Integrating Complexity and Creativity in Adult Online Learning Environments

Michael C. Pickett
National University

One of the main challenges in today's ever-evolving higher education arena is the notion of change. Change surrounds every waking minute of our lives in higher education. At the forefront of the many changes we have witnessed is that of the exponential increases in online education and adult learners. In many respects, traditional curriculum fails to effectively integrate an outcomes-based constructivist learning experience for the adult learner. With the implications from the developing sciences of complexity, and dynamic systems theory, the very nature of our online learning environments for the adult learning communities can be fundamentally reinvented through sound instructional design techniques, thus providing a more engaging experience for our adult learners. This paper proposes a model demonstrating the benefits of the integration of complexity theory, creativity, and constructivist learning theory into an online adult learner-centered environment.

INTRODUCTION

In previous research, Pickett and Al Hassan (2008) developed and presented a learner-centered assessment model (L-CAM). The purpose of this paper is to delve further into the relationship offered by the curriculum design component of the model (see Figure 1). In many ways, the current thinking in standards-based curricula and assessment argue the need for direction, focus, and accountability in the learning environment (Clarke, Stow, Ruebling & Kayona, 2006). Additionally, learner outcomes should define student expectations as well as the alignment of the curriculum as it is applied in the classroom. In higher education, much focus has been placed on the adult leaner and their specific learning styles in non-traditional modalities and pedagogies (Pickett, 2008). In as much as universities maintain a keen eye on the applicability of the programs they offer, it is essential that we, as educators, rethink the future value of the education we offer to our learners.

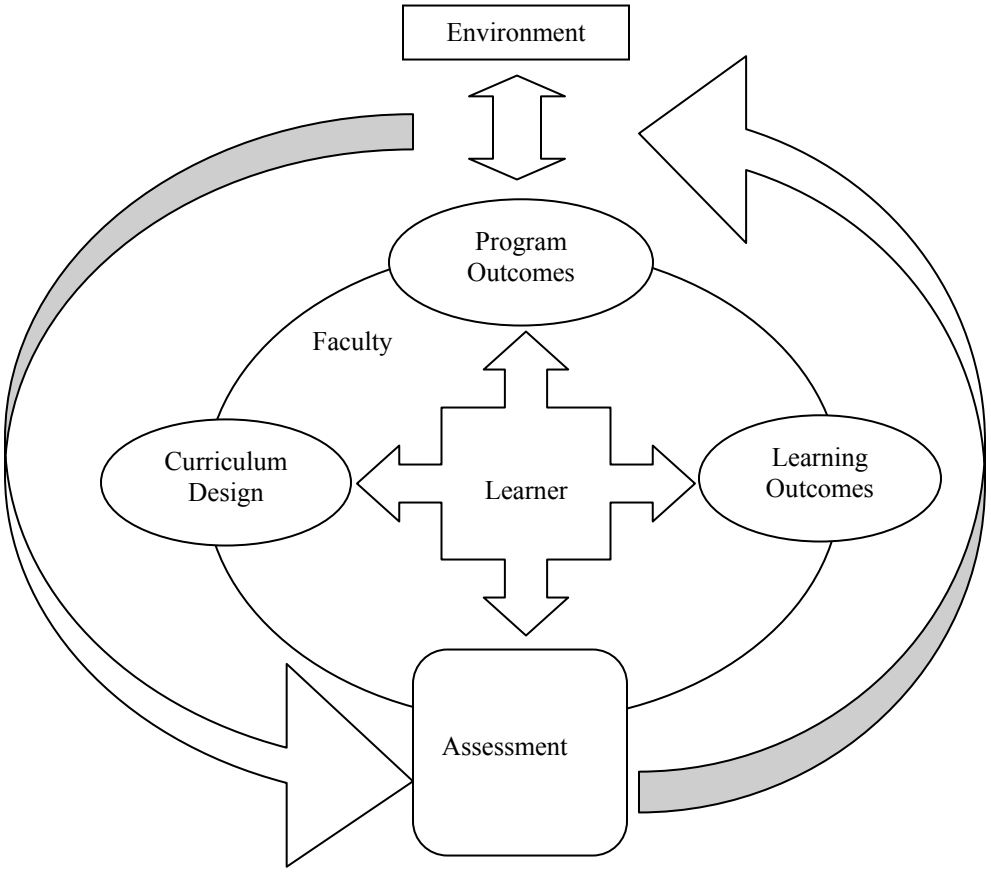
One method of achieving this goal is through the curricular integration of formal and informal learning. Formal learning is the processes educators associate with the learning and knowledge transfer that occurs during university programs. In contrast, informal learning can be attained through many contexts such as "...self-directed learning, incidental/experiential learning, and socialisation" (Barth, Godemann, Riechmann, & Stoltenberg, 2007, p. 420-421). The critical aspect to the integration of the two learning modalities is the competencies acquired within the process and is espoused within the outcomes identified within our respective individual course expected outcomes.

This paper is conceptual in nature and focuses on recent trends in current literature regarding the integration chaos and complexity into curriculum design within a learner-centered model of assessment.

REVIEW OF THE LITERATURE

This paper delves further into the exploration of learner-centered assessment model by identifying the core components of the notion of curricular design with respect to an ongoing, seamless assessment process. Pickett and Al Hassan (2008) presented a Learner-Centered Assessment Model (L-CAM) from which educators may be better able to assimilate learning outcomes into the assessment process. By integrating the various processes they were able to alleviate the necessity of developing assessment methods and subsequent processes in isolation of the curriculum. This model affords educators an opportunity to focus on learners as the center of the assessment process and provides a systemic approach to espousing our institutional values with the needs of our learners and communities (see Figure 1).

FIGURE 1
LEARNER-CENTERED ASSESSMENT MODEL (L-CAM)



Learning outcomes establish student expectations as well as the alignment of the curriculum as it is applied in the classroom. The understanding of how our curriculum design "fits" in to our overall assessment process is a critical aspect in the assimilation of a learning organizational view (Lin & Hwa, 2002). Sipos, Battisti, and Grimm (2008) argue for the adaptability of multiple domains of learning into the learning context through a transformative process. Additionally, Sipos, Battisti, and Grimm (2008)

found that learning outcomes ideally create a synergy between the varying aspects of the learning context i.e., critical thinking, reflection, and engagement.

Many universities are developing learning communities to integrate course content, coordinate assignments, and create an environment for honing academic skills as well as ongoing mentoring. Andrade (2007) identified a learning community as linked courses "commonly organized around a theme with shared and connected learning as curriculum goals" (p. 3). Exploring this notion further, we can all relate to our own experiences in our respective universities when we observe degree programs as fixed number of consecutive courses that may or may not have prerequisites that the students, as well as many faculty perceive as isolated entities. In this paper I will propose a curricular design typology that develops an understanding for the integrated nature of a synergistic curriculum thereby providing our learners with sustainable knowledge that takes into account the environmental variability due to chaos and complexity.

Standards-based curricula and assessment argue the need for direction, focus, and accountability in the learning environment (Clarke, Stow, Ruebling & Kayona, 2006). The processes we identify as important in developing a curriculum varies by discipline and level of program, yet Clarke et al. (2006) provided a process, or model for developing curriculum. The process contains a set of structural activities that include:

1. beliefs about the content area
2. the major themes of the content area
3. identification of the general focus and direction that students will be guided
4. mastery skills and concepts required, and
5. the pedagogical methods that achieve desired course outcomes.

As curriculum designers we are now able to understand the complexity involved in a development process that not only meets the need of our approval processes, but also provides added value to our learners. According to the Council for Higher Education Accreditation, "Student learning outcomes are properly defined in terms of the knowledge, skills, and abilities that a student has attained at the end (or as a result) of his or her engagement in a particular set of higher education experiences" (CHEA, 2003, p. 5). Correspondingly, Svanstrom, Lozo-Garcia, and Rowe (2008) argue for an increasingly synergistic and "…encompassing vision of the world" (p. 350) that will provide our students with true adaptability and utilizations of the education acquired through our institutions of higher learning.

Tereseviciene, Zuzeviciciute, and Hyde (2007) identified the necessity to include informal as well as formal learning outcomes as well as the need for an evaluation methodology for experiential learning outcomes. In a similar fashion, Shephard (2008) argues a need in higher education to identify assessment metrics for affective outcomes as opposed to the more traditional cognitive-based learning outcomes. From a process perspective, Barker (2008) identified several contexts in which learning takes place and posited an adaptive model to incorporate various learning environments and interactive media that provides a "…dynamic and adaptable… [approach]… to newly emerging pedagogies and technologies" (p. 139).

CREATIVITY

Much of what has been written about the nature of creativity has developed from Guilford's early research on the structure of the intellect, specifically divergent thinking (DT) (Hanson, 2014). In addition, research on creativity in organizations found divergent thinking to be "essential to creative performance" (Williams, p. 188). Organizational factors that have been shown to enhance creativity are organizational climate, leadership style, organizational culture, resources and skills, and lastly the structure and systems of an organization (Andriopoulis, 2001).

Our online educational environments are more similar to organizations than we may tend to believe. One of the major similarities is the status quo. Cultivating creativity in organizations means leaving the status quo. From a management perspective, challenges to the status quo and risk-taking to foster creativity are often met with resistance. However, a shift form controlling people to creating the

atmosphere where employees feel free to seek expression and self-fulfillment can enhance creativity in organizations (Andriopoulis, 2001).

One other very similar feature between these two environments is the resistance to ambiguity and unpredictability. According to Miller (2015),

> Since failure is not only a part of life but also an essential part of the creative process, we must embrace cognitive dissonance and accept that mistakes and confusion will litter the path to knowledge production. (27)

In essence, the culture and environment must be supportive of the creative process. In many cases students may hesitate to be risk-takers in online courses and find themselves just "doing what has to be done"

SYSTEMS AND COMPLEXITY

Ludwig von Bertalanffy (1969) developed general systems theory from his work as a biologist and since then it has propagated into organizational change theory. Because many of the terms are unlike most of our typical educational verbiage, I will provide working definitions for the terms that we will need to become familiar with.

System

A system is "...an abstract model for a more complex entity" (McWhinney, 1997, p. 6). A key understanding to systems theory is that we are able to see our organization as a part of a larger whole.

Field

Boundaries are not recognized as natural. They are assumptions created for the convenience of understanding and articulation. They are a space in which every point is defined in terms of some quality (McWhinney, 1997).

Schema

Schemas model regularities in the stimuli experienced by a system (Stacey, 1996). A schema consists of a set of rules that reflect regularities in experience. Schemas also contain rules indicating how a system should respond to its experiences.

Complexity research performed over the past few decades has been fraught with varying degrees of success. Some researchers believe that it is an extension of other theories, such as general systems theory, and is related to organizations while others argue that complexity theory has limited applicability (Murray, 2003). Nevertheless, educational organizations do behave as self-adapting systems presenting the very nature of complexity.

Complexity

Many authors have various definitions, but complexity occurs when "...information about behavior is so irregular that its description cannot be compressed" (Stacey, 1999). In other words, the behavior of a complex process can be different for two separate entities. For example one entity, in the same environment can be highly divergent from the other experiencing similar inputs. Additionally, "...systems in this state operate in an intermediate state between stability and instability" (Stacey, 1999, p. 286).

Complex Adaptive System

According to Stacey (1999): Complex adaptive systems are non-linear and:

> ...consist of a number of agents interacting with each other according to schemas, that is, rules of behavior, that require them to inspect each other's behavior and adjust their own

> in the light of the behavior of others...they survive because they learn to evolve in an adaptive way: they compute information in order to extract regularities, building them into schemas that are continually changed in the light of experience. (284)

Single and Double-Loop Learning

Single-loop learning (I) is a conditioning that arises when a system employs its schema without change. The firm adapts its behavior to the stimuli being presented so that its behavior becomes more beneficial as a result (Stacey, 1996). Double-loop learning (II) occurs when a system adapts its behaviors to stimuli presented to it in a beneficial way, and as a result causes change in the dominant and recessive schemas.

ANATOMY OF A TYPICAL ONLINE COURSE

As an example, the syllabus typically contains learning outcomes, grading criteria, etc., and is usually created by faculty in the department from which the course is offered and the online content is created by faculty or subject matter experts (SMEs) in a particular discipline as necessary. The course is housed in a learning management system and can be delivered synchronously, asynchronously, or a combination of both with all assignments and tasks well organized and easy to navigate. While not all courses are identical, they are typically similar enough to allow students to find their way course after course through the online degree program. At the close of each course, there typically is an after course survey to allow data gathering as to curriculum, instruction technology issues, etc. to be gathered. This information can then be easily reviewed for any curriculum, technology, or program changes as needed. This brief description provides an example of a very linear model, but works well for very structure-oriented educational institutions.

The Integration of Complexity

As mentioned previously, Clarke et al. (2006) provided a process, or model for developing curriculum that contained the following set of structural activities:

1. beliefs about the content area
2. the major themes of the content area
3. identification of the general focus and direction that students will be guided
4. mastery skills and concepts required, and
5. the pedagogical methods that achieve desired course outcomes.

If we take a moment to review the L-CAM model (Figure 1) we are able to align the various relationships of the components of the L-CAM and Clarke's structural activities with (see Table 1).

TABLE 1
L-CAM COMPONENTS AND STRUCTURAL ACTIVITIES RELATIONSHIPS

L-CAM Components		Structural Activities
Faculty[1]/Learner[2]	Environment[6]	Beliefs about a content area
Program Outcomes[3]/Faculty[1]/Learner[2]		The major themes of the content area
Learning Outcomes[3]/Faculty[1]/Learner[2]		Identification of the general focus and direction that students will be guided
Assessment[4]/Faculty[1]/Learner[2]		Mastery skills and concepts required
Curriculum Design[5]/Faculty[1]/Learner[2]		The pedagogical methods that achieve desired outcomes

Additionally, we are able to see that the environment affects all components as well as the structural activities. In a sense, we are better able to imagine the "self-adaptiveness" of our educational environments. Hence, the structural activities within an educational environment could be represented as thus:

$$\sum_{i=1}^{N} B_i T_i F_i S_i P_i \quad (1)$$

Where *B* = the beliefs about a content area, *T* = the major themes of the content area, *F* = the general focus and directions students are guided, *S* = the mastery skills and concepts requires, and finally, *P* = the pedagogical methods that achieve the desired outcomes. Once again referring to Table 1, the superscripts 1 through 6 represent the various components of the L-CAM to better represent the L-CAM Model within the structural activities equation, thus:

$$\sum_{i=1}^{N} B_{1,2,6} T_{1,2,3,6} F_{1,2,3,6} S_{1,2,4,6} P_{1,2,5,6} \quad (2)$$

A cursory view of the second equation helps us realize the complexity of all L-CAM components and structural activities within curriculum. While this remains behind the scenes, given the various perceptions of the expected course outcomes, it is no wonder that as students log in to a course they quickly analyze assignments, due dates, and any additional requirements and settle in with little thought of "thinking out of the box." Paradoxically, if the course structure does not provide an atmosphere allowing for creative tensions, the initial linear impressions the students perceive become the reality.

Understanding the curricular impressions the online environment places our learners in cannot go understated. Unlike our face-to-face instruction, our online courses can typically be viewed in their entirety, other than possibly the quizzes. In contrast to our face-to-face courses in which they are given pieces of the class in however many portions each school happens to divide them into. In both cases they are self-adapting systems with individual ongoing fields and schemas within various systems thereby making both environment complex adaptive systems.

Driver (2001, p. 29) identified thirteen steps for the fostering of creative behavior in classrooms:

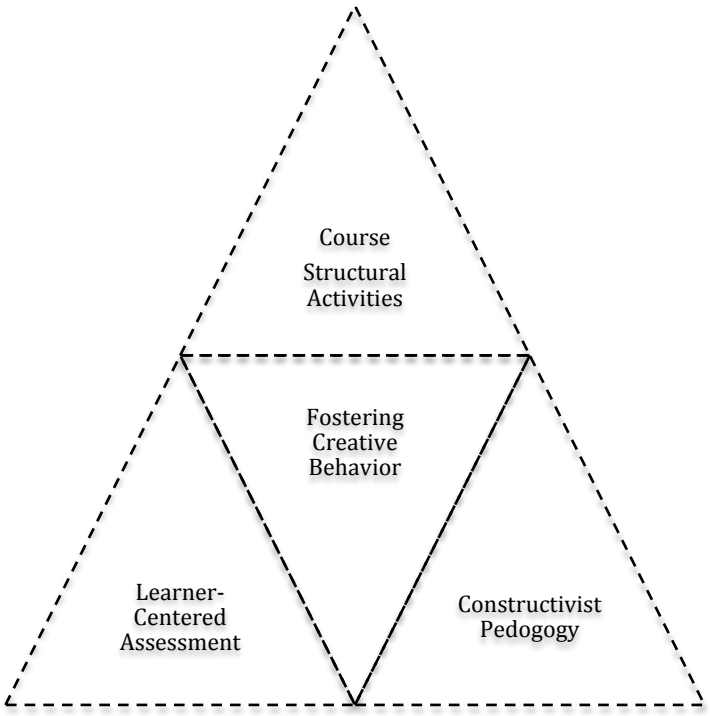
1. Allowing time for creative thinking
2. Rewarding creative ideas and products
3. Encouraging sensible risks
4. Allowing mistakes
5. Imagining other viewpoints
6. Encouraging explorations of the environment
7. Questioning assumptions
8. Refraining from evaluating/judging
9. Fostering cooperation rather than competition
10. Offering free rather than restricted choices
11. Encouraging dissent and diversity
12. Setting students up for success rather than failure
13. Requiring little if any rote learning.

These steps are well within the faculty's ability to enable in the classrooms, whether online or on ground. Given, all disciplines have varying needs based on content and context of learning needs. For example, historic dates fall within the "rote learning" category, however additional time may be spent discussing the various viewpoints and assumptions of the specific time in history and allow for varying viewpoints.

PROPOSED MODEL

Below (See Figure 2) is a model demonstrating the benefits of the integration of complexity theory, creativity, and constructivist learning theory into an online adult learner-centered environment.

FIGURE 2
ONLINE CREATIVE LEARNING MODEL



The model integrates the constructs of the L-CAM model and principles of constructivist pedagogy as its foundation. The core of the model houses the principles that we can do as instructors to foster creativity in the classroom environment. At the apex of the model are the structural activities that make up our curricular design. The dotted lines throughout the model indicate the notion of free-flowing information between all sections in the form of double-loop learning as discussed previously to include environmental stimuli. For instance, from a systemic perspective in the example of a typical online course discussed earlier, there are schemas from which students experience in the form of expectations. Once formed, these schemas regulate behavior and would continue (single-loop learning). On the other hand, when students change behaviors and adapt to changing systems and sub-systems, lasting change occurs (double-loop learning). From a student's experience, they modify their behavior to become resilient to change – a prerequisite in fostering creativity!

Lastly, through double-loop learning, faculty is better able to monitor program and learning outcomes to ensure alignment with assessment strategies and processes, this in turn creates better experiences for students and drives positive change to curriculum to ensure timely and relevant development.

REFERENCES

Andrade, M. (2007) Learning communities: Examining positive outcomes. *Journal of College Student Retention, 9,* 1-20.

Andriopoulos, C. (2001). Determinants of organizational creativity: A literature review. *Management Decision*, 39,10, 834-840.
Barker, P. (2008). Re-evaluating a model of learning design. *Innovations in Education and Teaching International, 45,* 127-141.
Barth, M., Godemann, J., Riechmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of Sustainability in Higher Education, 8,* 416-430.
Bertalanffy, L. (1969). *General systems theory: Foundations, development, application.* Braziller: New York, NY.
CHEA Institute for Research. (2003). Statement of Mutual Responsibilities for Student Learning Outcomes: Accreditation, Institutions, and Programs. [Electronic Version]. Retrieved August 12, 2008, from CHEA Institute for Research Web site: http://www.chea.org/pdf/stmntstudentlearningoutcomes9-03.pdf
Clarke, N., Stow, S., Ruebling, C. & Kayona, F. (2006). Developing standards-based curricula and assessments: Lessons from the field. *The Clearing House, 79,* 258-261.
Driver, M. (2001). Fostering creativity in business education: Developing creative classroom environments to provide students with critical workplace competencies. *Journal of Education for Business*, 17, 1,29-33.
Hanson, M. (2014). Converging paths. Knowledge Quest: Creativity and Innovation. 42,5, 8-13.
Lin, H., & Hwa,T. (2002). Current research in organizational systems: Higher education. *Futuristics, 26,* 11-19.
McWhinney, W. (1997). *Paths of Change: Strategic Choices for Organizations and Society*. Sage Publishers. Thousand Oaks, CA.
Miller, D. (2015). Cultivating Creativity. *English Journal*, 104.6, 25-30.
Morais, M, Almeida, L., Azevedo, I., Alencar, E. & Fleith, D. (2014). Perceptions of Barriers to Personal Creativity: Validation of an Inventory Involving High Education Students. The European Journal of Social & Behavioural Sciences. 1478-1495.
Murray, P. (2003). So What's New About Complexity? *Systems Research and Behavioral Science*, 20;5, 409-417.
Pickett, M. & Al-Hassan, M (2008). Learner-centered assessment: A proposed model for educators. Proceedings of the American Society of Business and Behavioral Sciences Fifteenth Annual Conference Las Vegas, Nevada February 21-24, 2008.
Pickett, M. (2008). Reframing the technology gap: Sustainability or susceptibility? Proceedings of the American Society of Business and Behavioral Sciences Eleventh International Conference Honolulu, Hawaii September 25-27, 2008.
Shephard, K. (2008). Higher education for sustainability: Seeking affective learning outcomes. *International Journal of Sustainability in Higher Education*, *9*, 87-98.
Sipos, Y., Battisiti, B. & Grimm, K. (2008). Achieving transformative sustainability learning: Engaging head, hands and heart. *International Journal of Sustainability in Higher Education*, 9, 68-86.
Stacey, R. (1999). Complexity and Creativity in Organizations. San Francisco; Berett-Koehler Publishers.
Svanstrom Svanstrom, M., Lozo-Garcia, F., & Rowe, D. (2008). Learning outcomes for sustainable development in higher education. *International Journal of Sustainability in Higher Education*, 9, 339-351.
Tereseviciene, M., Zuzeviciciute, M. & Hyde, J. (2007). The need of validation and recognition of learning outcomes acquired non-formally and informally. *Baltic Journal of Management, 2,* 334-350.
Williams, S. (2004). Personality, Attitude, and Leader Influences on Divergent Thinking and Creativity in Organizations. *European Journal of Innovation Management*, 7,3, 187-204.