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A Chaos Theory Approach to Systemic Change

Charles M. Reigeluth is a professor in the Instructional Systems Technology Department, School of Education, Indiana University, Bloomington. His major research focus is systemic change in public school districts. He also does research on the new paradigm of instructional methods and theories. He can be reached at reigelut@indiana.edu.

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A Leveraged Emergent Approach to Systemic Transformation

Charles M. Reigeluth is a professor in the Instructional Systems Technology Department, School of Education, Indiana University, Bloomington. His major research focus is systemic change in public school districts. He also does research on the new paradigm of instructional methods and theories. He can be reached at reigelut@indiana.edu.

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

Theodore Frick is an associate professor in the Department of Instructional Technology in the School of Education at Indiana University Bloomington. His teaching and research interests include Web design praxiology, analysis of temporal and structural patterns in education and systemic change in education (<http://education.indiana.edu/~frick>).

Kenneth R. Thompson is an independent consultant for developing predictive theories of intentional systems; e.g., educational systems, military systems, personnel hiring systems and so on. He is founder of the theory ATIS, Axiomatic Theories of Intentional Systems. He can be reached at ken@raven58vn.com.

Joyce Koh is a doctoral student in Instructional Systems Technology at Indiana University Bloomington. Her current research interests include motivation strategies, classroom applications of general systems theory, and instructional strategies for technology skills education.

A corporate reengineering approach to systemic change

Chris Ryan is a doctoral student in the Instructional Systems

Technology Department at Indiana University, where he also studies organizational behavior and human resource management in the Kelley School of Business. He may be reached at chryan@indiana.edu.

Leaning the system: Adding lean thinking to systems thinking

Shane DeMars is a full-time doctoral student and part-time consultant. His research focuses on transfer of training, strategic HR systems and leadership development. He may be reached at sdemars@indiana.edu.

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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

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).

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.

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 Schön (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.

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.

Author Information and References for Section 6

Systemic Changes in the Chugach School District

Wendy Battino is the Executive Director for the Re-Inventing Schools Foundation and former Chugach teacher, principal and team member. Wendy is the author of the first Malcolm Baldrige Award Winning Application in Education, for the Chugach School District. She continues her work with organizations around the globe focusing on reinventing schools based on the Re-Inventing Schools Model.

Jo Clem is currently a Board Member and Senior Examiner for RISC/ Reinventing Schools Coalition, funded by Bill and Melinda GATES Educational Foundation and can be reached at 214-458-1968.

Systemic Changes in Public Schools through Brain-Based Learning

Renate N. Caine, Ph. D., is a professor emeritus of Education, California State University, San Bernardino. She is currently serving as Executive Director of the Caine Learning Institute in Idyllwild, California. The institute is dedicated to creating schools, educators and teachers that use a comprehensive understanding of learning as the foundation for constructivist teaching. Renate is also the Director of Research of The Brain/Mind and Education Research Center.

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A Vision of an Information-Age Educational System

Charles M. Reigeluth is a professor in the Instructional Systems Technology Department, School of Education, Indiana University, Bloomington. His major research focus is systemic change in public

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Systemic Changes in Teacher Education

David J. Flinders is an associate professor at Indiana University, Bloomington. His research focuses on secondary school reform.

Carrie E. Chapman, Ph.D., Clinical Assistant Professor in Curriculum and Instruction, Indiana University, is Program Director for A Community of Teachers secondary education program and Research Associate at the Indiana Institute on Disability and Community. Her research focuses on K-12 school change initiatives and the preparation of teachers to work in those schools. Contact: cechapma@indiana.edu.

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Systemic Changes in Corporate Training

Larissa V. Malopinsky is the president of KM Concepts, LLC., a consulting firm that provides services ranging from organizational analysis and strategy development to design of instructional products. Her research areas include organizational strategic change and collaborative learning environments. You may contact Larissa at malopinsky@km-concepts.biz.

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