

EMERGENCE OF A BEAUTIFUL SPIRAL: HOW TO MERGE TECHNOLOGY AND LIFE

1. Introduction: the Seed of the Community Planted in a Virtual Field

*Here we enter the zone of confluence between the emergent ecological idea
and networked information technologies
(Frielick, 2004, p.2)*

*The multiplicity of the possible is here, it is now
(Serres, 1998, p. 2)*

*We must begin where we are
(Doll, 1993, p. 16)*

This is how we begin, from the “multiplicity of possible”, here and now. Our paper describes a project-in-progress. By its very design this project will never be completed, as it is intended to constantly grow via the ongoing processes of self-forming, re-forming, and transforming, via evolutionary jumps toward possibilities of change. Our inquiry is based on the theory of complexity applied to education. This means that the “linear, sequential, easily quantifiable ordering system dominating education today—one focusing on clear beginnings and definite endings—could give way to a more complex, pluralistic, unpredictable system or network. Such a complex network will, like life itself, always be in transition, in process” (Doll, 1993, p. 3).

We draw on complexity theory to create a networked and self-organizing virtual community, with the intent to unify three off-campus sites that are a part of a Teacher Education Outreach Program (TEOP) of a 4-year university located in the Pacific North west. Each off-campus site is separated from others and from the main campus by at a least a 1.5-hour drive or even by a ferry ride for some, and offers evening or hybrid (partly on-line and partly face-to-face) schedules for nontraditional adult learners who often have jobs and families. This somewhat lonely learning environment does not provide many chances to connect with the main campus, or other sites, or with the students at the same site beyond immediate cohorts. Although the cohort model gives opportunities to develop close intra-cohort relationships, the outreach learning environment is hardly addressing a basic human need, which is the sense of belonging to a larger community, and this is a significant concern. Starting with Vygotsky, Dewey, and Burner, educators continue to discover that strong feelings of community correlates with general wellbeing, retention in the programs, academic achievement, availability of support, and cooperation among members (Bruffee, 1999; Wellman, 2001).

The nature of the organization and the distance between our outreach sites do not allow for the creation of a cohesive community in a physical realm, as it might be expected on

any given university campus. So we decided to utilize features of technology to bring people together across space and time.

I live on a little Island, and calling anyone is long distance for me, as calling me is for everyone else. The ferry costs are pretty high, so I only cross if I have to for school. Basically, the only way I get information about what's happening is online right now. Having a way to connect with three campuses instead of just the one would be awesome.

(From the student's survey response)

Jonassen (2000) writes that educational technology can become a powerful source for “providing new ways of thinking, knowing, and acting in education” (p.23). Goldman-Segall (1998) adds that “used as a tool for personal and social reflection, articulation, and creation, new media can extend not only our technological abilities, but transform our cultures and our understanding of the world” (p. 15). Our goal is to utilize possibilities afforded by the Blackboard software, Internet, and digital media, in order to transform the culture of the disconnection and separation, into a culture of collectivity and mutual support. Our intent is to develop a culture of belonging to a larger whole (TEOP department) which, in turn, would be a part of an even larger whole (main campus). Our hope is to create and nurture a virtual community as an organically evolving complex system, a collective “entity” with its own identity, traditions, history, ethos, and own multiple capabilities to self-organize and transform.

With that, we are entering “the zone of confluence between the emergent ecological idea and networked information technologies” (Frielick, 2006, p.2). “The ecological idea” comes from the philosophical insights of the theory of complexity that radically repaints the picture of our reality, and as a result, offers new lenses from which to view knowledge, learning, learners, educational organizations, and educational research (McCalla, G., 2004; Nardi & O'Day, 1999)

Complexity theory is a cross-disciplinary field that has recently emerged out of new developments in mathematics (chaos theory, non-linear dynamics, fractal geometry), science (new theory of evolution, quantum theory, cognitive biology, new developments in ecology, study of climate change), economy (global market systems), and social sciences (systems and functions of social organizations).

Complexity offers a new way of thinking, organizing, and perceiving the world. It has been increasingly referred as a leading paradigm of the 21st century. If we adopt a vision of reality emerging from complexity theory, then we must depart from the mechanistic mega-metaphor and start seeing the world around us in a more organic light. The world of complexity is comprised of vibrating, pulsating, non-linear, adaptive, interconnected, self-organizing systems; systems within systems, within systems, up, up to the galaxies, down, down to ecosystems, human societies, organisms, and elementary particles.

Education based on the modern mechanistic approach values pre-set, logically designed, simply ordered, sequential steps, rigid planning, standards, percentages, accountability

measures, test scores, individualized achievement, closed systems; it “allows only one type of knowing, a rational, definitional knowing” (Doll, 1993, p. 56). On the other hand, education and educational research based on complexity, honors forces creation, evolution, spontaneous action, collectivity, ambiguity, improvisation, and self-organization. It invites risks, radical newness, possibility, opportunity, and surprise (Patton, 1991; Doll, 1993; Davis & Sumara, 1996, 2001, 2005; Davis, Sumara & Kepler, 2000; Jannone, 1995; Laroche, 2002; Laroche, Nicol & Mayer, 2007; Laroche & Roth, 2009; Stagler et.al., 1996; Reynolds, 2000).

Since our goal was creating and researching a fluid, organic, self-organizing “collective”, the concepts of complexity seemed to offer an adequate framework. We planted a seed of a new community in a virtual field; we wanted to learn how to grow and nurture it; and we wanted to know whether it could bear any flowers and fruits. Our central research question was: *How (if) participation in the virtual community could improve learning and wellbeing of outreach students?* To get to this point, however, we first needed to create this community and to learn about potentials and challenges associated with this process.

As a collective researcher we are comprised of three outreach program directors, one administrator (outreach department chair) and one instructor, who is the principal investigator of this research. It was challenging for us to identify and agree upon one certain research method, since we do not share the same philosophy when it comes to educational inquiry. This caused creative tension within and between us; this pushed us out of equilibrium, on the edge of chaos, which is a vital condition for self-organization. We will come back to our research method in a later section. For now, though, we shall briefly discuss some interesting phenomena that reside in the land of complexity, including complex systems, strange attractors, iterative feedback loops, butterfly effect, fuzzy logic, fluidity, the edge of chaos, and self-organization.

2. Self-Organization on the Edge of Chaos

*If postmodern¹ pedagogy is to emerge,
I predict it will center around the concept of self- organization
(Doll, 1993, p. 163).*

*There is magic, even there. Yes, I admit, magic. Do not worry, it is only white
magic. The mages dance, the mages signify, the mages calculate, they interact.
(Serres, 2000, p. 46)*

Davis & Sumara (2001) write that the conceptual shift promoted by complexity lies in distinction between complicated and complex systems. Complicated (or mechanical) systems are preplanned and manufactured to perform a certain task. No matter how sophisticated their design is, functions and outcomes of mechanistic systems (clocks, boats, or spaceships) can be logically calculated and predicted. Complex systems

¹ In our paper we avoid the term “postmodern” since it has many different definitions. William Doll uses this term to describe pedagogy based on constructive postmodernism that embraces concepts of the theory of complexity. In this sense, “postmodern” means “post-mechanistic”.

represent a radically different phenomenon; they are dynamically evolving “collectives” that are more than the sum of their parts. Their behavior is adoptive, non-linear, and unpredictable. “Terms like organic, ecological, and evolutionary have come to figure much more prominently in studies of complex behavior” (Davis & Sumara, 2001, p. 88). Examples of complex systems include living organisms, large-scale economical systems, or various human collectives. Complex systems, unlike the mechanical ones have capacity for self-organization and transformation.

Self-organization is defined as a spontaneous emergence of new complex orders. As Sadar and Abrams (1999) write, “the richness and diversity of interaction between a host of interdependent variables allow complex systems to self-organize. The process of self-organization happens simultaneously, as though by “magic” (p. 83). According to Prigogine (1996) self-organization seems to be deeply embedded in nature and culture. Snowflakes, street crowds, heartbeats, brain processes, poetry, classrooms, or vertices in turbulently flowing rivers, all represent the result of various forms of self-organizing processes around us.

One of the illustrative examples of self-organization is the so-called Benard’s cell experiment, where liquid is placed between two plates that can be cooled or heated. When there is no difference in plates’ temperature, the liquid remains in the state closest to equilibrium. When the temperature of one plate is increased, the system moves further and further from equilibrium, finally reaching a so-called “bifurcation point” where thermal convection suddenly shapes itself into a striking organized pattern of hexagonal “columns.” Such a process illustrates an amazing correlation between large numbers of particles. Self-organization happens as if each element of the system was watching the behavior of its neighbors and knew its own role in participation in the overall pattern (Prigogine, 1996). When the temperature differences increase even more, the system moves further and further from equilibrium until a new point of instability is reached. At this new bifurcation point, a honeycomb of structured cells self-organizes and transforms itself into spirals, the beautiful expressions of a new, higher level of complexity.

Certain conditions should be met in order for self-organization to occur. This includes but is not limited to an unrestricted flow of matter/energy and information, interactions and communications between all parts of the system, sensitivity to small changes (butterfly effect), multiplicity of possibilities from which to evolve, freedom of expression within flexible boundaries, and the presence of strange attractors.

The attractor is a state where a system-in-process eventually settles down. So-called point attractors “attract” trajectories of a single point. For instance, the moving pendulum “stops” in the center, due to gravity and air resistance. Its behavior is linear, calculable, and predictable; it does not have many choices from which to settle. The picture changes dramatically if the pendulum is strongly pushed to move between three magnets. Its movement becomes seemingly chaotic and unpredictable, but when graphed in a phase-space diagram, point-by-point, the movement reveals a strikingly beautiful pattern, resembling a butterfly with out-stretched wings. In this case, we are talking about chaotic (strange) attractors.

Strange (or chaotic) attractors are understood as power factors that draw the system toward evolution; they are the states to which the system eventually settles, depending on the properties of this system (Lewin, 1999). "Imagine floating in a rough and dangerous sea, one swirling around rocks and inlets. Whirlpools become established, depending on the topography of the seabed and the flow of water. Eventually, you will be drawn into one of these vortexes. There you stay until some major perturbation, or change in the flow of water, pushes you out, only to be sucked into another" (Lewin, 1990, p. 20-21). Attractors can be understood as temporary patterns of stability within a constant flux.

To extrapolate this to the process of human thought, the chaotic attractor could be a word, an idea, a flush of memory, or a speck of vision that propels our thinking toward new orders of complexity, toward new unexpected cognitive turns. To apply this to a human collective, it could be an intent, or a vision, or action, or pattern of behavior. Strange attractors are not permanent constructs; they appear and disappear during the course of a system's evolution. Writes Isabelle Stengers (1997):

An attractor is a stationary state or regime toward which an evolution described by the well-determined system of equations leads. Usually, an attractor is stable: different sets of different initial conditions determine evolution toward the same attractor (for example, a state of thermodynamic equilibrium, the immobile state of a real pendulum, from which one has not abstracted friction; or "limit cycle"). Once this attractor has been reached, the system will no longer spontaneously depart from it, fluctuations aside. "Strange attractors," on the other hand, do not have this property or stability. Two neighboring initial conditions can generate very different evolutions. The slightest perturbation can push the system from one regime into a very different one. Instead of stabilizing into a predictable and well-determined state, the system wanders between possibilities. (p.7).

Another important condition for self-organizations is a fluid realm. This is the state in-between complete randomness (such as a gaseous state) and complete form order (such as a solid state). Fluidity is a realm of shifting, mixing, and interconnections. Self-organization can occur in the realm of fluidity if the system is pushed out of equilibrium via some turbulence, gradients, or tension. The further the system is from equilibrium, the stronger the chance for self-organization. The state-far-from-equilibrium is called "the edge of chaos", a curious condition in-between complete randomness and firm order. It is a condition optimal for system's transformation, a Gestalt switch, an evolutionary jump, quantum leap, sudden change, "aha!" moment, birth of a new strange attractor, emergence of a new pattern of meaning. Every transformative process requires that the new information is fed back (iterated) into the system so the process may continue. Arguris, Spryon & Darzebtas (2008) write:

"As the complex system is able to observe the distinctions it makes, it is able to refer to result of its action back to itself. This makes it a self-referential system, providing its with ability to create new distinctions (actions) based on previous ones, to judge its distinctions, and to increase its complexity by emerging new meaning (p.19).

The self-organizing path toward transformations is non-linear and limitedly predictable; it depends on interplay of its history and numerous variables within and outside the system.

Terms of complexity such as “fuzzy logic” or “new rationality” account for ambiguity inherent in the behavior of complex systems.

Pedagogical models and educational research based on complexity embrace vital conditions of self-organization, including creative gradients and tensions, open systems, freedom of expression within flexible boundaries, interconnectedness and communication between all participating members, richness of possibilities, multiplicity of choices, and collective co-emergence. Laroche & Roth (2009) conceptualized fluid learning environments that allow formation, re-formation, and trans-formation of new cultural and epistemological patterns. Fluid environments have fuzzy and penetrable boundaries; they blur distinctions between schools, universities, nature, and society, while juxtaposing formal and informal educational settings. Fluid environments are conducive to emerging non-orthodox forms of educational research.

2. Design and Method: Creating the Path by Walking

In other worlds, within complexity science, the quantitative/qualitative binary is not a particularly useful one... What is useful here is the difference between linearity and non-linearity—or Euclidean and fractal geometry. An education or research project based on lines attempts to move from start to finish. An education or research project structured around fractals unfolds through recursive elaborations, by which memories and previous knowledge and memory are continuously revised according to immediate experiences and emergent iterative preferences.

(Davis & Sumara (2005, p.318).

We selected Blackboard software as a “home” for our community and as a quantitative tool for our research. Traditionally, our university uses this platform as a technological aid for teaching classes; it is therefore familiar to our students and faculty. It has many useful features, including the capacity to store and organize necessary information, an interactive discussion board, means for multimedia exchange, and statistical and graphic capabilities.

The idea of utilizing Blackboard for development of a partly formal, partly informal virtual community was unconventional, but promising. First, two inter-cohort Blackboards were developed separately in two outreach sites with the purpose of organizing program information and resources. Then, during a casual conversation, two of us suddenly realized (bifurcation point!) what kind of community Blackboard technology could potentially provide. It could be a source of shared resources, but also become a place for community connections and interactions. Potentially, it could offer a unifying space of belonging for outreach adult students. Laroche & Benedetti (2008) envisioned that this arrangement could generate many possibilities, including:

- “Anytime,” “anywhere,” access to an integrated, interactive, and supportive community of faculty, staff, current students, and alumni.

- The means to share interests, professional experiences, visions, concerns, and resources (using rich multimedia and collaborative database).
- Professional and peer advising, counseling, mentoring, and general support for the students facing the combined challenges of job, family, and school.
- Faculty-to-faculty, faculty-to-student, and student-to-student interactions by providing a forum for exchanging syllabi, questions, ideas, and multimedia artifacts.
- An opportunity for alumni to maintain connections with the program, to have an access to a shared resources database, and to mentor current students.
- Strengthened connections with the main campus, K-12 schools, and larger educational communities at the state, national, and international levels.
- Opportunities to develop and see connections between various disciplines

After some period of germination, a new bifurcation point suddenly emerged out of the realization that many aspects of envisioned strategies are supported by the literature on successful development of on-line communities. This includes common goals or interests, repeated participation, discussions and feedback, multiplicity of possibilities, flexible thinking structures, interpersonal connectivity, collaboration, interactions, distributed leadership, assigned roles, and shared outcomes (Abel, 2005; Farrior, 2005; Kim, 2001, Kelland, 2006; Penland, 2008). We realized that these strategies largely resonate with the concepts of the theory of complexity.

The idea of creating a Blackboard-based virtual community that would unify three off-campus sites was discussed during the program directors meeting in May and June of 2008. This is when we as a collective researcher and author were born. The vision outlined by Laroche & Benedetti (2008) became the objective of our project.

Our central, “big picture” research question is: “How (if) participation in the virtual community could improve learning and wellbeing of outreach students?” This question however, could not be addressed without several others. “What makes a virtual community a community?” “What challenges are inherent in its research and creation?” “What features and activities are relevant and necessary?” “What strategies and practices can be implemented to facilitate its self-organization and evolution?” “Could Blackboard, with its potentials and limitations, provide an optimal technological “home” for a virtual community?” And finally, we wanted to find if a virtual community is even needed or possible between or within our various programs, in light of students’ and instructors’ busy schedules. We also anticipated that some new questions might come to light as we walk our path.

Preliminary strategies discussed and outlined during the May and June 2008 meetings included the following:

- Announcements of information relevant to an outreach community (events, achievements, news).
- Utilization of the “Discussion Board” option for students’ and instructors’ informal introductions;

- Utilization of the “Discussion Board” option for students’ to submit outstanding class projects that could be rated by others and then nominated for presentation at the University Scholars week;
- Utilization of the “Blog Tool” for students to share narratives about practical experiences. Potentially, these experiences can be compiled into a collective book.
- Contests of self-produced multimedia materials about students’ experiences in the program. Some of these videos can be potentially used as marketing tools.
- Invitations of entrees of poetry and arts.
- Initiation of synchronous “Friday chats” around specific themes, case studies, real-life scenarios relevant and significant to teacher education.
- Initiation of a virtual advising and counseling office.
- Virtual field trips to the main campus, local schools, museums, and multicultural communities.
- Videotaped best teaching experiences of faculty and alumni.
- Creating group pages.
- Shared database of ideas and resources posted by students and instructors. This database will constantly increase as students take ownership for posting the information and multimedia materials. We hope that these shared resources will enable instructors to use each other’s multimedia and published materials to help students to see interdisciplinary connections.

Our tentative research design involved three phases. The first step included creating the structure of the community, while taking into the account aesthetic, informational, and organizational needs. The next two stages were envisioned as iterative feedback loops that would utilize the information gathered via surveys, narratives, blogging, and discussions. Quantitative statistical data would be provided via the Blackboard software. The information from each cycle would be critically interpreted by us, researchers, and then it would be used to “feed” the next phase of further development of the community. Our hope was that after our facilitation of initial phases, the self-organizing process will take off on its own and the community will start perpetuating and proliferating itself through continuous iterative feedback loops.

We speak of our research design in tentative terms because, as Swenk (2001) and Alhadeff-Jones (2009) note, if we accept self-organization as a dominant concept, then we should acknowledge that rigid planning is not only unrealistic, but also dangerous. Self-organizational planning allows fuzziness, ambiguity; it leaves room for errors, learning, and adaptations.

Patton (1990) advised that scholars who embrace concepts of complexity should seek new forms of research that walk through “a maze whose walls rearrange themselves every step you take”(p. 30). In the research described in this paper, we create a path by walking.

The abstract painter², while elaborating on the evolution of her work, explained that after the initial brushstrokes, she allows the painting to lead her creative process. The only thing she needs is to believe that something wonderful will come out of it. Musician and philosopher Nachmanovitch (1990) said that the only thing one needs is to begin, and then...the “evolving organism takes on a momentum and identity of its own. We conduct a dialogue with the living work in progress” (p. 7). This resonates with the view of Laroche & Roth (2009) who explored possibilities of overlapping concepts of complexity with educational research. They conceptualized an interpretative inquiry as a dialogue with the living work in progress, as a collective co-emergence through learning by doing and sharing. They perceived a collective of learners as an open, transformative system being in a constant flux and they invited to pay attention to the formation, re-formation, and transformation of complex patterns of meaning within a realm of fluidity, similar to watching the appearance and disappearance of vertices and whirlpools in a madly running river.

Davis & Sumara (2005) and Alhadeff-Jones (2009) identified aspects of educational research on the basis of complexity using geometrical terms to draw the difference between classical forms of research and those based on the theory of complexity. Educational research based on complexity blurs the distinction between quantitative and qualitative modes; it focuses not on quantity, but on shape. It views statistical, mathematical data as “a source for possible models rather than a source for actual explanations”. To the contrary, classical research makes a clean distinction between the quantitative and the qualitative modes of inquiry; it deeply embraces scientific preference for line-based logic and interpretation, linear graphs, and clearly defined “cause and effect” relationships. In the light of complexity such methods cannot be considered as adequate tools for the study of “such self-transforming phenomena as learners, classrooms, communities, and cultures” (Davis & Sumara, 2005, p. 313).

What makes complexity so “complex” is a large number of interactions, overlaps, and interferences between variables, agents, actions, retroactions, and random events that constitute our world (Morin, 2007). The behavior of complex systems is non-linear; their geometry is fractal, which means irregular and multi- and in-between-dimensional. Linear Euclidean forms (and classical forms of research) are built up through linear sequences of operations, whereas fractals are complex structures generated through recursive, iterative process. “At each stage in a recursive process, the starting point is the output of the preceding iteration, and the output is the starting point of the subsequent iteration. Every stage, that is, is an elaboration, and such elaborations can quickly give rise to unexpected forms and surprising complexity” (Davis & Sumara, 2005, p. 310). Extrapolating this to educational systems and educational research, the patterns of meaning emerge from the activity itself, through open, iterative, and communal conversations (Doll, 1993).

But how could research informed by complexity be useful for educators? How legitimate, objective, valid, and replicable could this research be? Davis & Sumara (2005) caution

² Virginia Cobb, DVD by Creative Catalyst Productions, Inc.

that the concepts of complexity will not give any exact what-to-do prescriptions but could offer useful generalizations. These generalizations, however, would not assure exact replicability, since complex systems cannot be duplicated or cloned. Educational research based on complexity would attend to “dynamic elements and conditions that enable emergence of certain sorts of engagement and insight”(p. 318). The authors continue that the concepts of complexity might be useful to those who attempt to understand and make effective and deliberate interventions in systems that do not always respond in predictable ways. An example of such systems is a social collective that develops non-linearly and has the capacity to self-organize and to transform itself. “With most complex systems, there are no all-powerful leaders and no pre-specified plans inscribed in the heads of individuals. Instead, collective activity emerges organically from mass interactions.” (Davis & Sumara, 2001, p. 90).

This is where we currently stand as a collective researcher, at the threshold of complexity. We must admit that stepping on this threshold was not a result of a collective “aha” moment, since our group does not share the same philosophy vis-à-vis the value of complexity as compared to the canons of classical research. From the classical perspective, research that walks through “a maze whose walls rearrange themselves every step you take” seem questionable, awkward, and “willy-nilly”, and this is a legitimate concern from the traditional vantage point. Nevertheless, recognizing that our virtual community is a complex system that is affected by multiple and often overlapping variables, and therefore cannot be adequately studied by analytical reductions, we agreed to give complexity a try.

“Re-inventing a pedagogical discourse necessarily involves the emergence of conflicts of interpretation and antagonisms producing as well as expressing the resistances determining the strategies implemented by researchers” (Alhadeff-Jones, 2009).

The challenge is that complexity theory has just begun paving its way into the realm of educational research. Our path therefore, is largely unexplored and is not well lit, which makes our walk intriguing and exciting. Although we envisioned a big picture of our virtual community, in no way could we predict exact sequential steps leading to this picture; we would not even exclude the possibility that the big picture would repaint itself as we walk our path.

4. Unfolding Growth: First Steps

Of course, this makes sense in any group; it's most efficient to have a community of learners who are all pretty much on the same page, and that all identify themselves with the community and are motivated to learn by the community.
(From the student' on-line discussion)

The multiple as such. Here's a set undefined by elements or boundaries. Locally, it is not individuated; globally, it is not summed up. So, it's neither a flock, not a school, not a heap, nor a swarm, nor a heard, nor a pack. It is not an aggregate. It is a bit viscous perhaps.

(Serrers, 1998, p. 5)

Initially, we created a static structure with a picture of a village as our Blackboard banner. Since our students are prospective elementary teachers, we thought that a banner with magical, cartoon-ish “flavor” would do the job. Images (homes) in the village represented the community’s information and activities. One of the limitations of the Blackboard software (at least for now) is that it does not allow creating stable underlying links to click on image in order to enter specific places in the village. So, the image is not interactive, just “for looks.”



Figure 1. The Blackboard banner representing a TEOP community

A way around it is to create corresponding buttons on the left side of the Blackboard interface. These buttons included menu options, as follows:

- **Program Overview** introduces our program as a whole and contains a video about the main campus. Potentially, we planned to produce and insert videos about each site.
- **Administration** contains information about program administrators and video addresses from the Dean and the Department Chair.
- **TEOP groups** contain cohort pages and other groups from all sites. Individual cohorts can use their group space for their own internal communication.
- **Interactive Forum** is created with the purpose of involving community members in various discussions and exchanges.
- **Practicum Blogs** provide an opportunity for our community members to exchange their practicum experiences. Potentially, we intend to compile these entrees into a published book with prospective teachers as a collective author.
- **Videos** section contains self-produced videos from our cohort members and faculty.
- **Our ART** section is intended for art and poetry submissions.
- **Everett**, **Seattle**, and **Bremerton** spaces contain site-specific information, such as practicum materials, lesson plan templates, announcements, schedules, textbooks, courses information, links to the site web pages).

- **Support** contains policies, scholarships, and technology information
- **Bank of Ideas** contains exemplary class projects from students and various teaching resources submitted by cohort members and faculty.
- **Resources for West-E test** (program exit exam) contains various links to relevant resources
- **SWEA/Leadership** section contains information about SWEA (Student Washington Education Association) and groups of local chapters.
- **Events** contains pictures from various TEOP activities, including the completion celebration, winter holiday party, and other events.
- **WWU centers** option provides connection to some centers in the main campus, such as the Center for Education, Equity, and Diversity, Writing Center, Center for Assistive Technology.
- **Alumni** section introduces alumni, contains alumni testimonies, information about their employment, and the video of an alumna in her classroom.
- **Communication** allows sending messages
- **Survey** option is created for introducing research surveys.

The shell of the TEOP community was basically completed by the beginning of the new school year and announced to all students and faculty at the end of September 2008. However, as Blackboard statistics indicated (number of hits), there were not many “customers”. The interest was quite low. Our collective system was in a state close to equilibrium. This fact reinforced our understanding that in order to ignite interest toward the community we must engage its members in creating it. With that, we were ready for the next, more interactive and engaging step.

Stepping into a new phase, we designed a survey that was comprised of an essay, fill-in-the-blank, and opinion Likert-type questions. The survey intended to be informative and explorative. It described current and potential resources and activities, examined the level of satisfaction with the status quo, and asked suggestions for further development.

But how do we make people participate or even open the community Blackboard? This was a good question. We needed to “push” the system out of equilibrium, to set it in motion. Two of us simultaneously suggested developing some sort of inter-site class assignment that would “force” the students to participate. One of us was teaching the same class to four new cohorts in two outreach sites. She designed the assignment as an inter-site on-line discussion of the topic “Cultural Diversity” that was a part of her class content. While explaining this assignment, the instructor simultaneously invited students to take a survey and to contribute to a newly created *Introductions* section in the Blackboard’s *Interactive Forum*. Although the latter two activities were not graded, they were somewhat “attached” to the assignment. As expected, this action resulted in a spike of participation, calculated and graphed by the Blackboard software.

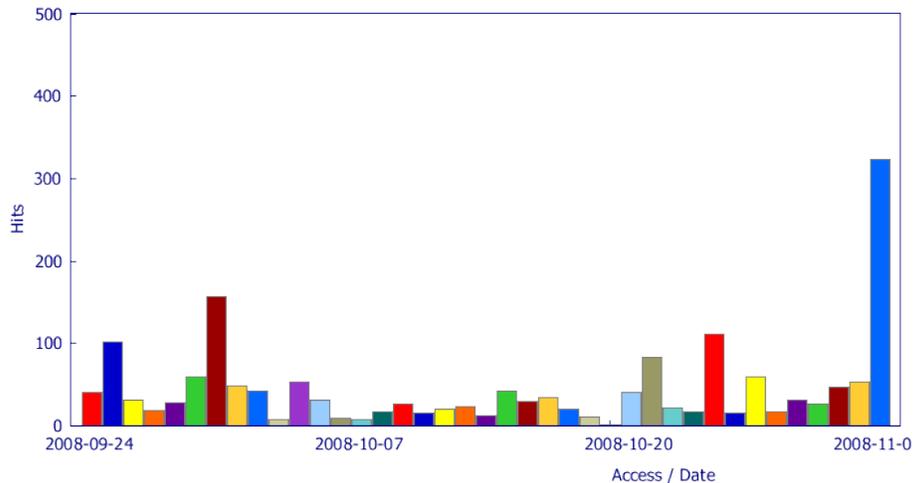


Figure 1. Graph of the overall use (hits) generated by the Blackboard Software. The highest spike corresponds to the date of a cross-site class assignment.

After this initial step, the invitation to participate in a survey was announced to the rest of faculty and the cohort members at all sites, but without being attached to any class assignments. The response was minimal. We concluded that some initial “push” must be performed in order to get the system moving. So far so good, we planned the activity, we “pushed” the system, we predicted the outcome, our prediction was confirmed, but then we stepped into the realm of limited predictability.

Will this “push” result in settling within a point attractor, when the system, after being forced to move, come to a single point of equilibrium, and the “pendulum” will have to be constantly pushed? Or, was it an entrance into the land of strange chaotic attractors, where our system starts evolving freely within flexible boundaries of the possible? This was, and still is, the unknown, and this is where classical research meets its limit, as we cannot identify “cause-effect” relationship with certain precision, since our system is subject to influence of many variables.

In their narrative reflections on the cross-site class assignment, the vast majority of students expressed satisfaction with this mode of instruction. They indicated that it was exciting and educational to connect with and learn from people from other sites. The re-occurring concern, however, was the length of the discussion and number of participants (71 participants and 284 postings!). To students, it was time consuming to read through all entrees. They definitely suggested repeating this mode of assignment again, but using smaller cross-site groups. The pattern of meaning emerged from this feedback: “if we do something like that again, we should organize cross-site discussion into smaller groups.”

In the “*Introduction*” section of the “*Interactive Forum*” students shared their hobbies, interests, inspirations, and pictures. This section was especially popular (384 postings). It was quite noticeable that the students were enjoying connecting across time and distance at a purely human level. Perhaps, it was our first step in creating “a space of belonging.” From a student’s e-mail:

I just wanted to let you know that I think the interactive forum is a wonderful idea. I had no idea how much I would enjoy reading exerts from all of the Cohorts. It has been terrific to read about the lives of people going through the program, and I feel like I have also gotten to know my Cohort better by reading their introductions.

One of the useful features of the Blackboard software is that it gives immediate quantitative data about participation in any given activity. Also, it has the capacity to create and administer surveys, while sorting and storing the results. The survey was administered at the end of November. It was introduced not as a questionnaire, but as an invitation to participate in the collective research focused on developing the inter-site virtual community. We explained our rationale, our goal, and outlined research questions. We also incorporated some humor stating that taking survey will take no longer than making a cup of coffee. To create an additional (point) attractor, we offered a tangible reward, randomly drawn university memorabilia prizes.

Our first survey included such questions as, “What features of your community make it meaningful to you? From your perspective, is it possible to transfer features of a "real" community into a virtual space? What are the potentials and challenges? Would participation in a Virtual Community be beneficial to you? How? Please browse through the existing TEOP Virtual Community structure. Is the information posted there (text, links, videos, images) accessible to you? Is it intuitive to navigate? Is it useful? Please take a look at the INTERACTIVE FORUM. Would you be willing to participate in blogging, discussions, or sharing projects, resources, and videos? From you perspective, what additional information should be posted on TEOP Virtual Community Blackboard? Can you suggest activities and/or topics for discussions that would make participation in the Virtual Community more interesting, beneficial, and interactive?” All anonymous survey responses were sorted by questions and shared with the entire community.

Responses on questions regarding meaningful features of community could be synthesized into the following categories.

- 1. Relationships and connectedness with people, the sense of belonging to the group*
- 2. A common identity*
- 3. Shared goal, knowledge, values, beliefs, and experiences*
- 4. Mutual help and support*
- 5. Trust, feeling safe, welcomed, and unconditionally accepted no matter race, ethnicity, gender, sexuality, and educational background.*
- 6. Engagement in activities*
- 7. Sense of humor*

Despite the abundance of the literature on definitions and characteristic of communities, it was vital for us to find out what is important to our students, here and now, as it gave us guidance from which to build our complex and unique system.

Survey responses further indicated our students’ opinions that it is possible to transfer features of a "real" community into a virtual space, but only to some extent, since virtual space lacks face-to-face interaction, bodily expressions, and physical contact. From the

students perspectives, *“virtual communities aren’t the best, but they are better than nothing”*. The overwhelming majority of respondents indicated that participation in the virtual community could benefit them. Below are excerpts from student responses:

“It would make more connections with the other sites, enabling relationships to blossom, share ideas and interests, making new friends and learning from others.”

“I would love to be involved in something like this. I know (and many of our teachers have confirmed) that each cite is different, although we are all working toward the same goals.”

Of course! Teaching is a collaborative field. We learn to be effective teachers not just from our professors and host teachers but from each other. Having access to people outside our cohort or our site can only expand our opportunities to learn!

From survey responses, students indicated general satisfaction with the informational content of the community Blackboard.

If I hadn't had the opportunity to take the TOEP survey, I would've missed out on taking the time to check out the variety of links that are available to students in this program. Based on what I've clicked on (the tabs) and the information that I was taken to, I think that the TOEP Blackboard community is very efficient! I've taken online classes before where there was half of the resources and options for students, so I'm very impressed and lucky!

There were some suggestions for reorganizing the content (Bank of Ideas) and creating a “News” section and “how-to” guide, to make it easier to navigate through the inter-site Blackboard. Students considered participation in interactive activities outlined by us, but “not often” and “not always”, due to busy schedules. Some of them indicated the necessity of reminders. The last question was about their suggestions regarding activities and/or topics for discussions that would make participation in the Virtual Community more interesting, beneficial, and interactive. Among their suggestions were, questions-answers forum where older students help newer students; commenting on each others’ lesson plans; cutting edge, provocative, taboo conversations; discussions related to classroom management; and exchange of information about children’s books and other resources useful for teachers.

We used the obtained information to “feed” next iteration loop, so to adapt and adjust our community in accordance to student suggestions. As a response to surveys, we created a “What is Here” button explaining the structure and functions of the community Blackboard.” We initiated and announced “Practicum Blogs,” for students to share their field experiences. We created a “Virtual Buddies” forum, with the purpose of exchanging questions and answers between newer and older cohorts. We also created “TEOP NEWS” section and several discussion threads in the interactive forum. This included, “Wisdom from Graduating Students”, “Cutting Edge Discussions”, “Lesson Plan Discussions and Support, Classroom Management Concerns and Tips, “Useful Books and

other Resources Information Exchange” and “Advertisement Board” as a place for open-ended ads, from old book sells to jobs and babysitting.

One of us, who happens to be the outreach programs department chair, came up with the idea to strengthen the connections with the main campus through overlapping the formal and informal dimensions of our community by combining academic work with the popular and fun format of “American Idol.”

Every year, in spring, our university hosts a conference-style Scholars Week event, where undergraduate students share their most outstanding projects. Students presenting their projects on the main campus spend the day touring the main campus, discussing their endeavors with interested students, faculty, and staff, and attending the WWU Scholars Week banquet the same evening.

The department chair has announced a new thread “Scholars Week Submissions and Nominations” in the Interactive Forum. The purpose of this thread was to coordinate the nomination process for TEOP’s 2009 student representatives who will showcase their research and other creative endeavors at WWU’s Scholars Week. Class projects in the form of academic papers, videos, web sites, Power Points, slide shows, self-written books, or any combination thereof from fall, winter, and spring quarters could be submitted electronically in this thread for viewing by the entire TEOP virtual community. All community members could nominate, self-nominate, comment on posted projects, and rate in one or more of the following areas: Most rigorous research, Most original presentation, Best use of technology, Best Teaching/Learning Innovation, Best Educational Intervention. It was indicated, that at the conclusion of the nomination period, all entries will be tallied and students whose projects receive the highest number of nominations in the various categories will be invited to present their projects at WWU in main campus during Scholars Week. Projects may also be identified for presentation by tallies for “Most Highly Rated Overall” and “Most Often Viewed.” This announcement resulted in the jump of “hits”, and perhaps in the evolutionary turn, since the chair has entered the scene as a member of the community and announced formal/informal activity that would potentially connect outreach students with the main campus.

The next step in the evolution was empowering self-organizing currents within our community by organizing a group of students who volunteered to become “Virtual Managers.” One of us has arranged and facilitated meeting via teleconferencing, where newly formed managers were introduced to each other and were given their responsibilities in cleaning corroded links, re-organizing the content, announcing news, and facilitating interactive blogs and discussions. A new button “Virtual Managers” was created, with pictures, contact information, and description of responsibilities. To involve older cohorts, we also organized a group of “Virtual Mentors”. Members of this group have volunteered to provide one-to-one advice to younger cohort members and to participate in facilitation of interactive activities.

Survey results were shared with the entire community, newly initiated groups and interactive activities were announced by Virtual Managers. How would our virtual

“collective” respond to all this? Would it respond at all? The next page of our story has been open and we could not predict with certainty what was going to be written there.

4. Evolving story: Identifying Patterns of Meaning

The challenge is to identify a pattern, then this pattern takes life on its own, gradually emerging out of obscurity, out of the background, dragging other patterns after itself. The chain of these patterns is not necessarily linear. Connections and relations can break and shift, so the patterns can be manipulated and rearranged into the story. This story never was, yet always existed, it existed everywhere and nowhere, in potentiality, in a virtual form, it waited to be recognized and actualized into words.

(Laroche & Roth, 2008, p.228)

In the realm of fluidity, there are no permanent and firm structures. As vertices and whirlpools, temporary patterns of meaning emerge, disappear, and re-emerge into an ever-flowing story. Our community is at its initial stage of growth, and communities like children, grow slowly. Nevertheless, we are able to identify some patterns that could feed our next iterative loop, and potentially, could lead to useful generalizations.

1. Quantitative/qualitative complementarity and multiplicity of overlapping variables

The Blackboard provides quantitative data (course statistics) that enables us to trace the number of active participants and number of hits (some people simply take a look without actual participation). The Blackboard sorts quantitative data by groups, by forum, by the content area, and by overall summary of use. As Davis & Sumara (2005) suggested, research based on complexity does not separate the quantitative and the qualitative, but uses quantitative data to “feed” the qualitative evolution of a model. For instance, our quantitative data indicated that the most popular interactive activities so far are informal introductions, “virtual buddies” forum, lesson plan discussions, and practicum blogging. Most popular informational section is “The Bank of Great Ideas”. Most active groups are four new cohorts and one of the outreach sites is most frequently “visited” in comparison with the other two.

In trying to make sense of quantitative findings, we have identified multiple reasons as to why the four new cohorts are more active than the “older” ones. First, the existence of an evolving community was introduced to them as a “given” at the very beginning of their program, which was not the case for older cohorts. Second, they were “forced” to participate due to the inter-site class assignment described earlier. Also, it could be a result of a “generation” factor; the younger cohorts are, the more technologically inclined they are. Indeed, our survey indicated that 69.56% respondents ranged from 18 to 29 years old. There also could be other reasons, such as differences in schedules and different frequency of Blackboard use by sites’ instructors and therefore, a different level of comfort in Blackboard use.

Or, another question, why one of the sites had been “attended” more frequently than the two others? Maybe, due to its previous history, since the idea and the structure of the

Blackboard community was first originated at this particular site and students enrolled in this site are more accustomed to its existence? Or, maybe, due to the particularly high level of involvement from the site's director, who is constantly posting information in the space designated specifically to her site? Or maybe, due to some other reasons that are unique to this particular site, including students' personalities, fondness to technology, or intra-cohort relationships?

Supposedly, we can study these questions further in order to separate and make sense of these variables, and this could provide further directions for our research. Nevertheless, we will never know the exact effect of the interplay of these variables. This is where research based on complexity differs from linear classical research, as it allows the researcher to speak in the language of patterns emerged out of the multiplicity of overlapping variables rather than in the language of the linear "cause and effect" relationship.

2. Size and shape of strange chaotic attractors

As we previously discussed, strange or chaotic attractors are power factors leading the evolution of a complex system. They "hold" seemingly chaotic activities with a certain pattern of temporary stability, providing the conditions for "controlled chaos". So far, we, a collective author of this paper, played a role of a chaotic attractor, by originating, controlling, and facilitating the community's evolution. Introducing Virtual Managers and Virtual Mentors has changed the size and shape of a strange chaotic attractor and was a step toward a distributed leadership. In other words, it has shifted the power factor that leads self-organization. It appears that this action brought an evolutionary jump in growth of our community, not only quantitatively (record number of hits), but also qualitatively. The "spirit" and the "voice" of our "collective" has changed, as Virtual Managers started communicating with members of community using less official and more humorous and playful language. We anticipate (well...we hope) that by communicating with their cohorts and within themselves they would create other chaotic attractors that could lead to next evolutionary jumps.

3. Spontaneous emergence of new complex structures and activities

One of the properties of complex systems is that they allow emergence of smaller complex systems within them; systems, within systems, within systems. In the course of community evolution, some complex structures have emerged spontaneously. The SWEA leadership group has created a 'facebook' and incorporated the link in the Blackboard community³. A spontaneous event emerged out of a student's suggestion to announce the contest of Winter Season pictures. According to the number of entrees and comments (74) this informal activity was a success.

³ Two outreach sites have SWEA (Student Washington Education Association) chapters. They take a leadership roles, including organization of community events, fundraising, and outreach activities.

4. Cross-pollination

Laroche & Roth (2009) indicated that fluid social realms allow cross-pollination between structures, information, and activities, and therefore facilitate development of the cultures of mutual support, which they call “educated solidarity.” It is interesting (and exciting!) to observe occurrence of this phenomena in our evolving community. For instance, older cohort members and the program director from one site provided the advice regarding lesson planning to beginners from other sites. In the “Virtual buddies” forum new and more experienced students exchange questions and answers about practicum, management of small groups, and working with diverse students. Cross-pollination and mutual support also manifested itself through evolving cross-site thread dedicated to sharing resources (books and links). Also, a collective story about practicum experiences is evolving from individual stories posted in “Practicum Blogs”. From student’s blog entry:

I just started at my new practicum in Lake Stevens. This is the first practicum where I have seen an aquarium where the students' have their class pets; the goldfish. I really felt welcomed to this new practicum because of the classroom community that my host teacher has instilled within her fifth grade students. I just wanted to share a little experience of why I have enjoyed my new practicum placement. It was a bit of a surprise to run into Logan, one of the students, from my new placement at the Bakery that I work at in Snohomish. I had only been to my new placement one time before, so it took me a few seconds to match his name with his face. However, he recognized me first saying to his mom, "This is Mr. Coe!" Although his mom looked at me a bit skeptically until I explained the situation to her in a bit more detail. Logan then burst out that they had gotten a new fish for the class that they had named Mr. Coe Jr. I just thought that I could share this, and was wondering if anyone else had an experience where they have been welcomed in a positive way into the classroom.

4. Limited predictability

Revisiting our tentative planning, we had an opportunity to reflect on the limited predictability of complex system’s behavior. According to our plan, we should currently be in the midst of our second iterative loop, designing, administering, and analyzing the second survey with intent to find what worked, what did not, and what else could be done. We realized, however, that the self-organizational process evolves slower than was initially anticipated. Self-organizational processes can have a “forced “ beginning when some turbulence or tension pushes the system out of the equilibrium, onto the edge of chaos. However, the evolution of such processes cannot be continuously pushed. The system self-organizes in accordance to its own pace. It must be “ready” to transform into another state. While being an inseparable part of a larger complex system, we, researchers, do not feel that the virtual community is “ready” to reflect on itself and to adapt accordingly. We feel that more time is needed for existent structure and activities to “germinate” at a present state. How will we know when it is ready for a second iterative loop? At this point, we have no certain answers to this question, but we trust that we will feel it; the community itself will tell us, as the abstract painting tells the painter when and what to create next.

At this point the complex system of our virtual community has underwent just one iterative step. Below is the graph of the evolution judged by number of “hits”. Of course, we do not know yet how far we have progressed toward our main goal, which is gains in learning and improved sense of wellbeing of the community members, but at the very least, this graph indicates the evolution of interest. Farrior (2005) writes that “most of website users (as high as 80%) who log onto a site are “lurkers” – they will take an occasional look at a website but will not participate in it; the participants, also called “posters” or “ contributors” are in the minority” (p.2). Does it mean that those who just “look” without actual participation do not benefit from occasional visits? Well, according to Bandura’s Social Learning theory (1977) vicarious learning (by observing) could be as valuable as enactive one (by doing). Also, increased number of hits might be an indicator that our students increasingly embrace a virtual community as a “home”. As an example, the blackboard statistics indicates 15 entrees in Practicum Blogs so far, which were viewed 474 times. This speculation could provide a good material for the next survey, for the next iterative feedback loop.

Non-linearity and fractal shape

It is apparent, that the line connecting bars is non-linear and the space outlined by the bars has an irregular shape. It is impossible for us to identify “cause-effect” of each spike, due to the interplay of various variables and activities. We can roughly guess that the first pick or evolutionary jump (see *Figure 2*) could be due to the announcement of the picture contest and another one could be due to the announcement of a “virtual buddies” forum. The third, the highest one, is perhaps due to introduction and subsequent activities of Virtual Managers. However, we cannot be completely certain in our interpretations, due to the interplay of other variables. It could be that during the day with highest hits, the program director posted additional materials in her site, or program coordinator announced something exciting that is going on in other site. Maybe people had some spare time, or they were in the mood to visit a virtual community. One again, when studying complex systems, we can speak of patterns, tendencies, and generalizations, rather than of rigid and clear “cause and effect” relationships. At this point, we are unsure how to create a beautiful fractal out of our quantitative data and what informational value it could provide to us besides the concept of infinite recursive operations. This is could become a subject for our further explorations.

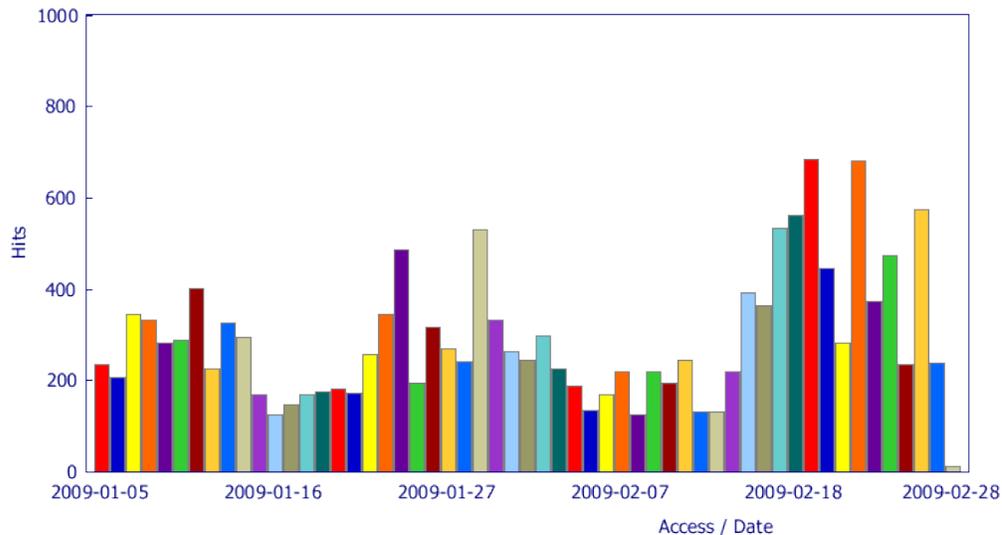


Figure 2. Graph of the overall use (hits) generated by the Blackboard Software.

5. Opening: The Spiral of Life Emerging in a Virtual Field

We must begin where we are.
(Doll, 1993, p. 16)

We adopted the notion of Alhadeff-Jones (2009) who substituted the convention of “conclusion” by the invitation into “opening”. Laroche & Roth (2009) elaborated on a curious and somewhat paradoxical nature of the concept “conclusion” within the realm of fluidity. Traditionally, rational and logical conclusion means “the end”; the door is closed and the flow is stopped. However, if we structure our research around the concepts of complexity, then we should “re-rationalize” our rationality, so to align it with the properties of fluidity. Laroche & Roth (2009) cited one of the founders of complexity, Illya Prigogine, who stated that a new type of rationality should embrace ambiguity, narrative, fuzziness, and open ends. This is consistent with Davis & Sumara’s (2005) explanation of differences between linear and nonlinear (complex) forms of research. Classical, linear forms of research move from start to finish, whereas research projects structured around “fractals unfold through recursive elaboration.” In the realm of complexity, every end is just a new beginning, and every conclusion is opening.

We started our paper with the statement that our project is ever on-going, by its very design. We planted the seed in a virtual field and attempted to create optimal conditions for its growth via the process of self-organization. The Blackboard platform provided an informational content and flexible boundaries (controlled chaos) for various interactive activities. We initiated some activities, but most came from students’ suggestions gathered via a survey, e-mails, and reflective narratives. We used Blackboard not only as a “home” for the community, but also as a research tool, employing its statistical and graphing capability. Statistical data provided a means to judge the popularity of content areas, discussion forums, or other activities, such as informal introductions or the picture

contest. This helps us to address one of our research questions: “*What features and activities are relevant and necessary?*” In a spirit of fluidity, unpopular forms of activities will be removed and new ones will be introduced after another phase of iteration.

Although in this initial stage of our research we would not attempt addressing all our questions, the answers to some of them are coming to light. “*What challenges are inherent in the creating and researching the virtual community?*” The first and foremost challenge is inherent to complexity of itself. Good old linear reductionism is easier to comprehend, to document, to utilize, and to agree upon. Complexity with all its non-linearity, fluidity, multiplicity of agents and activities, and fuzzy logic does not offer an easy framework for research, especially provided that this is a relatively unexplored endeavor to which we hope to contribute through our work.

The main challenge in creating the community is making it meaningful, exciting, inviting, but also educational enough, so students embrace the community in their culture despite extremely busy schedules and without bonus points or tangible rewards for participation. Farrior (2005) used a system-oriented approach to outline the best practices to engage participants.

Communities start small and simple and grow organically over time; people stay to maintain a web of relationships. Use feedback loops to grow the community – e-mails, message boards, surveys, chat rooms, polls, tracking, page use. As the community grows, there will be different roles and increasing influence over time. At first, there is a lot of energy at the launching of a web site – provide ground rules for etiquette, and host events to attract new members. Then eventually empower members to host the site, run events, greet and mentor new members, and run subgroups (p.1).

She further suggested defining purpose, building fluid and flexible gathering places, creating meaningful and evolving member profiles, designing a range of roles, developing a strong leadership program, encouraging appropriate etiquette, promoting cyclic events, integrating rituals in community life, celebrating holidays, facilitating member-run subgroups. We feel that we had a good start toward these practices, but there is still a long path to walk. Farrior also suggested the necessity of a host-facilitator who constantly “stirs” the community, engaging members in activities and conversation. At this point, one of us has a role of a facilitator, but we started the process of shifting the facilitating power to community members, as our purpose is to create a self-organizing community.

With that, we face another question, “*What strategies and practices can be implemented to facilitate its self-organization and evolution?*” We anticipate gaining deeper insights as we walk the path; however, there are some promising strategies, such as such as fluidity of the content and activities, involving the entire community in its own creation and research through iterative informational feedback loops, and encouraging cross-site cross-pollination and mutual support. Also, vitally important steps are expanding the strange attractor through the shift of the facilitating power to community members and initiating various creative tensions in form of engaging interactive activities.

In this paper, we are not ready yet to address the main research question: *How (if) participation in the virtual community could improve learning and wellbeing of outreach students?*”, as creating and understanding of our community proved to be a way lengthier process than we initially anticipated. Laroche & Roth (2009) used the Bernard cell experiment as a metaphor for stages of collective co-emergence. Under the gradients of creative tension, the emergent cultural structures could remain in the form of “honeycombs” or evolve into a single beautiful spiral. At this point, we cannot claim the emergence of a single spiral of the virtual community as an entity with its own ethos, history, language, and traditions. However, the first glimpses (honeycombs) of its growth described in this paper make us hopeful that its life gradually unfolds in a virtual field.

Addressing potentials and challenges of creating a virtual community, one student wrote:

I think it [virtual community] would be beneficial because we would feel less isolated from and more connected to our classmates at the other sites. Perhaps we will have inter-site gatherings where we can all get together and meet. However, I do not think we should solely rely on online communication and I hope that faculty and staff will provide opportunities at least twice a year for all of the cohorts to come together and meet face to face.

Perhaps, this suggestion could inform the next turn in the community evolution toward becoming a hybrid rather than exclusively virtual entity? Or, perhaps next iterative loop or even some seemingly insignificant event or insight will create another strange attractor and propel the community into a radically different state via the magic of a butterfly effect? The possibilities are endless, and this is where we begin.

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