An Ecology of Mind: Teaching—Learning Recursive Systems

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Abstract

Purpose – The purpose of this paper is to describe a paradigmatically cohesive approach to teaching about complex systems within the context of a Batesonian ecology of mind course.

Design/methodology/approach – The approach develops a conceptual framework with examples from observations, student work, and interviews with students.

Findings – The major points address how conflicting paradigmatic assumptions can undermine efforts to teach about and teach as complex systems. The fundamental approach is based on the alignment of teaching about complex systems with teaching as a complex system. The major foci of teaching about and as complex systems involve stories, context, relevance and meaning within transcontextuality and transdisciplinarity, epistemological shock, and other impacts on student learning. These foci describe critical aspects of enacting a complex teaching—learning dynamic. Other critical factors involve developing relationships, avoiding some of the typical double binds of educational institutions, and providing for flexibility, epistemological shock, recursion, and student engagement.

Originality/value – This paper promotes understandings of teaching and learning about complex systems within a complex systems approach. This work is unique at the point in time in that it focuses on a course based upon the film: “An Ecology of Mind: A Daughter's Portrait of Gregory Bateson.”

Keywords – paradigm, Gregory Bateson, ecology of mind, complex systems, teaching, learning, story, epistemological shock, recursion, transcontextuality, transdisciplinarity

Paper type – Conceptual paper
Introduction

In 1975, I participated in a 5-week live-in Workshop on Education with Gregory Bateson. Ever since then, my research as an academic and my teaching, which began in middle, then elementary and high school, and finally at the university level, have been affected by Bateson’s ideas. Some of the major ideas include context, learning, epistemology, multiple perspectives (or double description), relationships, and patterns. Although I have been incorporating many of these fundamental concepts in my teaching, it was not until after the release of the film, “An Ecology of Mind: A Daughter’s Portrait of Gregory Bateson” (2010), that I created a course focused on these and other concepts presented in the film. This course is a freshman seminar that attracts students from across subject matter disciplines. In designing and presenting this course, I have tried to create a course that not only investigates the concepts presented in the film (i.e., cognition as an ecology, relationship, cybernetics, Batesonian epistemology, difference, double binds (contextually intense “catch-22’s” [Bateson, 1972/2000; 1991; Bateson and Bateson, 1987/2005]), pattern, changeability, beauty, context, multiple perspectives, among others [An Ecology of Mind, 2010]), but also attempts to enact these concepts within the classroom dynamics.

This paper presents a conceptual background for the design and implementation of this course. Of significant importance in presenting a course such as this one is the issue of conflicting paradigmatic assumptions – between teaching from the typical approach taken in educational institutions vs. teaching from a Batesonian or complex systems approach (Bloom, in press a). In addition, the paper also examines a number of important aspects of the teaching—learning dynamic, including (a) stories, (b) relevance and meaning in
transcontextuality and transdisciplinarity, (c) epistemological shock, and (d) impacts on learning. Although this paper is more of a conceptual examination of the teaching—learning dynamic that arises from “An Ecology of Mind” (2010), examples from observations, student tasks, and conversations are embedded within this paper. A doctoral student and two different undergraduate students (each semester) assisted with the observations, video recordings, and interviews.

The Andralogical—Pedagogical Contexts

The subtitle of this paper, “teaching—learning recursive systems,” can be interpreted in two ways: (a) teaching and learning about recursive systems and (b) teaching and learning as recursive systems. The emphasis in this paper is on both interpretations. In fact, the claim is that both are necessary in order to address learning as complex and embodied. Learning is not just in the “head,” but also involves our identities, our ways of acting and interacting, our emotions, and our relationships with ourselves, one another, society, knowledge, and the environment. In the same way, teaching involves identities, ways of acting, emotions, knowledge, and relationships. In classrooms or other educational settings, all of these aspects of teaching and learning set up recursive systems of multidimensional, multimodal, and complex learning. In this paper, multidimensional learning refers to learning that delves into depth, constructs abstract explanations and models, and spans multiple contexts and disciplines (Bloom, in press a; Bloom and Volk, 2007). Learning that is multimodal involves not only conceptual understandings, but also emotions, values, aesthetics, imagery, and other frames of making sense of our worlds (Bloom, 1990, 1992; Bruner, 1992; Donaldson, 1992). Modalities of learning also involve our identities, as well
as embodied understandings (Johnson, 1987; Varela, Thompson, and Rosch, 1991) and those that are distributed among individuals (Hanard, 2005; Hutchins, 2000) and cultures. Complex learning may be complicated or simple, but learning as a complex, recursive system is key to adapting, surviving, and thriving (Bateson, 1979/2002; Capra, 1996). As a consequence, the teaching—learning dynamic needs to involve multiple recursive processes that address multiple dimensionalities and modalities of developing understandings.

A fundamental approach taken in this course is based on the idea of inviting chaos, trusting complexity (Bloom, 2006). Chaos, in this context, involves a sense of provocation and allows for the emergence of new ideas, themes, and discourse. Inviting chaos involves creating an atmosphere of openness and flexibility in which students can engage with content in a variety of ways. The interests and curiosity of the students and teacher can serve as the provocation for discussions and personal and social explorations. Promoting such an approach emphasizes the importance of variation, diversity, and the stochastic. “Trusting complexity” involves a sense of confidence that students will engage in and develop the ideas that are acting as provocations. As one young woman expressed during an interview by the graduate student, “I enjoyed the freedom... in-depth thinking of it...” When asked if the freedom motivated her, she said, “work harder, completely, yeah.” Another young woman student elaborated on the effect of the freedom, and said that leaving it open for students, “makes it harder to bullshit.... you can’t just do the assignments. You have to think. You have to put your own into every project.”

While our understandings of learning and teaching as complex and dynamic systems have advanced considerably (Carver and Klahr, 2001; Davis, 2004; Davis and Sumara,
2006; Fleener, 2002; Illeris, 2009; Jarvis and Parker, 2005/2007; Maturana and Varela, 1987/1992; McInerney and Liem, 2008; Mestre, 2005), the state of the institution of education in the United States continues to remain embedded in positivist and reductionist paradigms and their antiquated assumptions (Bloom, 2012). These assumptions work their way insidiously into institutional and individual practices and research, including those contexts that focus on complex systems. If we are to create educational contexts that provide cohesive approaches to complex teaching and learning, then we must take care not to undermine our efforts with contradictory assumptions and actions.

**Addressing Conflicting Assumptions and Paradigms**

As just discussed, most of current educational practices in the United States are deeply embedded in positivist, mechanist, and reductionist frameworks, where linear and sequential approaches are used to examine discrete and often fragmented pieces of information. The knowledge presented is couched in the assumption that the content is “the” correct knowledge that has been established by experimental or other empirical techniques. The critiques of such educational practices are substantial, but fundamentally ignored at all levels of education (Apple, 1999, 2002; Bloom, 2012; Doll, 1993; Fleener, 2002; Gatto, 1992; Johnson, 2004; Oliver and Gershman, 1989; Senese, 2007). Even in curricular materials, books, and other educational initiatives that purport to take a systems thinking or complexitivist approach, positivist assumptions work their way into these approaches (Bloom, 2012). Van Merriënboer and Kirschner’s (2007) *Ten Steps to Complex Learning* is an example of using fundamental principles of complex systems thinking, while embedding the methods in positivist and mechanist frameworks and assumptions. Other
materials, such as Booth Sweeney and Meadows' (1995) *The Systems Thinking Playbook*, provide collections of activities that promote systems thinking, but fall short of providing cohesive approaches that capitalize on relevant and meaningful systems thinking. However, complete avoidance of mechanist and positivist approaches is difficult within the contexts of educational institutions, which are themselves structured around positivism and mechanism. Courses are broken up into predetermined, limited, and sequential “time bits.” Schools and universities expect adherence to specific approaches that involve exams and grades that somehow “measure” learning. How much of this “hidden” curriculum affects the learning of students? We may not know the full extent of the effects or damage of such approaches, but we may be able to avoid many of the problems by aligning courses and instruction with principles of systems thinking and complex system that serve as learning opportunities about and as complex systems.

**The Course Context – Learning As...**

My university requires that students take at least one “Freshman Seminar.” There are several dozen sections, which an instructor can offer in any area of interest as long as it promotes critical thinking. Each section is limited to 23 students and can be taken by students from any department on campus. Although a few students had undeclared majors, the majority had majors in a variety of disciplines including, anthropology, athletic training, biomedical sciences, business and economics, chemistry, computer science, criminology and criminal justice, early childhood education, electronic media and film, elementary education, environmental sciences, health sciences and public health, history, hotel and restaurant management, mechanical engineering, nursing, philosophy—politics—law,
photography, political science, psychology, and sociology. Most students were at the age level of entering freshman (i.e., 18 to 19 years old). One student in each semester was older (one was 23 and the other in his early 30’s).

Beginning in the fall, 2011, I began offering one section entitled, “Ecology of Mind.” The entire course was designed around the topics contained within Nora Bateson’s film, “An Ecology of Mind: A Daughter’s Portrait of Gregory Bateson” (2010). The film was shown in its entirety within the first few meetings, then one to three chapters were shown periodically throughout the rest of the semester. Other relevant videos, a variety of activities, a field trip to a local museum, and student—centered discussions also occurred. The assignments included critical reflections on the film chapters, class activities, and readings for each of the following clusters of topics: (a) a general reaction to the entire film and other introductory activities; (b) ecology of mind, epistemology, and difference; and (c) changeability and beauty. Three major projects were required. Students presented these projects to the class and included: (a) relationships and systems, (b) double binds, and (c) patterns. At the end of the semester, students were required to design a public poster presentation that included all three of their major projects. The campus community was invited to view and discuss the presentations. Throughout this course, students were required to post their reflections and projects on a publicly accessible wiki website (http://ecomind.wikidot.com). This requirement promoted a course emphasis on students as producers of knowledge, rather than as mere consumers of knowledge (Marshall, 1992).

In designing the freshman seminar being discussed in this paper, considerable care was taken to promote a paradigmatically consistent classroom environment, course approach, and subject matter content so that there was an emphasis on “learning as” a
complex system. The film and other videos, readings, and activities were used to stimulate emergent themes. Assignments were open-ended, general frameworks that allowed students to develop personally meaningful and relevant projects. The atmosphere, while expecting a certain degree of rigor, was relaxed. As the instructor, I tried to focus on developing relationships with each student. Each student’s ideas as expressed in discussions, presentations, and writing were respected, even though critical and helpful feedback was offered. Students were encouraged to provide feedback to the instructor and to think of themselves as producers and communicators of knowledge through their own projects.

Although there was a sequence of topics laid out by the Bateson film, the approach taken in the classroom and throughout the course invited nonlinear engagement. In other words, class discussions were not controlled by the instructor, but by the students as they posed questions, made connections, and initiated emergent themes. Such an approach manifested as a recursive pattern throughout each semester. Students were encouraged to make connections between whatever topic was being explored at the moment with previous topics and experiences. Such connections arose in discussions and in their projects. Each recursion added new perspectives and new ideas, such as revisiting relationships within double binds, then again as seen through different individual’s epistemologies, then again through the lenses of patterns (e.g., as binaries and complementary pairs), and then from the perspective of changeability.

The Teaching—Learning Dynamic: Learning About... (and As...)
The film, “An Ecology of Mind,” begins by situating the rest of the film in the question of “How do we think?” From this introductory exploration, the film develops nine other major themes listed previously. The film does an extraordinary job of weaving these ideas into a cohesive exploration of how we think and how we need to think in ways that are consistent with how the biological world works. Other significant themes within the film include context, the map is not the territory, story, pathology, and multiple perspectives. All of the ideas comprised the conceptual context around which this freshman course was based. A variety of activities, videos, readings, and discussions were used to explore these ideas. Although these key ideas served as the fundamental “content” of this course, they more importantly served as “instigations” or “provocations” for further explorations and investigations based on the wide variety of student interests. The provocations of learning about and as this content are discussed, below, from the perspectives of (a) stories, (b) contexts, (c) relevance and meaning in transcontextuality and transdisciplinarity, (d) epistemological shock, and (e) impacts.

Stories

For Gregory Bateson, stories were critical ways for people to express meaning and relevance within a richly interconnected context, as in his statement that, “a story is a little knot or complex of that species of connectedness which we call relevance” (Bateson, 1979/2002, p. 12). In fact, “story” captures the essence of complexity and counters the emphases of positivism. Stories provide for personal connections that can spark further elaborations and meanings over longer periods of time than in the time period of the
“telling.” In many cultures, stories have served as ways of perpetuating the culture including its values, norms, and epistemologies.

For many students enrolled in the freshman seminar, the major projects on relationships, double binds, and patterns provided opportunities to explore their own experiences and interests and to share their stories. In many instances, I was impressed by the courage and openness of students. Stories of sexuality, sexual abuse, addiction, parental divorce, self-image, and interpersonal conflict were among some of the more powerful stories shared when discussing relationships and double binds. These stories were shared in classrooms of strangers and posted on a public wiki. Such sharing of personal stories brings up questions about how such openness can occur. What characteristics of the course and classroom support the sharing of personal stories? What dynamics in the classroom support students in their sharing of personal stories?

**Contexts**

Some possible contributing factors to the sharing of personal stories involve establishing an atmosphere or context within the classroom. At the beginning of the course, the emphasis was on establishing an atmosphere that was both rigorous and relaxed. The balance between these two seemingly opposite ideas was discussed explicitly with students and was modeled by the instructor. Asking penetrating and probing questions and critiquing knowledge claims within an overall sense of openness to various possibilities provided a sense of rigor. At the same time, humor and informality in dress, room arrangement, and presence helped to create a more relaxed atmosphere in the class. In order for both these aspects of atmosphere to have an impact, there also needs to be a
sense of safety, where students feel as though they can express themselves openly. (See “Support and Openness with Rigor,” below, for further details.) However, it is worth noting here that in order to effectively communicate such an atmosphere of safety, a sense of vulnerability needs to be expressed and valued (Bullough, 2005; Dale and Frye, 2009; Palmer, 1998). Defensiveness and an authoritarian, hierarchical structure do not promote a sense of safety, but quite the opposite. After the first few weeks of the semester, student conversations started to change dramatically. They talked more. The substance of what they talked about became more personal, which also seemed to involve a higher risk of criticism. From my graduate student’s observational notes, she described the instructor’s affect on the classroom context as follows:

[the instructor] has a very relaxed attitude with the students and they have picked up on his “essence,” it seems. They all call him [by his first name], and I get the idea that they really like doing so. It levels things. He never gives any student the impression that he dislikes things they share. He is constantly excited when his students share things with him. He doesn’t even really seem to mind if things discussed are on topic – he genuinely likes to see inside the minds of his students. He shows them a level of respect many students don’t get…. (9/14/12)

This observation initially began with a side conversation that developed into a class conversation about drugs, which followed an activity in which students developed a set of sequential, relational links between photos of two disparate objects or situations (one of which was a mushroom). The doctoral student observed that during this discussion “the students smile[d] and seem[ed] surprised that he [the instructor] [was] engaging in this discussion with them.” As will be discussed shortly, this event depicted some sense of
epistemological shock. The shock was not so much about the conceptual content, but was about their preconceptions of professors and perceptions of what can and cannot be discussed.

The instructional context also involves notions of modeling and mentorship. The notions or metaphors provide images of how to manifest as the instructor. If I expect students to share personal stories, to think in recursive ways, and to question basic assumptions about self and society, then I, as the instructor, have to model and support these ways of thinking and acting. How do you think about the situations, the people, and the events? How are emotions and values connected to reasoning? Where does humor fit within the stories? How do the stories connect with other stories and events? Each of these questions points to ways in which the process of mentorship involves the modeling of vulnerability, thinking, and emotionality. As the instructor, there is sense of vulnerability that is communicated when stories are shared. For example, I shared a story of my son’s chronic illness as an example of how relationships develop to find expertise. While providing a sense of the initial emotional difficulties in dealing with illness, the story demonstrated how reading a medical journal article led to a contact with a European doctor, who in turn connected us with a doctor a day’s drive away. Tapping into the community of physicians shrank our world of connections so that we were able to find the expertise we needed. The sharing of such stories connect with people in a variety of ways. As with stories as a means of passing on knowledge through the ages, contemporary stories can affect people over longer periods of time. While we have boxed education into specific time frames, learning from shared stories and experiences may span many years.
Another significant aspect of classroom contexts has to do with the ideas of “support,” “openness,” and “rigor.” When students share experiences and ideas in classroom discussions, there is a tension between acceptance of statements “as is” and criticism. In fact, the creation of double binds often occurs in classroom contexts. In our own classroom discussions, several students described situations where instructors demanded student participation and questions, but then demeaned students when they did participate or pose questions. Students felt that they were being penalized for participating and for not participating. In the freshman seminar, we explicitly discussed such patterns, especially during the double bind topic. At the same time, I was faced with the ongoing tension between providing support for students and providing critical feedback. Frequently, I found that comparing a student statement to some experience I have had was often an effective strategy. I criticized my own thinking or actions along with those of the student. The other variation compared their ideas to those of larger groups. Such approaches avoided personal attacks, while providing feedback on our shared human experiences. The other situation that occurred involved “attacks” or criticisms by other students. In such situations, the same sort of approach seemed effective. In such cases, both the criticizer and the one being criticized were supported. Again, placing the original idea and the criticism in a larger context helped to diffuse the potential for negativity and defensiveness.

**Relevance and Meaning in Transcontextuality and Transdisciplinarity**

In the freshman seminar, the conceptual framework, which served as a skeletal “course content,” was that of Batesonian systems thinking and ecology of mind. However, the breadth and depth of conceptual content varied among students. The topics explored
and investigated through Batesonian lenses were generated by the students. Some of the topics explored appear in Table 1. All of the topics were chosen by students. Assignment descriptions only listed the general characteristics that needed to be covered (e.g., exploration of their topic within the conceptual area of relationship, double bind, or pattern; reflection on the project’s impact on one’s thinking; etc.).

Table 1. Some topics explored by students within the three major project themes.

<table>
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<tr>
<th>RELATIONSHIPS</th>
<th>DOUBLE BINDS</th>
<th>PATTERNS</th>
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<tbody>
<tr>
<td>Left/Right Brain</td>
<td>Medical</td>
<td>Medical</td>
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<tr>
<td>Sports</td>
<td>Depression &amp; Love</td>
<td>Human Body</td>
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<tr>
<td>• track and field</td>
<td>Movies &amp; Pop Culture</td>
<td>Brain</td>
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<tr>
<td>• soccer</td>
<td>Family &amp; Divorce</td>
<td>Sports</td>
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<tr>
<td>Dance</td>
<td>Cities &amp; Environment</td>
<td>• football</td>
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<tr>
<td>Movies</td>
<td>Magazines, Media, &amp; Young Women</td>
<td>• gymnastics</td>
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<tr>
<td>Virginity and Sexuality</td>
<td>Drug Addiction</td>
<td>• sailing</td>
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<tr>
<td>Interpersonal</td>
<td>Abortion</td>
<td>Dance</td>
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<tr>
<td>Environment &amp; Humans</td>
<td>• &amp; Rape</td>
<td>Theater &amp; Dance Culture</td>
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<tr>
<td>Impacts of Media</td>
<td>Parental control vs. Individuality</td>
<td>• Nazca Lines</td>
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<tr>
<td>Technology &amp; Society</td>
<td>Religion – Convert or Lose</td>
<td>Animals</td>
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<tr>
<td>• Video Games</td>
<td>Friendship</td>
<td>• Beluga Whales</td>
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<tr>
<td>Child Abuse</td>
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<td>• Ant Hills &amp; Societies</td>
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<td>• sexual abuse</td>
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<td>Art</td>
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<td>Six-Degrees of Separation</td>
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<td>• Paintings</td>
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<td>Music</td>
<td>Teaching – Morals vs. Laws</td>
<td>Evolution</td>
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<td>• as relationships</td>
<td>Career Choices</td>
<td>Circles &amp; Fractals</td>
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<td>Jobs</td>
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In Table 1, the topics chosen by students involved those of personal passions, career-related interests, personal interests, and personal experiences. In a few cases, students even chose a topic because they did not know much about the topic (e.g., evolution). Some presentations on these topics were detailed and more “academic,” while others were very personal and emotional. One presentation about child sexual abuse started out in a typical academic-type of approach with a lot of detailed statistics, then ended with an emotional description of sexual abuse by her father. A male student, who presented about his passions for football in one situation, talked emotionally about growing up in a family of divorce and the double binds he encountered.

The students’ selection of topics provided for a shared transcontextuality and transdisciplinarity. Students were often surprised and intrigued by what others presented within the overall thematic areas. At a fundamental level, the shear variation in topics affected students by “expanding” their minds, as several students suggested. However, very few projects, reflection assignments, or journals actually involved extensive transcontextual or transdisciplinary thinking. One patterns analysis of football drew connections to everyday life. A rollercoaster patterns project drew connections to similar patterns in everyday life. Such transcontextual thinking is generally not promoted or valued in schools. Although such approaches were often modeled during classroom discussions and activities, these modes of thinking need further emphasis. Such transcontextuality not only provides meaning and relevance, but also develops abductive thinking (Bateson, 1991), which in turn promotes transfer of learning (Bloom and Volk, 2007).
Epistemological Shock

As Catherine Bateson (2004) described, epistemological shock occurs when we encounter a situation where our personal explanatory frameworks (epistemologies) do not function in a way that support our established assumptions. As an educator, I think I am obligated to try to present opportunities for epistemological shock as a means to personal and professional transformation (Bloom, 2009). Although expecting students to transform may be ethically questionable, deep learning seems to involve the dashing of assumptions and the emergence of new perspectives.

As various topics were introduced in this class, a number of students expressed confidence that their own ideas and interpretations were true. At various times throughout the course, students appeared to have various epistemological shocks as they confronted ideas and situations that challenged their assumptions, as with the instructor’s reactions to the students’ discussion of drugs described earlier. However, one activity introduced during the epistemology topic sessions seemed to have the most widespread effect. This activity had students look at a set of about 40 photographs, which, unknown to them, were smaller sections of larger photographs. For each of these photographs, they wrote down what they thought the photograph was depicting. After they finished looking at and describing each of these photographs, we went back and looked at each one, then viewed the larger photographs from which they were taken. Audible gasps and nervous laughter accompanied the introduction of each large photo. A photography major, who had expressed her surety about her perceptions and interpretations of the world just few days prior to this activity, described the effect of this activity in her journal:

...
The exercise... made me really think that things aren’t what they seem to be. When I saw the clips I thought or saw something completely different. I created a different picture in my mind with the small clue in the clip. This exercise [sic] made me ponder the idea that I do things like this in my everyday life. I assume different things from what they really are.

Another student reacted to this activity as “eye-opening. I’ve learned that not everything is what it seems to be. I am a judger and I think this class taught me to look at the big picture.”

In general, students began to question their assumptions about various aspects of their lives. Some of this questioning of assumptions may have started as epistemological shocks from class activities or readings, while others occurred as insights into the nature of their perceptions and interpretations. In either case, shifts in epistemologies seemed to begin during the course.

**Other Impacts on Learning and Thinking**

Of course, epistemological shocks can have huge impacts on one’s thinking and learning. However, such shocks may not be “visible” and may take time to take effect. And, not all impacts on thinking and learning may be epistemological shocks. Students may find new ways of thinking about and making sense of their worlds. Such changes may be shifts or reconfigurations in epistemology, but may not be major shocks.

The impacts on students, as indicated in their journals, final questionnaires, and final interviews, focused primarily on the topics of relationships, double binds, and patterns. However, some students had strong connections to other topics, including the overall notions of how we think and how the world works, as well as beauty, changeability, and
systems. These particular areas seemed to resonate most with their personal experiences and interests. Some felt that the ideas in this class were useful in other classes and in all aspects of their lives.

Although no one said anything about the course being transformative, there seemed to be a sense of “transformation in progress.” Even among students whose attendance was less than stellar and who seemed to be distracted during many class sessions, they did connect with certain ideas in profound ways, such as with double binds of child abuse, divorce, and family relationships. Some students did not seem interested in learning within the typical sets of expectations of schooling, but they were not always able to avoid learning when they encountered meaningful and relevant ideas.

Implications and Discussion

Creating and providing a course about and as systems thinking presents multiple challenges. These challenges include: (a) dealing with assumptions, (b) creating consistent teaching—learning context, (c) developing relationships, (d) dealing with time constraints, (e) providing opportunities for transformation and epistemological shocks, (f) engaging all students, (g) providing for recursion, (h) coordinating teaching—learning about and as complex systems, (i) providing flexibility, (j) focusing on students learning and thinking as multiple and diverse epistemologies, (k) emphasizing transcontextuality and transdisciplinarity, and (l) avoiding double binds.

In countering the insidiousness of positivist and mechanist assumptions, we need to focus on viewing and approaching teaching and learning as non-sequential and non-linear processes. In most of teaching, students and teachers going off on tangents is viewed as a
“bad” thing. However, from a complexity perspective, tangents are valuable as potentialities for insight, for emergent themes, for generating multiple perspectives, and for developing richly expansive contexts. We also need to move beyond the one correct answer and one correct approach to teaching and learning. Multiple answers developed through diverse approaches are critical to diversity from the perspective of an ecology of mind. There is within a systems approach a sense of openness and freedom, as suggested by students, that motivates further inquisitiveness and engenders a sense of ownership over their own learning and the ideas they generate. Such learning and thinking is unpredictable and therefore specific learning outcomes are not within the realm of possibility. Rather, learning proceeds down multiple, recursive pathways, which never end (at least not until death). As suggested by Catherine Bateson (1995), much of learning is helical, which is another metaphor for learning as recursive over time. Certainly the time constraints and organization of learning institutions do not view learning in this way, but rather view learning as embedded in the antiquated notion of pouring knowledge from teacher into student. Relevant and meaningful learning extends over long periods of time as ideas are revisited, connected to new ideas and experiences, and reconfigured intermittently over long periods of time.

What would learning institutions and programs of learning look like if they were to be based on learning as complex systems of recursion and reconfiguration? Mentor—apprentice situations seem to have embodied such views of learning (Lave & Wenger, 1991; Rogoff, 1990; Wenger, 1998). In such situations, relationships are of central importance (Bloom, in press b). The contact between the teacher (mentor) and students (apprentices) is more than just the exchange of bits of knowledge. These bits of knowledge
are just one part of the information flow between teachers and students and between students. The information flow involves body language, tone of voice, humor, ways of talking and expressing oneself, and engagement in various activities and experiences. The relational connections involve information flows from body, speech, and mind between teacher and students.

Students came into this course thinking that relationships were between people, especially in the romantic sense. However, they quickly began to realize the nature of extent of relationship up to the point where one student said, “I have honestly been questioning almost everything. One quote stood out to me, ‘the world is made of relationships,’ [then] what are relationships made of? I don’t think it is a question to be answered but to be pondered.” In addition to realizing the extent of relationships, some students began to probe into the nature of relationships. Such probing and curiosity relates to what Gregory Bateson suggested (personal communication, July, 1975): “students should leave school with more questions than answers.” This question about what makes up relationships was never put forth in class, but remained in the student’s journal. The time constraints of sitting in a class for 75 minutes twice a week for 15 weeks do not allow for extensive pondering. Questions and emergent themes of interest are difficult to support. In this freshman seminar, students at least had the opportunity to explore areas of interest in reflection assignments and major projects. Even though students could have developed all of their major projects around one area of interest, none of them did. They seem to have had too many areas of interest. So, they took the opportunity to expand into other areas as they began each project.
In a way the notions of transformation, epistemological shock, engagement, recursion, teaching—learning about and as, flexibility, student epistemologies, and transcontextuality—transdisciplinarity all fit together as different perspectives of the teaching—learning dynamics. Students’ epistemologies are the basis upon which engagement, transformation, and epistemological shocks occur. Each student’s way of making sense of the world, the experiences they have had, their beliefs and worldviews, and interests create the cognitive—emotional contexts for extended learning. From an instructional perspective, classroom activities, discussions, and assignments provide opportunities for students to express and explore their personal contexts and to confront different perspectives and explanatory frameworks. Taking a recursive view, where previously examined ideas are re-examined, stretched, and re-configured provides opportunities to learn about and as systems and systems thinking. Flexibility allows students to introduce new ideas and themes. However, the status quo of educational institutions often present a rigid set of hoops and deadlines. Real flexibility may require allowing students to take alternative approaches and change deadlines. During the first offering of the freshman seminar and after the first two students presented their relationship projects (which happened to be excellent... setting a high bar), the rest of the students asked if they could have more time to work on their presentations. What is the bottom-line of a non-positivist approach? To me, the bottom-line is learning and developing a sense of confidence in one’s abilities. The extra time paid off with a series of in-depth, if not provocative, presentations.

Avoiding double binds, as the final challenge in the list provided earlier, is somewhat tricky. We often set up double binds in classrooms, where students feel trapped. They are
asked to participate, then criticized when they do. We can profess flexibility, then admonish students who ask for flexibility. We can say we emphasize the development of relationships, then use relationships to harm other relationships (from Terry Deacon, “An Ecology of Mind,” 2010). Avoiding these kinds of double binds is critical for creating an atmosphere of safety, where inquisitiveness is valued and teaching—learning about and as systems can occur. However, other double binds can arise that cannot be avoided by participants (teacher and students) in a class. These double binds can become a challenge for all participants and an opportunity to take creative leaps.

Endnotes

1 This paper is based on research that received Institutional Review Board approval from Northern Arizona University for the 2011—2012 academic year.

References


http://eclectic.ss.uci.edu/~drwhite/Anthro179a/DistributedCognition.pdf


