Chapter 5

Complexity Science and Learning Culture

It is also important to understand that the components of a learning culture are affected by the forces described within Complexity Science, and are part of nonlinear dynamical and complex adaptive systems. Complexity Science is the study of Chaos and Complexity theories which yields the understanding of nonlinear dynamical systems, and complex adaptive systems. Nonlinear dynamical systems and complex adaptive systems are constantly affecting everything we do, and by understanding how they possibly affect the many learning culture components helps us to better prepare our learners.

Nonlinear dynamical systems are characterized by their variables being unpredictable. Sanders (1998) describes "variables can't be taken apart and added back together again like a child's building blocks; A+B does not equal C" (p.57). These component attributes exist not in a linear relationship, but in abstract ways. Since Chaos Theory is dependent on the initial conditions and possible consequences through Butterfly Effect; it's important to understand that Complexity theory, as described by Sanders (1998), "how order and structure arise through the process of adaptation set in motion by new information" (p.69). Complex Adaptive Systems, which are nonlinear and receiving new information and adapting with a new shape and emerge as a result of the adaptations. These adaptations are the product of the need for a new structure to form within a system.

Nonlinear and complex adaptive systems are especially applicable to the fire service learning culture. Examples of Complexity Thinking are prime for fire

departments: 1) The predictable attractor state is for the response equipment to arrive, Assess the situation and establish command, address rescue, evacuation, exposures, ventilation, fire attack, and support functions. (To a novice or untrained spectator the response process would appear chaotic, but there is order within the chaos.) If new information arises to create an incident within an incident, this is where an adaptation of the original system occurs. A higher priority may necessitate deviating manpower and equipment to another incident or system within this incident. This process is ever changing and dependent upon many forms of new or updated information. Most times these changes are a function of command, but as with ants and their leaving pheromones as an indicator of form emergence, there are "accepted command practices" that allow the fire scene system to adapt and emerge into another from.

The Learning Culture has many factors that are part of a complex adaptive system. These include but are not limited to: attunement with organizational hierarchy, performance assessment, mindfulness in learning, Self Efficacy, appropriate Pedagogical and Andragogical principles, Cognitive and Constructivist educational theories, environmentally sound web based platform for domain information, developing facilitation and facilitator guides, mindfully constructing learning environments--both virtual and physical, and evaluation.

These Learning Culture components contribute to the complex adaptive system, where as individual parts their sum may not form a whole. Each component must be regarded as it's own complex adaptive system, capable of change, adaptation, and emergence in an effective form. In a learning culture, there is no waiting for others to

provide the means to be educated, because the culture supports learning development, learning involvement, and individual responsibility for learning at every level.