

- replacing the current report card with an inventory of attainments whereby each student must reach a standard of attainment before progressing to the next one,
- requiring a personal learning plan for every student whereby each student can progress to the next attainment immediately upon mastering the current one,
- requiring a change in the teacher's role to a coach or facilitator, and
- requiring active parent participation in setting and attaining their student's goals.

Such structural changes are offered to help participants understand what a high-leverage structural change is, and schools then choose different structural changes that they believe will provide more leverage or be more consistent with their further elaboration of the district-wide beliefs. However, there must be broad stakeholder consensus on the structural changes before a design team is allowed to implement those changes.

The process of reaching broad consensus on the changes must focus on mindset change (beliefs or "strange attractors"), which becomes the impetus or motivator for change. The high-leverage structural changes serve as the enablers and sources of leverage. Together, these provide sufficient motivation and leverage to gradually change all other aspects of the system to be compatible with them. Unlike the Idealized Design Approach, no long-range ideal design is created by each building to gradually evolve towards. This is a much more emergent approach with the district-wide beliefs and values about education ("strange attractors") guiding the emergence, consistent with a Chaos Theory perspective. Hence, there is still some ideal thinking involved in the district-wide framework (a "fuzzy" ideal vision).

## → Systemic Change: Get Ready, SET, Go! – Where?

Theodore Frick, Kenneth Thompson and Joyce Koh

Many well-intentioned people want to improve education. So do we. We believe that education could be far more effective, efficient and satisfying than it is in our current educational systems — not only K-12, but higher education as well. The questions are: "Change what?" and "Change how?"

As an analogy, consider an old bridge that is failing — it is structurally weak and is impeding the flow of traffic. If the bridge is not fixed, it will collapse and vehicles will plunge into the river. When engineers design a new bridge, they utilize adequate scientific and praxiological theories. No one in modern times would consider designing a new bridge by trial and error. Yet, when we attempt to improve education, we have no *valid* way of predicting that new educational system designs will work any better than what we now have.

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, strongness) 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 out 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://simedtech.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!*

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 19<sup>th</sup> and early 20<sup>th</sup> 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.

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## A Corporate Reengineering Approach to Systemic Change

Christopher D. Ryan

If management wants 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