

Genetic Diversity as Inspiration for Instructional Design

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Abstract: This paper discusses a case study in which a university and a self-organizing community of practice collaborated in an e-learning endeavor. Independently, these organizations challenge traditional assumptions about education. Together they designed a virtual learning experience that draws inspiration from ecological principles and enables emergence.

New Mindsets, Metaphors and Models for New Learning

Charles Darwin observed that successful species are not the strongest, nor the most intelligent, but the ones that adapt to change. We are entering a period of profound change requiring new adaptations in the ways we work, learn and think. Our thinking is shaped by our culture; we may not even realize how profoundly philosophers, scientists and management theorists such as Descartes, Newton and Taylor have shaped our thinking. Language and metaphors help us glimpse our assumptions about a machine-like world: we work in organizational divisions, grease the wheels, hope projects work like clockwork, leverage opportunities, set measurable objectives, test for accuracy, codify best practices and even design instruction. As Dave Snowden writes, the conceptual changes required for academics and management “are substantial, effectively bounding or restricting over a hundred years of management science in a similar way to the bounding of Newtonian science by the discoveries and conceptual insights of quantum mechanics”(Snowden 2002, 106).

Much of our work today is less mechanistic than what prevailed in the industrial era; the process of assembling cars is ordered and predictable; the process of reducing the amount of ground we pave or fossil fuel we burn is not. Recent explorations of complexity (Dillon 2004, Kelly 1998, Shaw 2002, Stacey 2003, Zimmerman 1998) can help us shift our worldview metaphors from the mechanistic to the ecological. Instructional designers can have a pivotal role in this shift: helping people to think and learn in more emergent ways for work in complex environments.

The concepts of complexity and emergence are not new. Stacey (2003) quotes Norbert Elias’ early work, which describes how unplanned, orderly formations arise. Elias didn’t know about complexity science, but was describing what is now known as self-organization and emergence:

...plans and actions, the emotional and rational impulses of individual people,... can give rise to changes and patterns that no individual person has planned or created. From this interdependence of people arise an order sui generis, an order more compelling and stronger than the will and reason of the individual people composing it. It is the order of interweaving human impulses and strivings, the social order, which determines the course of historical change (Elias1939 cited in Stacey 2003, 366).

This paper explores a joint project by Royal Roads University and CPsquare where the authors worked to design and offer an international, emergent e-learning opportunity about communities of practice. In this paper, the authors explore the meaning of, and the implications of, instructional design where the design process is collaborative and crosses traditional organizational boundaries. Preliminary successes reflect both the common values and the differences of the two organizations, suggesting that genetic and ecological metaphors are useful in describing the process. The authors hope the metaphors that we use to explore our collaboration will help to guide new thinking, learning and collaboration.

Some context is needed to understand our collaboration and its outcome. The Foundations of Communities of Practice workshop (henceforth referred to as “CPW”) has evolved each of the 17 times it has been offered since 1998 with enrollments ranging from 12 to 40 people from around the globe. Information about CPW is on the CPsquare website www.cpsquare.org and its evolution has been discussed in Smith and Coenders (2002), Arnold

and Smith (2003), Arnold and Smith (in press), and Arnold, Smith and Trayner (in press). As the Master of Arts in Knowledge Management degree was designed at Royal Roads University www.royalroads.ca/km one of the final courses was a combination of online activities and a virtual field trip to CPW. We refer to this 4-credit-hour offering as KM 650, officially, "Knowledge Management 650: Communities of Practice". During the course, participants use three social technologies: an e-learning platform developed by Royal Roads University, an enhanced version of Web Crossing in the workshop, and a third tool, such as Simplify from Tomoye or SocialText's wiki, which can change annually. KM 650 learners develop personal learning plans that provide considerable latitude for individualized, applied project work and the demonstration of competencies. Wenger et al. (2001) defines a community of practice (CoP) as a group of people "who share a concern, a set of problems, or a passion about a topic, and who deepen their understanding and knowledge of this area by interacting on an ongoing basis"(4). Communities of practice and the learning that results from their activities are fundamentally emergent: one cannot predict exactly how they will operate, who will belong or what they will produce. Today, they are often dispersed geographically, which raises issues about the use of technology for collaboration and community adaptation. Education about communities of practice is education about emergence and learning.

The authors' roles in each of their organizations involve preliminary design and ongoing adaptation. Alice has played the roles of knowledge management program director and designer, as well as instructional designer and course instructor/facilitator of KM 650. She is also a mentor and facilitator in CPW. John's roles have included CPW participant, organizer, host, coach, advocate, technician, designer, and instructor. We see instructional design as an aspect of our work at every level before, during, and after the participants log on to their computers

Working across the Edges: Reflecting on our own Collaboration

With some notable exceptions at institutions including Fielding Institute, Cambridge University, Pepperdine University, and University of California at Berkeley, the kind of learning we are describing here has not entered the mainstream. In "Not only the lonely: Implications of 'social' online activities for higher education", Fraser and Greenhalgh (2002) note that there appear to be few post-secondary examples of on-line collaborative learning. Perhaps universities suffer from what Richard Bernstein (1983) described as "the Cartesian anxiety" – the fear that if we do not have absolute certainty, we have no knowledge at all. Historically, this anxiety has paralyzed us, Bernstein writes, and "We need not to refute it so much as to be cured of it!" (Bernstein 1983 in Pierce 1998, 8). As a solution, Brown and Duguid (2000) suggest: "the way forward is paradoxically to look not ahead, but to look around" (8).

Participant Perspectives on the Collaboration

The designers' intentions mean little without participants' responses. Through Royal Roads surveys, the authors know there is initial discomfort with the openness and flexibility of the design, but participants adjust quickly. Course ratings have been consistently excellent. "It is the best learning experience that I have had in my academic life (2 undergraduate, 1 graduate, one certificate degree)," writes one participant. "Bravo Alice and the team who put this together. It has been so stimulating that I know I will continue learning in this area far after the course is completed". So far, every Royal course participant has stated that the more realistic CoP experience of CPW has been a valuable complement to the academic study of KM 650.

The community-oriented style of CPW facilitates continuity over time as well as communication across distances. Participants in the Foundations workshop are invited back to serve as mentors, volunteering in a subsequent workshop to share their experience, bring in additional context, and help with the production of new knowledge. After graduating with MAs from Royal Roads, two workshop participants returned in new roles this year, one as a mentor and another as a guest speaker. Ron Donaldson of English Nature could have been commenting on this ongoing relationship when writing that, "the ultimate goal is that emergent property so valued in our natural communities, that of sustainability, which means that the community will self-organise and maintain its activities once it is left alone" (Donaldson 2004, 125).

Perspectives of Executives, Designers and Colleagues

As research for this paper, the authors explored questions about education and this collaboration in an on-line forum for previous CPW participants. We read the UNESCO report in which Giarini and Malitza (2003) explore the lag in

educational reform in relation to rapid change and the need for lifelong learning and interdisciplinarity, which does not fit with "the rigid classification of human knowledge" (23) or the traditional separation of learning from work. (21). Although working in an online environment, criticisms such as Riel and Polin's (2004) also resonated:

Traditional classrooms, weighted down by the burden of a prescribed curriculum...and with compulsory attendance, lack the defining characteristics of a community. Collaborative learning might be employed for a specific lesson, as an instructional strategy. However, for most of the time, the traditional classroom is a thinly contextualized, unfocused collection of tasks that does not support a community of learners (22).

In the on-line forum, the theme of university tradition emerged. We relayed questions to Royal Roads University executives and received this insightful response:

First, I note you refer to 'traditional ways of doing things' and for me the key word is 'tradition'. There are good and powerful reasons why we do things in more or less habitual, reflexive ways, so changes to those ways are resisted, often for good and powerful reasons that have much to do with the personal value we gain from feeling and being competent, even if the effects of our doing are not optimal for others and/or the organization of which we are members.

My rationale for encouraging complementarity in considering alliances and partnerships is that it permits us to lead from what we see and feel are our strengths and at the same time acknowledge what we do not know or cannot do but which are available from allies/partners (anonymous personal communication, March 27, 2004).

When asked in the forum about risks associated with the instructional design, Alice replied: "one of the things that seemed risky to me was that, like a courtyard, the virtual field trip to the workshop was potentially empty space. I wanted participants to have something close to an authentic CoP experience. They were responsible for their own participation and learning. I was not 'purchasing' deliverables; I was purchasing possibilities. Try to do a return on investment calculation on that!"

BJ Berquist responded: "I love that phrase, 'purchasing possibilities', Alice!...If you enter a CoP expecting to be spoon-fed information, you will be sorely disappointed." Such is the nature of a complex and emergent learning space.

This online forum was one of several that shaped our partnership. We have engaged in grassroots learning initiatives focusing on topics including communities and leadership, and enabling technologies. These conversations have ranged from a dozen kindred souls around a coffee table to groups that are several times that size and are diverse in nationality, occupation, or organizational setting. We believe these events help to build the common context that is critical for relationships that span many types of boundaries.

Metaphorical Analysis: alternative perspectives on our collaboration

There is no recipe book for inter-organizational instructional design. However, metaphors from nature's complex systems have helped us make sense of our collaboration and could guide similar initiatives. Although experts don't always agree about whether complexity science applies to organizations, most agree that thoughtful use of metaphors drawn from the natural world and complex adaptive systems can help us make meaning, and approach challenges in new ways (Stacey 2003, Petzinger 2000). Metaphors help us explore the boundaries and attractors that made the collaboration between RRU and CPsquare possible and the tensions that can make it difficult.

Hybrid Vigor: Beware of the Drive for Efficiency

Hybrid vigor refers to the improved strength, health or yield that sometimes occurs with crossbred plants and animals. Rutgers geneticists have discovered what may be the science behind hybrid vigor through analyses of maize genomes. "If you have two members of a gene family but expressing themselves in two different tissues," explains Hugo Dooner, "then a crossbred plant could contain both of the genes and may therefore be better off"

(Blumberg 2002, 1). This may be particularly true under stressful environmental conditions. So, the benefits of crossbreeding come from diversity and redundancy (a negative concept in business).

Natural hybridization happens at the edges of ecosystems and innovation often occurs at the edges of organizations. John Seeley Brown (Ark Group 2004) comments that, “most of the really interesting stuff within an organisation is happening on the edge...If you're on the edge of an organisation you are constantly trying to make sense of what's going on. It struck me that sense making and knowledge sharing were two sides of the same coin” (1).

The university and the community of practice bring different strengths to this relationship and to the course design. One graduate student wrote: “I am now definitely aware of the difference between learning about a CoP and learning in a CoP...I always think of academics as learning about something, and in some ways that is a lot easier than learning in something - for me it requires more self confidence to do the latter”. This participant has experienced the hybrid vigor of “learning about” and “learning in”—a powerful combination.

As we integrated an online course from a masters-level curriculum with a self-contained online workshop, we encountered redundancies, and left several intact. For example, the informal self-assessment that forms naturally around a workshop project or a community-wide inquiry was left to coexist with the self-, peer- and instructor-assessments that are essential components of university education. The power of our joint networks to identify and recruit guest speakers is greater than what either CPsquare or Royal Roads University can command separately.

We believe that hybrid vigor is a valuable metaphor for exploring the organizational collaborations that online learning enables. Just as the genetic diversity of two blended populations can increase the vigor of a species, we propose that diversity and synergies resulting from collaborations such as ours can enrich learning environments and increase the adaptability of our educational offerings. The reader should consider whether a potential partnership could improve strength, quality or yield through diversity and a healthy degree of redundancy.

Mutualism: Diagnosing Intelligent Wholes

In parasitic relationships (e.g., fleas on a dog), both “partners” ideally survive, but one benefits at the other’s expense. In other relationships, neither partner is hurt, and one or both species benefit (commensalism or mutualism). For example, the bobtailed squid, *Euprymna scolopes*, is a nocturnal feeder, hiding by day and hunting after sunset. If it were not for its relationship with a tiny organism, *Vibrio fischeri*, predators would spot the squid’s silhouette from below. The bioluminescent *Vibrio* colonizes parts of the squid; the squid controls the amount of light emitted. Their combined efforts help both to thrive (Graf 2002). The many different examples of mutualism suggest that organisms with little common genetic material may produce something neither of them could create alone.

We know the strength of KM 650 comes from the intimate relationship between the university and workshop learning experiences. We see our relationship as productive on both sides. Although CPsquare and Royal Roads University can survive independently, the collaboration has revealed new possibilities on both sides. From the perspective of a Royal Roads graduate student, Royal Roads “hosts” and envelops CPW, yet the workshop also “lives” independently and is regularly offered with no Royal Roads involvement. At an administrative level, benefits could include increased awareness of both organizations. At a learning community level, participants experience an unusually colorful, robust and responsive learning environment. We see mutualism as a metaphor and a goal for the collaboration.

We believe collaborations will be more effective if they benefit all parties. How could mutualism arise? Consider use of a communities or practice technique: ask each of the potential collaborators what they might contribute, and what benefits they might derive, from the relationship.

The Selfish Gene: Fighting our Nature

In his best-selling book, *The Selfish Gene*, Richard Dawkins (1989) proposes that instead of thinking about organisms using genes to reproduce themselves, we think of how genes build and maintain us as gene machines in order to reproduce. Many apparently altruistic acts in nature can be explained through this lens of genetic survival, e.g., weaker males helping stronger relatives to mate, thereby increasing their genetic fitness.

As individuals and as organizations, the authors come from different structures, countries and corporate cultures. It's "in our nature" to associate with similar partners, however, our "genes" are clearly different. A CPsquare "gene" might be no required products; one from Royal Roads might be formal assessment. Although we focus on common interests, our differences contribute to tensions. We don't expect the collaboration to be simple; we take inspiration from Dawkins who warns those wishing for a co-operative society to "expect little help from biological nature...Let us try to understand what our own selfish genes are up to because we may then at least have the chance to upset their designs, something that no other species has ever aspired to"(3).

Morphic Resonance: Being In-Tune

Perhaps we are far more sophisticated than our genetic programming. If we draw from biological metaphors to inspire innovation, we must include the controversial frontiers. Biologist Rupert Sheldrake (1987) likens genetic coding to bricks; you need high-quality bricks to build a house, but the plan is not contained in the bricks (5). He writes that non-genetic morphic fields (much like the invisible fields surrounding a magnet) determine the form of organisms, or groups of similar organisms. Sheldrake cites evidence of how learning can be enabled and accelerated by the creation and accessing of morphic fields.

Might our two organizations, drawn together by our interest in knowledge creation, sharing and learning, be creating a field in which collaborative instructional design and emergent learning structures are able to evolve more rapidly? Might experiments that are eroding mechanistic worldviews create a synergy? Is it possible that learning and innovation for emergence will be accelerated as a result of our collaboration?

The authors work together, in part, because their professional experience and intuition tell them that they are working with important topics that deserve more focus. Do not abandon your human-ness in your explorations of new approaches. Reflect on what is important, trust your intuition, work with groups that fit, and see what emerges.

Conclusions

There is growing interest in complexity and emergence, but, notwithstanding interesting initiatives in several universities, this has not led to widespread shifts in post-secondary instructional design processes. The authors collaborated across organizational boundaries to produce a graduate course that uses three toolsets to support virtual community learning. A workshop, which also exists as an independent entity, is nested within the course. The combined environment is deliberately under-designed, and strongly supported, to enable emergent learning. Students report that they learn about, *and learn to be*, in a community of practice.

Metaphors drawn from nature can be powerful tools to inspire new approaches to instructional design for organic and emergent learning. In nature, hybridization can result in new strengths. Despite organizational differences, the instructional design relationship has developed because of common interests, mutual benefits and resulting hybrid vigour evidenced by participant feedback. "Best practices" cannot be transplanted for use elsewhere, but this case study, and the metaphors we have chosen to illuminate it, may provide guidance for similar collaborations.

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