase II. Prepare a Starter Team.

Once a formal agreement has been signed, the facilitator guides the school district in forming a "Starter Team" to initiate the change process. The Starter Team should be small, preferably with the most powerful leader from each of the major stakeholder groups (e.g., the superintendent, a new board member, a parent, the teachers' association president and a non-teaching staff member). The primary role of the Starter Team is to assess the district's capacity for systemic change, develop an understanding of the need for and nature of systemic change and develop a systems-design culture on their team, in preparation for expanding into a larger Leadership Team in which that culture and understanding will be cultivated.

Phase III. Develop a district-wide framework and capacity for change.

The Starter Team expands into a Leadership Team of about 25 people, comprised of highly respected opinion leaders in all the various stakeholder groups. The Leadership Team provides political support for the change process and is entrusted with making the decisions, with much stakeholder input, about the change process and the changes. It creates a framework of shared vision, mission and beliefs for an "ideal" (but conceivably eventually workable) learner-centered, information-age system for their community. It also creates and develops a Central Support Team (Schlechty, 2001), made up of central office personnel, to work with school-based Design Teams in Phase IV.

Phase IV. Create designs for new schools.

The Leadership Team and Central Support Team help each building to enhance its readiness for design and form a Design Team of about 10 well respected creative thinkers from all the building's stakeholder groups. They work with all their stakeholders to design and implement an information-age, learner-centered school consistent with the district-wide framework. Large schools often create multiple design teams for smaller schools-within-the-school. The Leadership Team later forms a district design team to redesign the district-level administrative and governance systems, with strong participation from each School Design Team.

Phase V. Implement and evolve the new system.

Once a school's design has been approved, it is implemented and continually refined through formative evaluation. Eventually, the process will begin anew.
The Schlechty Center For Leadership In School Reform

Monica Solomon

The Schlechty Center for Leadership in School Reform (www.schlechtymcenter.org) was launched in 1988 by Dr. Phillip C. Schlechty as a means to provide high-quality and responsive support to those who are leading school reform efforts across the nation. The Center, a private nonprofit corporation, works with public school districts and their leaders to transform the existing system of rules, roles and relationships that govern the way resources are used in schools to a system that is focused on the quality of work provided to students.


- The Theory of Engagement focuses attention on student motivation and the strategies needed to increase the prospect that schools and teachers will be positioned to increase the presence of engaging tasks and activities in the routine life of the school.
- The Theory of Change focuses on transforming schools from organizations based on the assumption that the core business of schools has to do with producing compliance and attendance to organizations where the core business focuses on nurturing attention and commitment.

In support of these theories, the Schlechty Center has developed frameworks to help district and school leaders to bring about this transformation. To accomplish the transformation called for by the Theory of Change, schools and school districts will need to undergo systemic change as well as introduce innovations that are disruptive and threatening to many of the interests that are served by the present arrangement of schools. The following is a brief introduction to the Theory of Change.

According to Christensen (1997), there are two kinds of innovations: sustaining and disruptive. Sustaining innovations are those innovations which are congruent with existing systems and which existing systems have the capacity to support and sustain over time. Sustaining innovations can be introduced through strategies that are quite similar to the strategies used in improvement efforts, since such innovations do not require much in the way of systemic change. In other words, sustaining innovations can be introduced through well-articulated, codified and pre-packaged projects and programs of action.

Disruptive innovations are those innovations which are incongruent with existing systems and/or which are beyond the capacity of the present system to support and sustain for a long enough time to demonstrate their effectiveness. Improvement can result from actions intended to enhance or improve the skill with which persons employ the present technology (the means of doing the job). These actions are properly viewed as training activities, and are sometimes referred to as staff development. They are also frequently associated with the introduction of sustaining innovations. Sometimes, the improvements needed go beyond the technologies that the present system has the capacity to support. These require the introduction of innovations that require supportive changes in systems as well as changes in the orientations and performance capabilities of individuals. Such disruptive innovations cannot be introduced through programs and projects. These innovations and the systemic changes that are needed to support them can only be introduced through leaders who understand the nature of systems and systemic change. Such leaders must possess the courage and fortitude to bring about changes in the structure and culture of the school to enhance the possibility of success.

The structure and culture of the school gain expression through systems of norms. Both structure and culture determine the capacity of the school to accept and incorporate new technologies. (The structure of the school refers to existing systems of rules, roles and relationships. The culture refers to the values, commitments, tradition, lore and shared meanings of the school).

The normative system is organized around functional areas that are critical to the life of the school district and school:

- the Recruitment and Induction System
- the Knowledge Transmission System
- the Power and Authority System
- the Evaluation System
- the Directional System
- the Boundary System

The Theory of Change is the basis for the Center's 10 District Standards (http://www.schlechtymcenter.org/psc/10standards.asp). For schools to be able to support and sustain the systemic changes needed to introduce disruptive innovations, they must possess the following capacities:

- the capacity to focus on the future
- the capacity to maintain direction in the face of adversity
- the capacity to act strategically

A Professional Development Approach to Systemic Change

Geoffrey Caine

In the view of the Caine Learning Institute, the systemic change process is first and foremost a professional
development process, because the key to systemic change is a shift in the mental models of stakeholders.

**Our foundation: Process learning circles**

Process learning circles are action-based, reflective study groups for teachers, non-teaching staff, administrators, parents and other stakeholders. They build a sense of community and trust among participants so that they get beyond the fear of looking ignorant and begin to genuinely examine their own ideas and practices.

To be successful, participants must be able to listen well. One building block, therefore, is a strategy that we call an “ordered sharing.” This process only takes about 15 minutes of a 90-minute meeting. Group members silently examine some core material, and then each person in turn shares a thought or personal story about the material out loud. Everyone else listens without interruption and, as much as possible, with a mindset of “isn’t that interesting?” When one person is finished, the next one continues, and so on around the circle. Because the direction of sharing is fixed and there is a limit to how long anyone can speak, there is no competition for time. And because there are no interruptions, people begin to feel free — over time — to reveal what they actually think and believe.

The direct experience of a good field of listening helps to trigger a shift in educators’ awareness of what a really good learning environment looks and feels like and can be like in a classroom.

**Stage one: Creating more complex direct instruction**

The first step in moving from direct instruction to a more learner-centered and constructivist approach is to make it more complex and creative. Our frame is our 12 brain/mind learning principles (Caine et al., 2005), such as “the brain/mind is social” and “the search for meaning is innate.” Group participants examine one principle a month in their process circles. They discuss it, reflect on personal experiences as learners and brainstorm ways to use the principle during the following weeks. When possible, we or colleagues also visit each teacher in the classroom once a month for coaching and feedback. During this phase, reflection is partly guided in terms of three elements that can ultimately work as an organizing frame for sophisticated instruction. These are the creation of an optimal climate for learning, immersion of learners in experiences in which the standards are embedded and continually guiding learners to process experiences through artful questions.

This process typically takes about a year.

**Stage two: The jump to simple constructivism**

For educators who already appreciate the multi-dimensionality of students, we introduce a more complex model of instruction based on the three elements mentioned above (creation of an optimal climate, immersion in experiences, and guiding learners through questions). The focus is always on creating a classroom climate where students feel competent, confident and interested. The essence of the instructional model is for a teacher to construct a “global experience” as the basis for introducing students to a new topic. After this 10- to 20-minute event, there is time for students to describe what they found interesting and to formulate questions of their own. These questions become the basis for subsequent student research and teacher guidance. Thus, the teacher retains substantial control and at the same time begins to hear and work with authentic student voices.

This instructional model is developed by teachers through the process learning circles. Again, it is a matter of guided study, experiments by teachers in their classrooms and reflection on action in the learning circles.

Over time there is a major shift in the way that teachers see the classroom, students and themselves. At that point authentic student choices and decisions become the focus for all that a teacher does. Thus, teachers need to have a fluid approach to time, space and content.

... Then there’s the system

Moving the system is difficult, but our philosophy is the same. While there are many other critical factors, paradigm shift requires a change in the mental models (perceptual orientation) of enough stakeholders. Our goal, therefore, is to support the shift of as many adults in a school as we can until there is the critical mass that enables a constructivist philosophy to prevail.

**User-Design for Systemic Change**

Alison A. Carr-Chellman and Luis Almeida

User-design is a relatively new phenomenon that was first introduced to the Instructional Systems/Educational Technology field by Banathy (1991). It is difficult to say if user-design is more of a philosophy or an approach to systemic change. Either way, user-design can have a powerful impact on a systemic change process. It empowers users, the people nearest to the ground, nearest to the front lines. It allows stakeholders to design their own systems of human learning, and it gives them a responsibility to do so. Banathy used to tell us that it is immoral to design for another. We agree.

This brief introduction to user-design only offers a basic outline of the approach in the hopes that the reader will seek more information. User-design is founded on systems theory and thinking and can be concisely defined as “an authentic empowerment of a particular set of stakeholders, the users of any innovation, such that they are creating their own systems of human learning” (Carr-Chellman, in press). User design takes as its central assumption that users should be responsible for creating their own systems and that professionals who have design expertise should be responsible for helping users in that process.

User-design is a difficult process akin to design by committee. Those who advocate for user-design make no pretense that the process is easy, but they recognize the inherent value of engaging users, and they also see the return
on investment that comes during the implementation, adoption and sustaining phases of the change process. Benefits of user-design include the reduction of resistance during adoption, improved quality of ideas and designed solutions, greater relevance of ideas to the context, smoother diffusion and sustainability of innovations and several other areas which improve effectiveness if not efficiency.

It can be said that many excellent, professionally designed solutions have failed miserably when they “hit the ground.” This is often the case because of a lack of user empowerment and decision-making. While the users may have been consulted (although, often not) in the design process, they are too often not empowered. Lack of ownership typically results in users having a higher resistance to an innovation. Also, design flaws that might have been uncovered during user-design are not eliminated before implementation, resulting in “unexpected” future costs.

In order for user-design to be effectively employed, a major shift in power dynamics (Carr, 1996) must occur. User-design is distinct from user-centered or learner-centered design (in which users are consulted but not empowered), emancipatory design (in which the goals of social reformation tend to overshadow the goals of good design) and participatory design (which is commonly associated with Scandinavian forms of human computer interface design). User-design draws heavily from these roots, from the foundations of stakeholder participation and from systems theory and thinking.

While the value of including the users in the creation of their own systems of learning may seem obvious, such inclusive efforts have a history of incomplete implementation. Meeting the challenge of shifting power dynamics, empowering stakeholders and educating for design must, at some level, fall to the leaders of any organization undergoing systemic change. Thus, user-design is inherently political. It requires careful decision making around who will be involved (everyone, representatives of groups?), how leadership will be involved (fully, partially, consulted?), what aspects of the project will be user-designed, how to overcome apathy, how to secure leadership support and user-engagement – and the issues go on and on.

The basic stages in the user-design process cannot be captured in a bulleted list or a linear step-by-step model. This would be antithetical to the nature of user-design and what it seeks to accomplish. However, for the designer interested in facilitating user-design, the process does approximate the following rough stages: readiness, team selection, process design/tool selection, capacity building, process engagement, trials of innovations, iterative assessment of process and product innovations and evaluation of user-design systemic impacts. Naturally this represents an oversimplification, but more can be learned about the user-design process by studying the work of Banathy (1991; 1992; 1996) and Reigeluth (1993; 1996) on the subject and examining Carr-Chellman’s (in press) text on the application of user-design for instructional design.

A Chaos Theory Approach to Systemic Change

Charles M. Reigeluth

The process of transforming a school system is highly complex and difficult to predict or control. Chaos theory (Kellert, 1993; Wheatley, 1999) was developed to help understand highly complex systems. It recognizes that beneath the apparently chaotic behavior of a complex system lie patterns that can help one to understand and influence its behavior. Some of the key features of chaos theory are described next.

Co-evolution

A system changes in response to changes in its environment, and its environment changes in response to its changes. As we evolve deeper into the information age, the need for co-evolution in education has become ever more urgent (Banathy, 1991).

Disequilibrium

Co-evolution is fostered by disequilibrium, which Prigogine characterized as the necessary condition for a system’s growth.

Positive feedback provides information about opportunities for a system to change the goals it pursues. Thus, it helps a system to co-evolve with its environment. Often it takes the form of perturbances. A perturbation is any change in a system’s environment that causes disequilibrium in a system.

Transformation

Disequilibrium makes a system ripe for transformation, which is reorganization on a higher level of complexity. Transformation occurs through a process called “emergence,” by which new processes and structures emerge to replace old ones.

Fractals and “strange attractors”

Transformation is strongly influenced by “strange attractors,” which are a kind of fractal (Wheatley, 1999). Fractals are patterns that recur on all levels of a system. In educational systems, they are “core ideas” and values or beliefs (Banathy, 1991, 1996) that characterize the system. These recurring patterns strongly influence, and are influenced by, complex system dynamics and structures (Senge, 1990). One example of a fractal in education is autocratic control. On the district level of an educational system, the school board typically controls the superintendent, who controls the principals. On the building level the principals control their teachers. And on the classroom level the teachers control their students. Another example is uniformity or standardization, and there are many other fractals that characterize our factory model of schools.

A strange attractor is a kind of fractal that has a powerful influence over the processes and structures that emerge in a system undergoing transformation. One example in
education is empowerment, which entails providing both the freedom to make decisions and support for making and acting on those decisions. On the district level this takes the form of the school board and superintendent empowering each building principal to experiment with and adopt new approaches to better meet students' needs and to make other important decisions (hiring, budgeting, etc.). On the building level the principal empowers each teacher to experiment with and adopt new approaches to better meet students' needs and to participate in school policymaking and decision making. On the classroom level the teacher empowers each student to make decisions about how to best meet her or his needs. Other examples of strange attractors include customization/differentiation (or diversity) and shared decision making/collaboration.

To become an effective strange attractor for the transformation of a school system, the core ideas and values (or beliefs) must become fairly widespread cultural norms among the stakeholders most involved with making the changes. Once this happens, very little planning needs to be done for the transformation to take place. Appropriate behaviors and structures will emerge spontaneously through emergence and self-organization.

Self-organization
Self-organizing systems are adaptive; they evolve themselves; they are agile (McCarthy, 2003). They require openness, self-reference and freedom (Wheatley, 1999). To be open with its environment, a system must actively seek information from its environment and make it widely available within the system. Self-reference refers to the ability to remain consistent with the core ideas, values or beliefs that give the organization an identity. Freedom for people to make their own decisions about changes, as long as it is guided by sufficient self-reference, will allow changes to occur before a crisis point is reached in the system, thereby creating greater stability and order.

Chaos theory can help us to understand when a system is ready for change and the system dynamics that are likely to influence individual changes and their effects, as well as to understand and improve the transformation process as a complex system. It tells us that we cannot hope to control the transformation process, but we can hope to influence the process through the use of strange attractors and leverage points, and that we must constantly adjust and adapt the process to the emerging, ever-changing reality of a particular educational system and its environment.

A Leveraged Emergent Approach to Systemic Transformation
Charles M. Reigeluth

The process of transforming a school system is a far more complex and difficult endeavor than is piecemeal reform, because it entails designing and implementing an entirely new paradigm of education, rather than changing a piece within the existing paradigm. The primary approach to systemic transformation that has been offered in the literature is the Idealized Design Approach pioneered by Russell Ackoff (1981) in the corporate sector and adapted by Banathy (1991) to educational systems.

The central difficulty with the Idealized Design Approach is that much time and energy must be invested to design the new system in some detail before any attempt is made to transform the current system to the new one. Problems with this approach include: (1) the large amount of time without visible results can cause considerable loss of motivation for change, and (2) key personnel (school board members, superintendents, principals and teacher leaders) frequently move on to other positions before the process has a chance to play out.

The Leveraged Emergent Approach is an alternative approach that arose out of the district-wide K-12 systemic transformation effort that is still underway in Decatur, a township of Indianapolis. The Leveraged Emergent Approach is based on the following principles:

- Leverage. In transforming an existing system to a new paradigm, it is hard to change everything at once. When you change one part of the system, it will become incompatible with the rest of the system, which will then work to change it back. Therefore, you must first change a part or parts of the system that can exert powerful leverage on the remaining parts of the current system — more powerful than the leverage that the rest of the current system will exert on changing the new parts back to what they were. Starting with a few high-leverage changes can make the whole systemic change process considerably quicker and easier.

- Emergent design. It is difficult to design a new system from scratch, because it is difficult to predict what will work best (see previous blurb in this section). In an emergent approach, a few guiding principles or beliefs (“strange attractors” in Chaos theory) are selected, a few high-leverage changes are implemented, and the remaining changes occur through creativity, trial, and error — they gradually emerge over time.

- Visible progress. It is important for participants in a systemic change process to be able to see progress often. This sustains motivation and wins over skeptics.

This approach begins with establishing a district-wide framework of “ideal” mission, vision and beliefs that are learner-centered and in other ways consistent with the educational needs of the Information Age. Then, school-level design teams are charged with building consensus (mindset change) on a few high-leverage, structural changes of their choice, as long as they fall within the district-wide framework. They might include such changes as:
The “what” is the new design of the bridge. The “how” is the process of getting from the old design to the new one. Many researchers have focused on the change process, including Reigeluth, Duffy and other authors in this special issue of TechTrends. We believe it is also extremely important to focus on the outcomes of change — i.e., how well the new system is predicted to work. We need both approaches (which are complementary), since a change process can be effective but the resulting new system may not work well. To continue the analogy, we could successfully build a new bridge, but it might collapse during a heavy wind.

We propose the Get Ready, SET, Go! model to predict educational system outcomes to guide the change process. This is an inquiry-based approach that utilizes SimEd Technologies (SET). The model is outlined below:

**Phase 1: Get Ready**

- Identify the specific current education system to be improved.
- Over some interval of time, measure system properties (e.g., input, regulation, complexity, strength) with Analysis of Patterns in Time and Configuration (APT&C), which is a methodology for measuring system dynamics and structure.
- Use Predicting Educational Systems Outcomes (PESO) software to predict future outcomes based on observed system properties under existing conditions (e.g., complexity increases, decreases, or remains constant). PESO is a computer modeling tool, based on a well-defined Axiomatic Theory of Intentional Systems (ATIS), that will predict what future outcomes will occur as a result of current system conditions. These predictions are based on how the system is currently designed and operates under existing conditions, before any new design is implemented.
- If these outcomes are what are wanted, then do not modify the system; otherwise, proceed to Phase 2.

**Phase 2: SET**

- Use PESO software to model newly envisioned educational system designs — i.e., the changes desired that are feasible.
- Run PESO predictions far enough in time to make sure all the consequences of the newly designed system would be acceptable. Are these the wanted outcomes? If yes, proceed to Phase 3. If no, continue to use PESO and try different changes until satisfactory outcomes are predicted.

**Phase 3: Go!**

- Implement the new design chosen in Phase 2.
- Over some interval of time, measure system properties with APT&C.
- Verify that the measures confirm the predicted system outcomes. If not, then analyze both the Phase-2 and Phase-3 processes to determine what modifications are required. For example, why did the changes not produce the predicted result?
The first analysis would be a Phase 3 analysis to determine if the validation parameters were accurate, and if the changes were implemented properly. Most problems concerning outcomes will be a Phase 3 problem. Phase 2 problems are concerned with the design of the theory and cannot be evaluated as a part of the empirical analysis. If the problem cannot be resolved in Phase 3, then it must be transferred to a theoretician familiar with ATIS.

SimEd Technologies consist of APT&C and PESO software programs that are currently under development. APT&C is a mixed-mode research methodology and software tool to help create knowledge of education that is directly linked to practice. APT&C bridges the gap between traditional linear models in quantitative research and qualitative research findings that lack generalizability (Frick, 1990; 2005).

PESO is a software tool that makes predictions for a specific educational system, based on current conditions. One must first observe properties of that system and determine how the values of those system properties change over some time period — e.g., increase, decrease, remain constant, increase to some value then decrease. When those changes in system property values are entered into PESO, the software finds relevant axioms and theorems which match those conditions and then executes the logic of the Axiomatic Theory of Intentional Systems (ATIS: Thompson, 2005). PESO effectively applies relevant parts of ATIS in order to make predictions of what will happen in the system. For further information, see: http://simechtech.com.

Work remains to be done before the strategy we recommend can be utilized in practice. APT&C, PESO and ATIS are currently under development. Empirical research is needed to validate theorems in ATIS. APT&C and PESO promise to be powerful tools to facilitate this research. Then Get Ready, SET, Go!

A Corporate Reengineering Approach to Systemic Change

Christopher D. Ryan

If management want companies that are lean, nimble, flexible, responsive, competitive, innovative, efficient, customer-focused, and profitable, why are so many businesses bloated, clumsy, rigid, sluggish, noncompetitive, uncreative, inefficient, disdainful of customer needs, and losing money?

Michael Hammer and James Champy pose this question in the 2003 update to their seminal 1993 work on business process reengineering, *Reengineering the Corporation: A Manifesto for Business Revolution*, a book that presents exciting ideas and holds valuable lessons for systemic change in business, government, and education.

The treatment of their subject, the systemic reorganization of business firms, offers strong parallels to changes that are being called for in education systems. Key to Hammer and Champy’s argument is the idea of throwing out existing business practices and starting from scratch — a powerful, if daunting, approach to aligning the way business is conducted under the requirements of the information age.

Reengineering focuses on dismantling the industrial-age model originally imposed on business organizations in the 19th and early 20th centuries. This view held that work should be broken down into its smallest parts, with workers and their products controlled by a highly centralized management. Hammer and Champy argue that this model is outdated and inappropriate for today’s business environment; it fragments work, undervalues workers and management and creates a cumbersome system plagued by miscommunication, redundancy and excessive overhead costs. The authors advocate synthesis rather than fragmentation: an approach to organization built around the fundamental business processes that serve customers, rather than around non-value adding internal checking and control systems.

**How to reengineer**

The authors begin the “how to” section of the book by explaining who will do the reengineering. At the organizational level, they identify the leader, a senior executive who “owns” the organization’s overall reengineering effort; a steering committee of senior managers, responsible for oversight of the organization’s overall effort; and a reengineering czar, responsible for the organization-wide development of reengineering tools and techniques and achieving synergy across multiple efforts. At the process level they identify the process owner, a manager who maintains responsibility for a given process both during and after the reengineering effort; and the reengineering team, which critiques the existing process and develops and implements the reengineered process.

The authors next examine what should be reengineered. Mapping an organization’s business processes, which can be obscured by organization charts and business units, is the first step. Once processes are mapped, reengineering efforts must be prioritized, typically based on three considerations: 1) degree of dysfunction, 2) importance of the process and 3) feasibility of successfully reengineering. The authors recommend looking for “broken” processes first, and provide several examples of how to identify “diseases” afflicting processes by recognizing “symptoms.” When a process has been selected for reengineering, process reengineers must build their understanding of the process and determine how it “should” look, primarily by focusing on the needs of the ultimate process customer.

Hammer and Champy next tackle the experience of process reengineering by providing a fascinating look at what a redesign session is really like, and introducing tools and techniques from their consulting practice.
These include identifying and questioning all assumptions associated with a process, and using information technology to radically change how work is done. The authors identify information technology as one of the fundamental enablers of the reengineering movement, but they emphasize that using technology to try to fix existing processes is not a valuable solution; only the transformative power of technology can achieve radical breakthroughs in performance.

Lastly, the authors offer advice on succeeding in reengineering. A key to success is anticipating, and dealing with, the change management issues associated with reengineering. They emphasize the importance of strong, committed leadership and clear communications, from the outset, throughout the organization. They recommend introducing reengineering efforts through a “case for change,” explaining clearly why reengineering must be done, and following this with a “vision” of how the reengineered organization will function.

Conclusion

Hammer and Champy’s work is required reading for those who would effect systemic change in organizations, because it moves so far beyond theory and into the applied practice of reengineering. While they focus on business firms, Hammer and Champy’s arguments and ideas are applicable to any organizational setting, such as government or education, where there is a complicated bureaucracy and hierarchy that can obscure the needs of the ultimate customer (think taxpayer or student).

**Leaning the System: Adding Lean Thinking to Systems Thinking**

Shane DeMars

In the early 1990s business jargon started to become increasingly international. As folks learned the lessons of Toyota’s production system *kaikaku*, *kaizen*, *muda*, and *poka-yoke* became familiar terms. In 1995 James P. Womack and Daniel T. Jones synthesized the principles of Toyota and other lean production systems, in their book, *Lean Thinking*. Their revised 2003 edition brings the ideas up to date and provides a longitudinal look at the status of the organizations depicted in their many excellent examples. Here’s a quick primer on lean thinking and how it relates to systems thinking.

*Lean Thinking* describes five principles that are at the core of lean thought.

1. **Value** — This is the heart of lean thinking. Creating and sustaining the value that only the customer defines. Once value is defined, all efforts are aimed at identifying and eliminating *muda*, or waste.

2. **Value Stream Mapping** — This activity follows a product (which may be a service) from inception to delivery. It is scalable, and may stretch from raw material to final product or only from in house concept development to ultimate delivery. The idea is to gain a greater understanding of the entire value stream so that muda can be identified everywhere and eliminated. There are activities that directly produce value, those that produce no value but which cannot be currently eliminated (type 1 muda) and those which add no value whatsoever (type 2 muda).

3. **Flow** — There is no value in an idle product, one that is transported unnecessarily or one that is not really needed. When products continue to flow through a system, they continue to acquire value. When the flow is interrupted, by backlogs, stoppages or even by over production, then muda takes form.

4. **Pull** — This concept can be summed up in a simple phrase: Make nothing until the customer wants it, then make it very quickly. If followed, most storage and nearly all over-production are eliminated.

5. **Perfection** — In quality terms this relates to continuous improvement. Perfection can never be attained, but must be pursued relentlessly. The key to perfection is transparency. Everyone knows what is going on, so everyone at any level can identify ways to improve.

In addition to the principles, Womack and Jones offer an “action plan” (process) for conducting systemic change.

After identifying the value stream, most type two *muda* can be quickly eliminated. In nearly all cases, a process is redesigned for maximum efficiency. Called *kaikaku* (radical improvement) this lean activity may resemble reengineering, but this is where the similarities end. In the pursuit of perfection, employees, not just managers, practice *kaizen* (continuous improvement) to continue eliminating *muda* and increasing quality. Furthermore, lean thinking inherently incorporates more systems thinking. Here are some examples of how:

- Value stream mapping is a way of looking at all the systems that act on a product.
- The ideas of flow and pull are interdependent elements of a lean system. Indeed, an organization can be only maximally effective through lean thinking if both their suppliers and their customers understand the processes.
- In the democratic and collaborative spirit that undergirds the pursuit of perfection, *Lean Thinking* advocates and describes how many lean organizations help the customers and suppliers by teaching them these principles and aiding in their lean transformation.
- Relationships are emphasized and the system becomes stronger through transparency. Different functional areas begin to realize the interdependent nature of their activities.

You may say, “Ge, thanks, but I’m not in manufacturing.” While this may be true, any process, product or service can benefit from the application of lean principles. Here are a few examples of how knowledge of lean can be applied in ISD, training, and education.
• Instructional design and production — Instructional Systems Design (ISD) has long been lambasted for its muda. While several alternative instructional development models exist, lean thinkers Womack and Jones would likely laude benchmarking, but caution that it may not be appropriate everyplace. Instead apply the principles and banish muda in your system.

• Lean training — As the popularity of the lean movement increases, more and more organizations are searching for the best way to learn the lean techniques. The Lean Enterprise Institute (http://www.lean.org/) is one nonprofit organization with this aim in mind.

• Higher education — The Lean Education Academic Network (http://www.teachinglean.org/) is a recently established organization of educators interested in increasing the incorporation of lean thought in university education. As these skills become increasingly valued, so too will graduates of programs that incorporate these lessons.

Author Information and References for Section 5

Step-Up-To-Excellence: Protocol for Navigating Whole-System Change in School Districts


The Guidance System for Transforming Education

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A Professional Development Approach to Systemic Change

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User-Design for Systemic Change

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A Chaos Theory Approach to Systemic Change

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A Leveraged Emergent Approach to Systemic Transformation

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Systemic change: Get ready, SET, go! – where?

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Learning the system: Adding lean thinking to systems thinking

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Section 6

New Systems Produced by Systemic Change

Systemic Changes in the Chugach School District

Wendy Battino and Jo Clem

The 200 students in the Chugach School District (CSD) are scattered throughout 22,000 square miles of remote area divided by glaciers, mountain ranges and icy seas in South-central Alaska. Some village and school sites are 100% Aleut (Native Alaskan), while other sites include heterogeneous groups. Students receive educational services in one of three villages accessible by small aircraft, or from itinerant teachers who regularly visit wilderness homes in the Valdez and Fairbanks regions through the District Extension School Program.

The new system

A comprehensive systemic change effort was initiated in 1994. Using input from our schools, communities and businesses, CSD realigned its curriculum to create performance-based standards in 10 areas: mathematics, science, technology, reading, writing, social sciences, service learning, career development, cultural awareness and expression and personal/social/health development. Individual Learning Plans (ILP), Student Assessment Binders (SAB), Student Learning Profiles (SLP) and Student Lifeskills Portfolios support and document consistent progress toward proficiency in all standards for each learner. CSD developed performance standards continuums for all content areas. These continuums of standards are a working document for our students, parents and teachers and provide a roadmap of clear expectations towards success for our students.

In order to break away from traditional modes of education, CSD applied for a waiver from the Alaska Department of Education and Early Development to...
forgo traditional Carnegie units, or credits, as graduation requirements and instead use our performance standards as graduation requirements. This waiver was granted, opening the way for CSD to meet the needs of individual students. Student results are measured formally and informally through a system of multiple assessments.

Humans learn and develop at different rates, but traditional educational systems do not allow for this individuality. The power of our new system is that students are given the flexibility to achieve levels at their own pace. Some students achieve graduation levels at 14 years of age while others reach them at age 21. This individualizing of our educational system allows all students to succeed, take ownership of their education and reach the graduation levels at a pace that is appropriate for them. No student waits for the rest of the class or is pushed into learning beyond their developmental level. Every student is expected to master the same rigorous academic materials. This approach has created confidence in students and made them much more accountable for their learning.

Graduation requirements exceed state requirements in many ways. We spell out the quality that students must demonstrate in all areas. In our traditional system, a student who received a “C” or “D” in a high school language arts class received credit and moved on. In our new system, a student must prove proficient in multiple assessments, which equates to a “B” in the old system. Students are allowed extra time to achieve that level if necessary, but must meet the rigor of graduation level. Another way that CSD graduation requirements exceed state requirements is exemplified by our ten content areas. While the Alaska High School Graduate Qualifying and Benchmark Exams (HSGQ&BE) assess students with criterion-based reading, writing and math exams, the Chugach assessment system gives criterion assessments in seven additional content areas: service learning, career development, personal/social/health development, technology, cultural awareness and expression, science and social sciences.

Teachers, parents, students and community members are aware of student educational goals, because they helped to create the standards. All opportunities are available to students regardless of their learning abilities. District-wide multiple assessments have been created to evaluate student progress. Given thirty days of staff development annually, teachers have the time and skills to make their instruction effective so students know exactly how to achieve their educational goals.

Results

Student performance skyrocketed as a result of these systemic changes. The district was in crisis twelve years ago due to low student reading ability. CSD is now a provider of leading-edge education where all students are reading at or above their grade level in a traditional system. We have created a seamless and connected educational system that works for all of our students from preschool until after graduation. California Achievement Tests (CAT) scores soared from the bottom quartile to an average of 72nd percentile in five years. In 2000, CSD students ranked second in the state on a statewide writing assessment. One hundred percent of Chugach graduates are making a successful transition to further educational opportunities. While such results are encouraging, the plan does not end here. New innovations are currently being designed to help CSD provide the best education possible for all students.

Systemic Changes in Public Schools through Brain-Based Learning

Renate N. Caine

We (Renate and Geoffrey Caine) have introduced our Brain/Mind Learning Principles and process learning circles into both single-school and multi-school projects. Our single-school endeavors include Dry Creek Elementary, a K-6 school in Sacramento (see Caine & Caine, 1997) and Redwood Elementary in Fontana, California. Our most extensive engagement has been as part of a team on a project called “Learning to Learn” in Adelaide, South Australia. Learning to Learn is an initiative of the South Australian Government that has developed in three phases over the last six years and covers a network of over 170 educational sites, from preschool to Year 12.

One of the first changes at Dry Creek Elementary, after a period of disequilibrium, was the emergence of a new sense of orderliness that permeated the entire school. It was evident in the front office as well as in the classrooms, in interactions between adults as well as between adults and children. A similar shift in atmosphere and culture emerged over time in many of the Learning to Learn schools as well.

There were also significant shifts in approaches to teaching, as reflected in observations, teacher self reports and anonymous surveys. For instance, one teacher wrote: “I’m aware that I’m doing too much direct teaching. I should facilitate more.” A general shift to teachers engaging one another in more professional and sophisticated discussions about learning and teaching was reported across projects. This was a typical comment: “With my colleagues we have begun listening to each other more quietly and carefully in meetings (I’m still working on it).” Some, but not all, teachers went on to make the major shift from direct instruction to brain-based, learner-centered methods.

Similar types of outcomes, with a range in the shift that teachers have made so far, occurred in Learning to Learn. The most commonly reported general set of outcomes identified by Learning to Learn participants relates to the transformative power of their Core Learning Program and the subsequent reconceptualization of their role from one of “teacher” to “leader of learning.” Le Cornu, Peters, Foster, Barratt & Mellowship (2003) state that the significant outcomes consistently reported by teachers, leaders and students in Learning to Learn sites

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have demonstrated wide-ranging changes to “classroom practice, learning environments, learning relationships, learning conversations and learning tasks” (Quoted in Department of Education and Children’s Services, 2004, p. 14).

In one on-line survey (Department of Education and Children’s Services, 2004), 140 teachers and leaders reported changes to many aspects of school-wide and classroom-based practices. When focusing on their own attitudes and practices, marked improvements were reported in teaching method and teacher morale. Survey results highlighted increasing self-esteem and confidence in teachers, increased attendance at professional development events and a decrease in staff absenteeism. Furthermore, teachers reported that they had become more open to questioning and uncertainty; more willing to seek critical discussion and debate and to question long-held beliefs and that they were now better able to articulate learning theories and models.

Larger systemic changes have also emerged, particularly when non-teaching staff have been involved in the process. Learning to Learn reports that teachers, students and parents have been working together more frequently, while in our single schools there is evidence of a greater sense of connectedness between parents and schools, as well as much more parent involvement. Interestingly, there is also evidence of a greater focus on research and observation of outcomes (Learning to Learn data collection, 1999-2003, available at http://cmslive.curriculum.edu.au/leader/default.asp?id=12065). Learning to Learn has developed close connections with a range of state and national initiatives and within the Department of Education and Children’s Services (DECS), systems thinking is now more in evidence.

Finally, in both the single schools and Learning to Learn, there have been extensive shifts and improvements in student outcomes. All sites report substantial improvement in test scores. Redwood, for instance, is a low SES school but jumped from the tenth to the seventh decile in terms of test scores in one year. In addition, most sites report that a greater number of students exercise choice responsibly, reflect on their learning, accept alternative viewpoints, work with greater persistence, express greater hope for the future, are able to articulate learning, can assess their own learning and participate in the design of the curriculum.

In conclusion, brain-based, learner-centered, professional development, combined with a larger set of systemic changes, leads to both better student performance and significant shifts in the culture and operation of the system itself.

A Vision of an Information-Age Educational System
Charles M. Reigeluth

Reigeluth and Garfinkle (1994) presented one possible image of the features of an educational system appropriate for the new conditions and educational needs of an information society. They called this image "LearningSphere 2000" and developed it to help those interested in systemic change both to "jump out" of their current mindsets about education and to offer some ideas they might find useful for their own new system. This blurb presents a summary and update of that image, which is intended to be illustrative rather than prescriptive and to stimulate thinking rather than present a solution.

1. Learning experiences. The learner’s progress is continuous and personalized, utilizing active learning and authentic and interdisciplinary tasks. Each learner must master a task before progressing to another in the same general area. Collaborative learning, mastery and advanced technology are central. Students learn to assume increasing direction and responsibility for their learning.

2. New role for teachers. The teacher is a guide who helps the student and parent(s) decide upon appropriate instructional goals, and then helps identify and coordinate the best means for the student to achieve those goals. The guide assumes responsibility for a student for a developmental stage (3-5 years), which develops a caring relationship. Apprentices, parents, other students and other people also facilitate learning.

3. Clusters as schools. A cluster of 4-10 guides (much like a law firm) acts as an independent contractor in a school district.

4. Choice, incentives and resource allocation. Parents choose an appropriate guide with help from an independent Consumer Support Agency. If more students want a given guide than that guide is willing to take, a lottery system decides who attends. Clusters receive a set amount of money for each child (directly from the state), but the amount is higher for children with special needs. A cluster’s primary budget, therefore, depends on the number and neediness of students enrolled. Its secondary budget is based on the ratio of "first choice" selections its guides receive. Guides’ salaries (and employment) depend on their whole cluster’s success, so guides in a cluster have great incentive to help each other. Clusters may not levy extra charges.

5. Learning centers. Learning centers operate as independent contractors and cater to guides. Every few months each child receives a certain number of passes (depending on the child’s level of education) for use of the learning centers. Learning center budgets depend on number of passes collected. There are “shopping mall” centers (centrally located facilities ranging from one-person “craft shop” operations to regional or national chains), community centers (such as museums and businesses) and mobile centers (that travel among clusters
or even communities. Technology plays a central role in the learning centers. Community service projects are common.

6. Learning contracts. Learning contracts (perhaps three months long) serve both planning and monitoring functions. Parents, teacher, and student set each student's goals and cooperate to support the student's learning.

7. Developmental levels. Four developmental levels replace grade levels. At the first level, students learn primarily in a "home room." At the fourth level, students learn primarily in learning centers.

8. Curriculum. All aspects of human development are fostered. The curriculum emphasizes the SCANS Report's (1991) five core areas as vehicles for learning basic skills, thinking skills and personal qualities.

9. Assessing student outcomes. The purpose of assessments is to certify attainments, not to compare students, and all students are expected to reach the required standards. Optional standards allow students to cultivate individual talents and interests.

10. New roles for technology. Technology keeps track of student attainments, facilitates decisions about what to learn next and how to learn it (for the learning contract), helps implement those means (e.g., computer-based simulations and tutorials) and helps assess attainments — all in a seamless, integrated system.

11. Administration. Successful clusters grow, and weak ones shrink based on student choices. "Incubation" policies (similar to those used with small businesses) encourage the formation of new clusters and learning centers. The district administrative system serves a support function rather than a control function, with separate agencies to support clusters, learning centers, and parental choices.

12. Governance. The state and local governance systems also serve a support function rather than a control function, to foster the attainment of high standards.

This learner-centered system should be far more effective than the factory model of schools, but it should also be more cost effective due to guides' use of inexpensive human resources (e.g., peer students, interns and volunteers) and labor-saving technology, as well as a considerable reduction in administrative costs (see e.g., Egol, 2003).

Community of Teachers (CoT) is an alternative secondary teacher certification program at Indiana University that was designed to challenge the saber-tooth approach to teacher preparation. In particular, the conventional view of professional training includes first learning a body of theoretical knowledge, followed by the application of that knowledge to practical problems. CoT works from the assumption that knowledge is in the action. As Donald Schón (1984) argued, intelligent practice is one thing, not two. We are not intelligent, and then act. Rather, the two come together, at least whenever we are able to characterize practice on this basis. Today this approach is called performance-based learning, and CoT has served as one of its pioneers for the past twelve years.

What does performance-based teacher education look like? First, CoT students are required to spend one day a week observing teachers and students in various school settings. After choosing a particular teacher, CoT students then work in local schools, beginning their first semester in the program. We call this an apprenticeship, and it culminates in their student teaching. While time in the program varies across individuals, CoT students are typically in their apprenticeship for two to three years. During this apprenticeship, students gain responsibilities for classroom teaching and program development based on their own initiatives. In particular, asking students to set their own goals and problem solve in the field is at the heart of self-directed learning, which the program values over university course work per se.

Second, CoT students engage in the ongoing development of a professional portfolio. This portfolio is designed to demonstrate the student's individual teaching skills, abilities and interests. The student's portfolio, which is organized around thirty expectations based on the INTASC standards for beginning teachers, demands that he or she work extensively with adolescents, parents, and fellow teachers in the field. Observation is an important part of the CoT apprenticeship, but observation alone cannot fulfill a single expectation. To evaluate the evidence that a student uses to meet an expectation, we look for a range of contexts (school, university, other), a range of sources (self-report, observations by others, etc.) and the student's level of self-reflection. This method of assessing a student's readiness to teach can be contrasted with standardized tests such as the PRAXIS. Where tests are item based, the portfolio is project based. Where tests provide a snapshot at one point in time, portfolios illustrate development over time. Where tests are content-centered, portfolios are learner-centered. Where tests place a premium on memory and recall, portfolios place a premium on judgment.

The third component of CoT designed to support the apprenticeship is an ongoing, weekly seminar. These seminars range from fifteen to eighteen students who are responsible for running the weekly sessions. Each seminar is also facilitated by an Indiana University faculty member. The facilitator and students stay together over multiple semesters, and jointly decide the seminar's curriculum.

Systemic Changes in Teacher Education

Carrie Chapman and David J. Flinders

In his spoof, *The Saber-tooth Curriculum* (1939), Harold Benjamin, in the guise of J. Abner Peddiwell, lampoons universities by recounting the rise of Paleolithic teacher education. In these programs, aspiring teachers earned their "teachers bone" (license) by accumulating a specified number of "fish-eats" (course credits) that were divided into various "magic areas" (academic subjects). Little has changed in course-based teacher preparation programs since the publication of Benjamin's classic satire.
Educational theories are often explored during these seminars through assigned common readings. Given equal weight, however, are the problems and challenges that CoT students encounter as part of their apprenticeships and the building of their portfolios. Problems are discussed both to find a solution or resolution, and with respect to their underlying causes or as they are symptomatic of social issues.

Students register for course credits for both the seminar and their apprenticeships, and all credits are graded pass/fail. Nevertheless, no set number of credits is required by the program, and CoT does not regard credits as representing any form of "knowledge." All these credits do is serve as a vehicle for the university to be compensated financially.

The Community of Teachers (CoT) program is thus grounded on the premise that, if we are to change the way teachers teach, we must ensure that they experience preferred ways to learn as integral parts of their professional preparation. This premise, along with the three key components of the program, provides the structure by which our students from diverse backgrounds and needs all gain knowledge in action — our form of systemic change in teacher education and through teacher education.

Systemic Changes in Corporate Training

Larissa V. Malopinsky

One of the manufacturing sectors of a large Midwest pharmaceutical company has been undergoing systemic changes for the past three years. Their experience has shown the effectiveness of a new collaborative approach to learning and implementing new business processes. This organization demonstrated a paradigm shift in its training practice from an autocratic, standardized approach that required memorizing and applying directives of the top management team without considering the working context, to a collaborative learning approach where every employee has an opportunity to directly contribute to the new organizational strategy, express their concerns and share ideas about new processes with their peers.

The initial strategic propositions developed by the Top Management Team (TMT) grew from the need to address the issues raised by external regulating agencies. The ad-hoc approach in managing procedural knowledge, fragmentary information about the manufacturing process collected over years and isolated process improvement efforts needed to be replaced by systematic process management and integration of rigorous research methods and control mechanisms into daily production operations.

A survey of line managers conducted by the organization's learning and communication group revealed additional organizational issues, such as lack of consistency across manufacturing networks and sites (process standards and documentation), competing priorities across functions, insufficient communication across management levels and unclear definition of roles and responsibilities in specific process steps. Although the TMT conceptualized a new strategy that was intended to address both external and internal concerns, the employees experienced difficulty translating it at the operational level. Overall, the new strategy was viewed by line management as a foreign approach that did not address the real issues they faced daily.

Following analysis of the organizational context and the needs of managers who executed the process, several propositions were made by the learning consultants:

- Involve line management (which is responsible for process execution) in strategy development and identification of potential barriers and enablers for strategy implementation;
- Create a collaborative environment where line managers would be able to exchange ideas and concerns and develop a shared understanding of the structures, technologies, and key process elements needed for implementation of critical strategic decisions proposed by the TMT;
- Provide managers with a conceptual tool that would allow facilitation of the collaborative strategic design.

The learning events that integrated the above propositions were observed by the author at the organization's 2004 conferences focused on the development and implementation of the new business strategy. Approximately 80 line managers and organizational leaders participated in the workshop that utilized collaborative design methodology. The framework of activity theory (Engeström, 1987, 1999) was used for: a) reflecting on the current business processes, b) sharing ideas about the potential changes that would bring process improvement and c) collaborative modeling of critical business "events" with consideration of specific organizational contexts, constraints and employee experience.

Four major manufacturing events were identified (e.g., technology transfer and manufacturing process validation) that were treated as micro-systems involving participants, technologies, tools and relationships. This approach allowed managers to view the process as a multidimensional system, identify the gaps that required immediate actions and develop a strong sense of ownership over the models they collaboratively designed. These knowledge products were recognized as valuable organizational assets by various organizational units. They consequently applied these models in the business plans they submitted to the TMT throughout fall 2004 and spring 2005. The plans contained evidence of strategic thinking that managers had demonstrated during their collaborative learning exercises.

The results of a questionnaire administered after the collaborative learning event showed that 91% of the workshop participants expressed maximum satisfaction with the new approach. The quality and focus of the managerial response suggested a fundamental change
in the way they thought about the company’s processes. Specifically, they indicated that the new learning approach expanded their view of the organization as a complex system, and they became more aware of the issues that existed in other organizational units. Managers also recognized that the new approach allowed them to see learning gaps and identify specific curriculum areas for addressing those gaps. Although the new approach was well received by the line management, it caused some tension within certain leadership groups who perceived it as overly liberal, time-consuming and difficult to implement at every training event.

In spite of the initial varying responses, the collaborative approach has been recognized by all the participants as a major transformation of the organizational learning strategy that catalyzed systemic cultural and managerial change within the company. Further analysis and systematic restructuring of the organization’s training curricula is planned to advance the implementation of the new approach within the organization.

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What You Can Do

What Technology Specialists Can Do

Brian Beabout

Technology Specialists are high leverage educators who often work systemically with a broad cross-section of the school population. For example, when the technology coordinator of an urban public school was disappointed with the public speaking ability of her students, she was able to work with teachers and the administration to add public speaking to a pre-existing ninth-grade unit. The students created PowerPoint slides and delivered presentations on colleges they were interested in. This public speaking mini-unit became a fixture of the 9th-grade curriculum, and teachers were able to build off it for the rest of 9th grade and beyond.

As this example shows, technology specialists are in an excellent position to apply the principles of systemic change in their work. Residing outside a specific grade-level or content area, they can observe the functioning of the school somewhat holistically. Additionally, they often have some budgetary input and a close connection to the administration. Financial resources and approval of the administration can prove invaluable when attempting to implement and sustain changes in any organization (Ely, 1976).

Technology specialists are also great change agents because people “expect” new things from them — new software, new computers, new web resources — so why not new types of lessons and new types of assessments? Who knows how the innovation of a public speaking curriculum for 9th graders would have turned out if it had come from a district mandate, but there most likely would have been some resistance to what was perceived as forced, top-down change. When the idea comes out of the collaboration of two teachers, the innovation might be received differently by teachers. Utilizing the budgeting responsibilities that are a part of their job, technology specialists can ensure that technology items purchased by the school are those that can help the school meet its vision and those that will be utilized by students.

By combining their holistic view of the school with day-to-day access to nearly all of a school community, technology specialists can apply systems principles to create positive change in the learning of students.

What Instructional Designers Can Do

Shawn Foley

“Never let schooling interfere with your education.”
- Mark Twain

People naturally learn. Whether their learning is the outcome of instructional design or something more natural can depend on the approach of the instructional designer (ID). IDs should:
- Capitalize on the natural, lived experience of the learner.
- Use the natural system, interconnections and interdependencies to guide the design of learning.
- Foster an active, collaborative, holistic culture of learning within whatever environment surrounds the learner.
- Provide a relevant learning experience that improves life for the learner.

Learning should lead us to “do” something. Every day we face real life challenges. These challenges can produce learning in every context imaginable. Through learning, we reflect on life and the culture that surrounds us. As we strive to understand the world and our role within it, our perspectives will naturally grow and guide our learning. Learners should be encouraged to apply new knowledge to improve their lives and the lives of others. This will further an understanding of the topic through active participation, the application of knowledge and the realization that we can “change” the world around us.

To design effectively, the designer needs to find what the learner will “do” with acquired knowledge. This action or practice becomes the focus of the learning. The designer should use systems thinking and systems design to capitalize on the natural, and should encourage learners to do the same. Learners bring new perspectives to the learning process and become instrumental in the learning community. They should be autonomous and accountable and encouraged to collaborate and network with peers. They celebrate diversity and begin to think holistically when solving complex problems. Open dialogue exposes learners and their communities to interpersonal and intrapersonal reflections. This reflection guides discovery. Dialogue should facilitate shared understandings.

As we explore the ID’s place in the information age, we need an open mind that accepts a more strategic and systemic role. We should think less about “developing the learning environment” and focus instead on fostering an active, collaborative, trans-disciplinary and multi-dimensional culture of learning within the existing setting.

What Teacher Trainers Can Do

Marjorie Rickard

There are several ways that teacher educators can apply systems thinking to our work and contribute to systemic change. The key to systemic change in education is understanding the difference between learning from technology and learning with technology. Although many teachers have begun to utilize technology in the classroom, it is still a teacher-centered environment. Students today are technology savvy and are used to a multi-tasked, eclectic environment. To reach today's students, teachers
must understand the importance of developing a customized, learner-centered, attainment-based paradigm of education.

How will teachers acquire skills for implementing learner-centered methods in their classroom? The International Society for Technology in Education (ISTE) National Educational Technology Standards (NETS) provide the necessary resources for school improvement through technology use. ISTE proposes that students develop positive attitudes towards technology uses that support lifelong learning and develop the telecommunication skills necessary to collaborate with others.

Developing an understanding of both school and district structures will help teachers overcome impediments to implementing effective learner-centered methods. The education of America's youth must be a collaborative initiative by community, parents and the educational system. Educators need to work in cooperation with the community in developing a learner-centered environment where diversity, creativity and knowledge will thrive.

Can teachers successfully prepare all students to meet the challenges and demands of the 21st century? This is an essential question which educators, employers, the public and parents want answered. Implementing an effective change process that involves a school's stakeholders in bringing about school-wide structural change will lessen hindrances to learner-centered instruction.

The global society of tomorrow is quite different from that of yesterday. It will require students to think critically, work collaboratively, learn independently and be contributing members of the community. When teachers understand the importance of the evolution of mindsets that leads to successful implementation of learner-centered instruction, then changes will occur in the structures of schools.

We teacher educators need to better prepare teachers to develop a customized, learner-centered, attainment-based paradigm of education for all students and thereby contribute to systemic change.

What Teachers Can Do

Janise Venia Wriddle

A teacher can do two things to use systems thinking in a classroom. A teacher can always be mindful of the big picture, and can gradually apply the concept. Because systems thinking in education is the application of systems theory, systems methodology and systems philosophy in education, it allows one to examine the variety of components associated with the teaching and learning environment.

Systems thinking in education encompasses "...the embeddedness of educational systems ..." (Banathy, 1996, p. 83), which can include relationships, purposes, dynamics of interactions and properties of teaching and learning. Engaging in systems thinking enables a teacher to think about the design of each instructional experience in the context of the entire process a student experiences, as well as the individual interests, backgrounds and special needs of the student.

Systems thinking in the classroom is about keeping the big picture in mind, with the goal of functioning as an efficient and effective teacher. For example, the teacher should examine the efficiency and effectiveness of the classroom routines from the beginning of the day to the end of the day. Which routines are useful? Are there any routines that can be discarded?

Other ways to use systems thinking in the classroom can include being cognizant of the implementation fidelity of lessons, instructional programs or teaching strategies (Mills & Ragan, 2000). Are you really executing the math lesson, computer program or reading series in a way that fits your teaching environment and learner's needs?

Another way to apply systems thinking in the classroom involves curriculum planning. When planning the use of supplemental materials, systems thinking can be applied to establish curriculum congruency (Miller, DeJean & Miller, 2000). Are the materials congruent with mandated curriculum, mandated tests and learner needs?

Finally, start small and then expand. Pick a classroom issue of concern. Examine the concern in relation to the big picture. Redo the necessary components, implement the concept, maintain it and expand the systems thinking to a new area.

What Parents Can Do

Laurie MacDonald

As parents, teachers and a nation, we want every child educated to his or her fullest potential. But schools and teachers can't do it alone. They need the help of their students' first teachers — their parents and other caregivers. National Education Association (NEA) president Bob Chase suggests that teachers would like to see parents and other caregivers more involved in their children's education.

Parents can do things at home that will help their children succeed in the classroom. The most effective educational tool is time. Effective parents can really listen to and talk with their children. They can read them a bedtime story, even after they are old enough to read for themselves. They can play brain games with their kids. A parent's love, support, caring, attention and discipline can make a world of difference in a child's education (Garcia, 2001).

Outside the home, parents can be a part of systemic change by being involved in the change process. As Bill Lampereis, principal of an extremely successful alternative high school in Fort Collins, Colorado, writes "One of the indicators of a school's success is the presence of a vibrant, active parent group" (Lampereis, 2005, p. 188). School staff and parents need to communicate and be partners in the process of building the home-school-community connection that is critical to a school's success.
This should not be a haphazard relationship. To be the most effective, efforts need to be made to create an organizational structure for parent involvement. Otherwise, parents can feel at a loss as to how they can help, and teachers can sometimes feel burdened by parent volunteers whose skills may not match the classroom's needs (Louv, 1999). Where there is effective communication of school needs and an opportunity to match these with community talents, there is mutual benefit. Open communication among parents, teachers and administrators encourages collaboration based on mutual understanding and respect for the assets and talents of each group. With these types of alliances, students will have the opportunity to spend time with, and learn from, positive community role models.

What Corporate Trainers and Performance Technologists Can Do
Stephen Smith and Rob Campbell

Our challenge in corporate training and human performance technology is how to apply systems thinking to improve individual, team, corporate and societal performance (Kaufman, 1989, 1995, 1996a, 1996b). In Thomas Gilbert's (1996) coinage, our challenge is to increase "Worthy Performance" — to ensure that the change in performance proves more valuable than the effort required to build that performance. Our advice is:

1) Challenge convention / think systemically,
2) Become principle-based, as opposed to rule-based, and
3) Blur the distinction between researcher and practitioner.

Systemic change requires that we understand overall performance architecture. Performance architecture underpins individual, team, organizational and societal performance and learning. If conventional, piecemeal thinking and structures create design, development or delivery limitations, as systemic professionals, our duty and privilege is to challenge and change this thinking and structures. Take the challenge to identify at least five systemic change principles that you have learned in this special issue, and apply them to improve yourself, your team, your organization, even your industry and the society you work in.

A key driver to systemic change is to become principle-based, rather than rule-based. A principle-based approach allows our performance to be driven by a set of agreed-upon core principles, rather than a set of rules that blind one's systemic perspective. A common set of principles allows an organization to remain flexible and react, or better pro-act, to improve their existing business performance, industry and environment. If your policy manual or approved processes dictate arcane and irrelevant procedures, it is beyond time to build a principle-centered organization. Building systemic perspective into your guiding principles improves their effectiveness.

At times there appears to be cognitive dissonance between academic and corporate professionals in education and training. Viewing performance and learning through a systemic lens builds commonality and shared purpose, and can lead to greater collaboration to improve individuals, teams, organizations and ultimately societal performance.

Now, what are you waiting for? Your world abounds in systemic change opportunities for you to experience, understand and advance. Your systemic thinking will identify performance improvement opportunities that previously were invisible to you.

What Professors of IDT Can Do
Johannes Strobel

Ideas of systemic change can guide professors of IDT in a variety of ways and layers of their work:

- taking into account that the impact of how professors do research and teaching is as important as the impact of what is being researched and taught, by emphasizing the development of successful sustainable communities.
- integrating systemic change in teaching through participatory design and reflective lenses that address the intertwined complexity of educational endeavors.

Through an increased emphasis on research and design in naturalistic contexts, be it professional communities, formal educational systems or loosely operating informal settings, researchers become more visible and their actions become as inextricably connected to the context as the phenomena that are being studied. Research and design interventions are no longer isolated endeavors — if they ever were — but are forces in the crafting of sustainable communities of diverse stakeholders. For the work of researchers/designers, it becomes important to build trust and sustainable partnerships, and to reflect on one's own processes.

The number of non-traditional students is increasing, and through the emphasis on life-long learning and continuous education, the landscape of universities, programs and individual courses is changing. For many students, work, family life and educational pursuits are inextricably connected. Although challenging to teach within this context, the multifaceted experience of students can considerably enrich and change the shared endeavor.

Systemic change action can be employed on three different layers: (1) participatory design of instruction can actively build on the experience of course participants and turn control over to students; (2) providing reflective lenses that are based on systems thinking can emphasize students' own endeavors as complex systems that require systemic solutions; (3) a professor can explicitly emphasize one's own role in the context of students and curricular demands.

In conclusion, a systemic view of one's role as a professor adds to the effectiveness of research and teaching and provides new opportunities to contribute to sustainable solutions in education.
Author Information and References for Section 7

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What Corporate Trainers and Performance Technologists Can Do

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Rob Campbell is Vice President and Chief Learning Officer at Center Corporation’s KnowledgeWorks Organization. He was the founder and leader of Cerner Virtual University (CVU). His 20 years experience in training and development, instructional technology and knowledge management include working at Andersen Consulting and AT&T. He holds a masters degree in computer science with a double emphasis in artificial intelligence and educational software design from Northwestern University.


What Professors of IDT Can Do

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