

Look, Think, Act: Using Critical Action Research to Sustain Reform in Complex Teaching/Learning Ecologies

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This paper argues that educators interested in sustainability should look to complexity science for guiding principles. When we view our classrooms and campuses as living, dynamic ecologies, we can, as insiders, make sense of what might otherwise seem chaotic or meaningless. This perspective enables us not only to describe and explain what is happening around us, but also to use our findings to influence emerging patterns across our classrooms, campuses, or our larger communities. We suggest that educators use a Look, Think, Act cycle recommended by Professor Ernie Stringer to encourage and support sustainable school reform.

For decades, educational leaders have acknowledged that even the most promising reform initiatives are not sustained over time. This paper argues that educators interested in sustainability should look to complexity science for guiding principles. When we view our classrooms and campuses as living, dynamic ecologies, we can, as insiders, make sense of what might otherwise seem chaotic or meaningless. This perspective enables us not only to describe and explain what is happening around us, but also to use our findings to influence emerging patterns across our classrooms, campuses, or our larger communities. In other words, critical action research can set conditions for sustainable reform in schools.

In this paper, we define sustainability as more than just the maintenance of procedures or structures within a system. Sustainability refers to the maintenance of a dynamic and ongoing focus on who we are and what we are about--respect for human dignity, agency, and a commitment to the shared intentions of the people at work within the system. We agree with

Fullan, who defines educational sustainability as "the capacity of a system to engage in the complexities of continuous improvement consistent with deep values of human purpose" (2005; p. 10).

Since the 1970s, researchers in the natural sciences, mathematics, and computer science have expanded our understanding of systems, relationships, and causality. Whereas they previously focused on linear causal relationships, static or simple dynamic systems, and small numbers of relevant variables, they have now developed the computational tools to investigate systems of nonlinear causality involving large numbers of relevant variables (Eoyang, 2001). These various areas of study have been referred to as chaos theory, nonlinear dynamics, complexity theory, and the science of complex adaptive systems.

As these physical sciences generated new descriptive models and metaphors to describe complex adaptive processes, researchers in the social sciences adopted and adapted these models to better understand the unpredictable behavior of individuals, small groups, organizations, and communities (e.g., Eoyang, 2001; Stacey, 2001). Sawyer (2005) asserts that one insight is common to all of these approaches—"that societies are complex configurations of many people engaged in overlapping and interlocking patterns of relationship with one another" (p. 1). In educational research, this approach is more productively framed as "systems thinking" (Burns, 2007; Davis & Sumara, 2006) –"a way to understand the multiple realities that different stakeholders experience," (Burns, 2007, p. 7), rather than as an absolute map of objective reality.

Davis and Sumara (2006) provide a wide-ranging discussion of complexity thinking applied to research on teaching and learning. The observer/researcher can focus on networks of relationships within or among one or more learners, groups of learners, classroom(s), campus(es), the institution(s), or the community at large. These patterns of relationships are manifested in system-wide patterns of discourse and actions which emerge when particular conditions are present (Davis & Sumara, 2006; Eoyang, 2001).

Defining "Complex Adaptive" Ecologies

We can think of a complex adaptive system as a collection of semi-autonomous agents that transact with one another to generate system-wide patterns, patterns that adapt to changing conditions and that sustain over time (Olson & Eoyang, 2000). "Transact" is used in the sense that Dewey and Bentley (1949) used the term instead of "interact," which they recommend for

more mechanical and reductionist phenomena. From this perspective, we view the components or agents in a system transacting and transforming so that the whole becomes different from the sum of the parts. This position assumes that discrete variables within a complex system cannot be isolated nor controlled because all variables are interdependent and will be somehow changed in ongoing transactions. Emergent, system-wide patterns have the potential to influence or constrain the subsequent dispositions, discourse, and work of individuals and groups within that system.

Researchers point to ant colonies, beehives, flocks of birds, and ecosystems as examples of such systems. In the human world, we can point to myriad groups that fit this definition: stakeholder networks; stock traders, gangs, church congregations, and families. In schools, we can point to school boards, grade level teams, and classroom communities. Emergent patterns in these systems are not always democratic or supportive of student achievement. Leaders within complex adaptive systems can attempt to set conditions that influence these patterns, but they cannot claim to control system components or agents over the long term. A number of features of complex adaptive systems can help us think about classrooms and campuses as complex adaptive ecologies.

Individual actors and groups are massively entangled and interdependent. This includes interdependence across one scale (or level) of the system as well as interdependence across multiple scales. We can think of this as connections among the parts, the whole, and the greater whole. This can explain why one unhappy student can influence the attitudes of a whole class; it can also explain why high stakes testing can influence instruction, even in content areas that are not tested. Complexity scientists may call this phenomenon “co-evolution” (e.g., Byrne, 1998; Demers, 2007).

In complex systems, although system-wide patterns or trends may be anticipated, the behaviors or dispositions of individuals at a particular moment cannot be predicted. For example, we see the butterfly effect--the phenomenon in which small changes at the beginning of a process may be amplified across the system and result in unpredicted and dramatic or significant effects. Conversely, large changes in a system may ultimately result in negligible long-term effects over time (Olson & Eoyang, 2000; Eoyang, 2000).

We can think of coherence as “meaning” emerging from the recurring patterns across a complex system or ecology. These patterns begin to “make sense” as they give meaning to

otherwise random behaviors or features of a system. In human systems, coherence is sometimes seen or heard as a shared mission or goal or identity; as a pattern among beliefs, structures, functions, roles, and responsibilities; or as familiar discourse patterns. For example, teachers tend to affirm particular student comments and behaviors that are consistent with course objectives or classroom expectations. In a kindergarten class, the teacher may continually communicate through words and actions, "It is OK to make a mistake when you are learning." This encouragement of risk-taking can contribute to the coherence of classroom events that might otherwise seem random.

Individuals within a teaching/learning ecology cannot be considered in isolation any more than an individual plant or animal can be productively studied in isolation from its ecological system. Surrounding social and cultural group dynamics and histories make significant contributions to emerging patterns in the system. Although teachers and researchers can focus on particular individuals and groups for a time, the most useful information comes from "zooming in" and "zooming out"--gathering information about individuals and their various contexts.

Most complex systems, including those emerging on campuses and in classrooms, involve multiple, overlapping feedback loops. Eoyang explains, "Feedback describes the tendency of a system to use its own output to make adjustments in its inputs and/or processes. Positive feedback amplifies the system outputs, and negative feedback opposes them" (1996). She points to a thermostat as a classical example of a negative feedback system. We see both positive and negative feedback loops in classroom and campus ecologies or systems. For example, a teacher's compliment on a student's performance might encourage similar performance in the future. Teasing from peers for the same performance, however, would probably serve as negative feedback. With deliberate use of questions, comments, and consequences, teachers can use feedback loops to influence students' performance--although we should always remember that particular students may respond in unpredictable ways to what we assume to be a clear message. Feedback is the complex system's primary mechanism for control and for learning so attention to feedback loops between and among all participants and parts of the system is critical if a leader intends to enhance sustainability.

In response to internal and external changes, complex adaptive systems transform or self-organize in ways that increasingly fit the changing environment; in other words, when a healthy

system responds to changes inside and outside itself, new patterns develop that are more sustainable (Hodgson, 2000). This self-organization is sometimes called emergence. Emergence refers to how “successive symbolic interactions among autonomous individuals result in collective phenomena” (Sawyer, 2005, p. 22). Healthy systems are somehow able to make small, minute-by-minute adjustments (via feedback loops), as well as being able to transform in larger ways when necessary. Those systems have structures and processes in place that allow feedback/information to flow to the participants who need it and allow individuals and groups to make necessary changes in response to that new information. Emergence refers to the “whole” that is different from the sum of its parts (See Figure 1). Teachers sometimes comment that a class of students has "taken on a life of its own"--which is another way of saying that these students, or "semi-autonomous agents," are transacting with one another and generating system-wide patterns. In other words, they are self-organizing, and collective patterns are emerging.

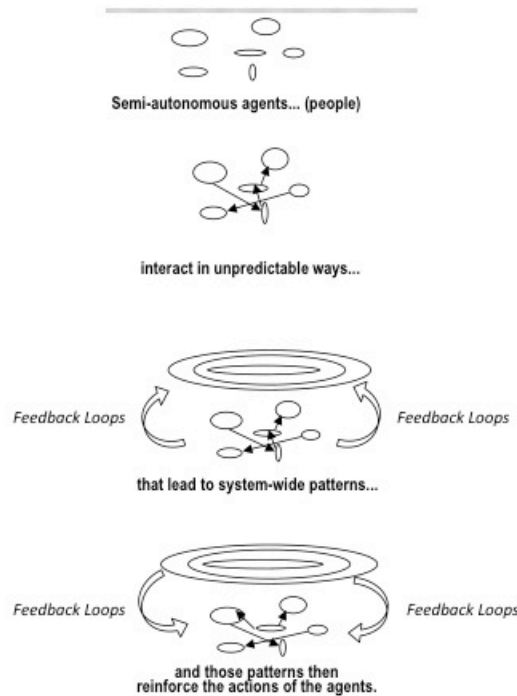


Figure 1. Emergence in a complex adaptive system (Holladay, 2005). This figure illustrates the self-organizing process or emergence in a complex adaptive system.

In a sustainable system, emerging patterns and relationships move the system both toward internal coherence and toward fit with the environment. These patterns constrain the system to maximize sustainability over time, through whatever changes may arise. As people participate in the system, they tend to follow the strong patterns already in motion. As patterns are repeated, strengthened, and amplified, the patterns tend to constrain subsequent actions and discourse, exerting even stronger influence on the system. Some researchers call these strong patterns “simple rules” that emerge from the system and subsequently influence it (Holladay, 2005). People in the system may experience these rules as norms, customs, cultural practices, or ideologies. These rules may be either explicit or unwritten. When the system is appropriately constrained, simple rules will emerge that move the system toward fitness and coherence and, therefore, toward sustainability. Individual participants--teachers and students--certainly have agency; an individual may not follow these emergent rules, and if enough follow alternative patterns to change the patterns, the dynamics across the whole system may shift so that the existing system is no longer sustainable. In that case, a new or different system may emerge.

In complex human systems, we acknowledge that individuals have agency and, therefore, can take action either in concert with systemic patterns or in resistance to those patterns. When people pay attention to feedback, survey relevant options, test hypotheses, and integrate new concepts or principles into their existing knowledge, educators call it "learning." When they act on what they have learned, Eoyang and colleagues call it "adaptive action." Eoyang (2010) asserts that adaptive action--taking immediate action based on feedback, gathering relevant data about consequences, and then considering subsequent action--provides flexibility and adaptability not present in more traditional strategic planning schemes. Holladay & Quade (2010) argue that individuals who understand system dynamics can consider relevant information and take deliberate action as an agent within the system, sometimes in resistance to dominant patterns or rules. These actions can help reshape those system-wide patterns to better achieve particular goals and, potentially, to enhance the adaptability and sustainability of the system. Senge and colleagues (1994; 1999), Dixon (1999), and Dixon and Ross (1999) have called this "organizational learning." Educational researchers call it "critical action research."

Critical Action Research Enables Adaptation and Sustainability

Many leading thinkers in the social sciences have long acknowledged that complexity

science principles are at work in social organizations (e.g., Byrne, 1998; Sawyer, 2005). Leaders in organizational development also point to individual and collective learning as the central processes whereby system participants evaluate feedback, revise their actions, and sustain adaptive change (e.g., Dixon, 1999; Senge, 1994; Senge, et al., 1999). In other words, a human system can sustain itself because the learning process helps individuals and groups within that system adapt to changes both within the system and outside.

Although these ideas from complexity science are not widely recognized in the field of education, several leading authors (e.g., Caine & Caine, 1997; Fullan, 2005; Hargreaves & Fink, 2006) assert that this focus on learning as systemic adaptation is also related to school reform. Reforms based on individual and group learning in schools are often framed as action research, for example, in practitioner research (Cochran-Smith & Lytle, 2001; Cochran-Smith & Lytle, 2009) or in professional learning communities (Dufour, Eaker, and Dufour, 2008; Hord, 1997; Hord & Sommers, 2007), but few researchers have noted the connections between action research and these complex adaptive learning principles (e.g., Burns, 2007; Donato, 2003; Pine, 2009).

These researchers do not conceive of action research as a methodology but as “an approach to inquiry that supports many methods in the service of sense making through experimental action . . . (combining) inquiry with action as a means of stimulating and supporting change and as a way of assessing the impact of that change” (Burns, 2007, p. 11). Burns (2007) draws the most explicit connection between action research and complexity thinking. He provides examples of action research in a wide range of organizations (including schools), and he focuses on how large systems (macro) can be changed if we support multiple action research initiatives across a network of local (micro) contexts, led by individuals or small groups of practitioners. He claims that action researchers should acknowledge “scaling,” or the interdependence of individual, small group, and larger system dynamics, which he calls 1st person, 2nd person, and 3rd person action research.

Action research has been represented concretely in a variety of ways (Burns, 2007; Cochran & Lytle, 2001; 2009; and Patterson, 2008). We are using the model suggested by Stringer and colleagues (1996; 2007; 2009), who describe the practitioner inquiry process as a “Look, Think, Act” cycle. This description is straightforward and appropriate both for teachers and for students. Its simplicity, however, is deceptive.

The "Look" step or phase could refer to kid-watching (Goodman & Wilde, 1996) or to a complicated data collection and analysis scheme. The "Think" step could refer to a quick reflection or to more extended critique of instructional, theoretical, or political implications. The "Act" cycle might focus on action steps related to academic skills or on social action beyond the classroom. The "Act" cycle often involves framing new questions that lead to further inquiry. Because of this flexibility, we are using "Look, Think, Act" to refer to critical action research cycles in our examples below. We do recognize, however, that critical action research involves multiple, layered, and interdependent "Look, Think, Act" cycles which spiral from one inquiry into the next. The "Act" phase of one inquiry may well overlap with the "Look" phase of a subsequent inquiry. Figure 2 is useful in that it illustrates how these phases are related, but this representation is deceptively simple and does not show the potential complexity involved.

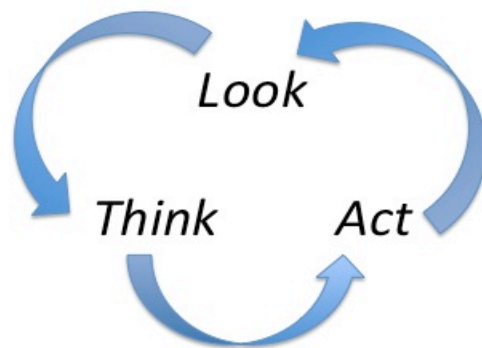


Figure 2. Look, Think, Act action research cycle (Stringer, 1996). This cycle describes the three simple rules that set the conditions for sustainable adaptation in complex human systems.

Agents within a complex adaptive system (which, in schools might be called a teaching/learning ecology), can use this cycle to make sense of the patterns in the system of which they are a part. Using this process and appropriate tools, these agents can examine what is happening, adjust procedures, actions, and messages based on what they see, and adapt to changes both inside and outside the system. We argue that educators should view campuses and classrooms as complex adaptive systems or ecologies because this conceptual framework acknowledges the self-evident realities within these settings: interdependence of multiple components or agents within the system; the self-organizing emergence of realities that cannot

be predicted or controlled; the ongoing search for coherence or meaning; the influence of contextual factors, the influence of feedback loops, and the potential for changing the system through adaptive action. This perspective is powerful because it suggests a whole array of tools to guide our work.

School contexts present emergent systems in which the stated goal--the primary directive--is to learn. Applying the claims inherent in the previous discussion, we would assume that in these complex adaptive systems or ecologies we would want to follow simple rules that make learning not only possible but probable, simple rules that would make learning sustainable. As Hargreaves and Fink say, "Sustainability isn't just a metaphor borrowed from environmental science. It's a fundamental principle for enriching and preserving the richness and interconnectedness of all life, and learning lies at the very heart of high-quality life (2006, p. 9).

We suggest that the Look, Think, Act cycle (Stringer, 1996; 2007; Stringer, Christensen, & Baldwin, 2009) is a concrete manifestation of this kind of learning, and we recommend these three imperatives as simple rules that will sustain a complex adaptive system.

- Look--Gather information related to what is most valued--to the goals or the work of your system.
- Think--After identifying relevant assumptions and expectations, analyze/interpret this information to evaluate possible antecedents, cultural and theoretical assumptions, ideologies, influences, consequences and potential actions.
- Act--Take action to support or enhance your central values, goals, or expectations.

As agents in complex adaptive systems (or teaching/learning ecologies), we should engage in continuous, recursive "Look, Think, Act" cycles to ensure that the system adapts to changes within and changes in the environment but also that these adaptations are coherent with our shared values, beliefs, goals, and expectations. These adaptive actions will enhance the sustainability of our systems.

Further, we argue that this particular framework is powerful because it can move action researchers to take a critical stance. From this stance (during the "think" phase), action researchers would be concerned with larger political and cultural systems and with the ideologies that influence patterns in schools, as well as with more instrumental actions and consequences. Those ideological patterns across the system are sometimes hard to resist, and they can shape perceptions and actions in ways that maintain coherence with the larger system (whether or not

people are aware of their influence). Social theorists have called this phenomenon "hegemony," or in other contexts "cultural reproduction." Because action researchers interested in sustainability cannot ignore these larger influences, we would recommend that they "look, think, and act," always considering potential ideological influences. For that reason, we use the phrase "critical action research," rather than just "action research" which is sometimes implemented merely with functional or instrumental objectives.

This central function of critical action research is to enhance the system's sustainability. The system will shift or self-organize and will sustain over time if these simple rules are integral to the work of the system (and individual components or agents in the system). If agents within this system do not follow these simple rules, they (and/or the system) cannot respond to feedback and will not adapt appropriately. The system will eventually become dysfunctional. Critical action research (the Look, Think, Act cycle) helps us understand and influence the complex ecologies in which we participate so that we can enhance its sustainability. This process is illustrated in Figure 3.

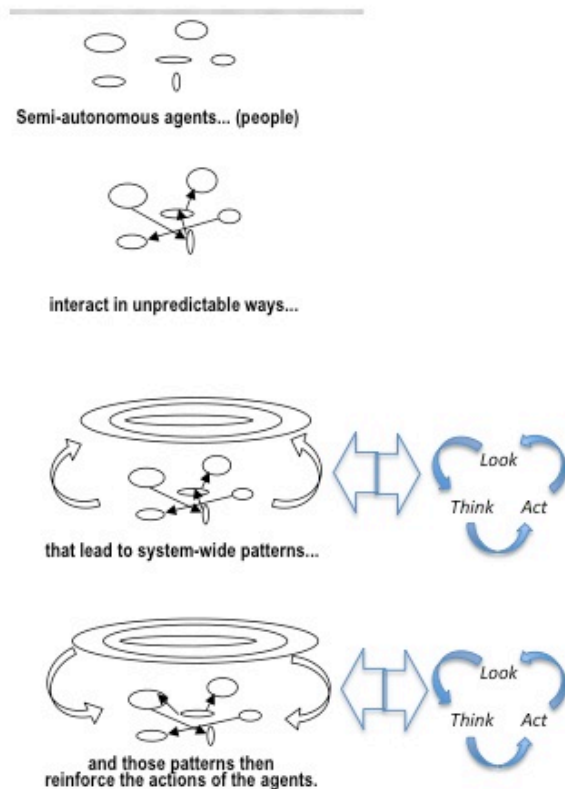


Figure 3. Critical action research as a transforming feedback loop in a complex adaptive system. This figure illustrates how the "Look-Think-Act" cycle can structure feedback loops to support sustainability in complex adaptive systems.

Three Cases

The following cases illustrate how three teachers explain their use of this critical action research cycle in three very different contexts.

Mandy

In the spring of 2009, I took a graduate level Spanish class in which we read eight novels, wrote a research paper, and discussed the literature, all entirely in Spanish. I am not a native Spanish-speaker and had not taken a Spanish class since 2001 so I knew it would be a challenge for me, but I wanted to better understand my English Learners' (ELs) experience of learning academic content, specifically literature, in a second language (L2). My guiding question was "How will my learning experience in a second language influence my beliefs about teaching English Learners?"

Look. Throughout the semester, I kept a journal of my experiences in this class, how I felt during the process and my reaction to the assignments, fellow students, and my professor. I analyzed the data from my journal many times to identify the main factors that contributed to or hindered my academic progress. These factors all demonstrated the complexity of positive and negative influences on my L2 learning. One of those factors that emerged from the data was risk-taking. It was a great risk for me to take a class out of my comfort zone because I did not feel competent in my academic abilities regarding Mexican literature from the previous century; furthermore, I was one of the few non-native speakers in the class. Through the data analysis, I realized that risk-taking paved the way for my success in the course and improvement of my oral language and literacy abilities in Spanish.

I also carefully documented the barriers I experienced in making meaning from the texts we read in class. I noticed that language was not the only obstacle I had to overcome. There were many cultural differences between the novels and my own experiences that created obstacles of my comprehension of the texts. I also had to reconstruct my self-efficacy as a learner in the Spanish academic environment. Many academic tasks are much easier for me in English and I would often feel frustrated as a result of not possessing the productive language

(writing and speaking) in Spanish to be able to thoroughly demonstrate my understanding of the texts.

Think. Although I experienced many obstacles, I was successful in the course and returned to my data to determine the factors that positively influenced my learning. Many of these factors relate to socio-cultural theory and became evident through the collaborative learning I engaged in with the students in my Spanish class and the professor's positive feedback. The importance of community became evident in my L2 experience in the relationships I developed with my classmates and the transformation that took place in my learning due to those relationships. The verbal, written, and visual feedback I received from students and the professor proved to be pivotal mediation for my success in the course.

Act. Taking an inquiry stance gave me the ability to become more like my EL students, understand them more deeply, and teach them more effectively with greater concern for the whole person. Second language acquisition theory I had only previously learned about in books or experienced second hand through my students, came to life as I engaged in personal L2 learning experiences. I am astounded by how this experience has transformed my theory and ultimately my practice. I found many areas where my stated beliefs did not match my actual practice. For example, I thought I attended to my students' emotional needs very well but I learned that there were many affective factors that I needed to adhere to more appropriately. When I returned to the ESL classroom the following summer, I made many changes in my instruction to better meet the unique learning needs of second language learners. In addition, my account of this experience will be published in a journal for teacher researchers (Stewart, in press). The changes I made as a result of this action research continues to sustain my learning as I revisit my L2 learning experience in order to make the most effective classroom decisions for my students on a daily basis.

Ragina

As a middle school teacher in a pull-out English as a Second Language (ESL) program, I was frustrated with the push-and-shove, drill-and-kill methods of cramming knowledge into English learners. I wanted to improve my students' literacy and their general attitudes towards reading and writing. I believed helping the students connect personally with texts would make a difference. I also wanted to encourage students to tell their own stories and help them realize what they have to say is appreciated. My research question began as, "How does reading aloud,

followed by writing opportunities, improve middle school English learners' reading and writing abilities, while fostering their independent motivation to participate in literacy activities?" I wanted to see what happened if I flooded my students with a continual flow of reading selections accompanied by writing extensions. Would this improve their comprehension and joy of reading and writing? Would all of this reading exposure and writing practice improve their vocabulary and grammar skills?

Look. Because my students were limited in their English language proficiencies, I read all the literature selections out loud to the whole group. This enabled us to discuss and explain topics and vocabulary throughout the reading of the story. Sharing the literature also enabled us to build bridges, connections, between the individuals and the text. Due to this personal connection my students were able to write in depth stories of their own experiences that related to those of the characters. To document how my students were responding, I observed and listened to my students as we interacted during and after readings of a text at the beginning of the year I recorded in my field notes that they rarely acknowledged any recognition or connection to text, yet after my modeling or questioning they were able to see personal connections, as the year progressed my students began to recognize personal connections on their own without prompting. I photographed my students as they reviewed the book *Hugo Cabret* (Selznick, 2007) by performing tableaus while the others identified the scene, character, and purpose for the action portrayed. Finally, I collected written samples of my students writing in individual folders in order to see personal growth.

Think. As the year progressed, I watched my students' enthusiasm and attentiveness grow. My students' writing revealed their comprehension, and their writing was clearly increasing in length and improving in terms of conventional use of English. My students' self-confidence soared, along with their newfound eagerness both to read and to write.

One story is typical of the progress I saw in all my students—a sixth grade boy who had not joined in class discussions and had only responded with one or two word responses when I asked him directly. In his writing he wrote briefly one or two sentences with no elaboration or personal connection. When responding to the book, *Ziba Came on a Boat* (Lofthouse, 2007), his words seemed to come alive both orally and in his written work. He told the class that his uncle had left Guatemala to come to the United States because of war. Later, when we wrote stories, he wrote his first story, one and a half pages long, detailing events and emotions along his uncle's

journey. It was obvious he took great pride in sharing this story as he read it aloud to the class and eagerly answered the questions of his classmates. After this he began writing each of his stories in great detail. After this experience, his writings in response to the text read often showed personal connections. He began to open up and share his thoughts and feelings more openly each time receiving a positive reaction, which further encouraged him to continue. By the end of the year, his writings evidenced elaboration and personal detail. It was clear to me that his continued success in writing helped "sustain" both his engagement and his literacy development.

Act. Responses like this from every one of my students affirmed the power of reading literature aloud to my English learners and the potential of having them talk and write about the literature. Throughout the school year I continued to read aloud and incorporate writing activities. Students who were quiet and withdrawn began responding during read alouds and their sentence structure and flow of language improved both orally and in their writing. At the beginning of the year students would enter my room each class period asking questions such as "Are we going to read **again** today?" and "Do we have to write today, this is not a writing class?" By the end of the year the same groups of students would enter asking questions such as

Are we going to finish that book today?

I can't wait to see...

Who will we be writing for today?

Last night I read ___ and I wrote a ___. Would you like to read it?

Juan

I teach courses that introduce students to literacy principles and practices for students from linguistically diverse communities. At the end of every semester, I think of ways I can improve my teaching so that my students can better internalize the many theories and practices as a way of thinking--a teaching stance--not just "add-ons" to their current thinking, but it bothered me that my students did not seem to be thinking critically about the course content. This was most evident in their journal entries; many of them would write word for word what I had said in class the day before, or they would simply list facts they had found in our text without deep practical or critical reflection (van Manen, 1977). I knew that my students were not making connections between what they were learning, what happens in the classroom, and implications for their beliefs and practices. As a way to address this I asked myself, "What can I change in my practice so that I create a culture that elicits content ownership and that rewards

meaningful, sustained learning?"

Look. After searching for options with my critical friends (Pine, 2009) in our graduate class, I decided to adjust the format and grading of my students' journals. Until this semester students evidenced their learning by writing six things they learned, three things they found interesting, and one practical question. Their products focused on listing facts from the text and surface level questions. Instead, I changed my questions to provide an opportunity for students to build a schema before reading, respond after they read, and then share, not just with me, but also with classmates through small-group conversations.

Think. Changing the journal invitations from requests for technical responses to more reflective and reflexive invitations transformed our conversations in our classroom. I saw evidence of this in their journal entries, their other course assignments, and in the level of engagement in our class discussions. Students made connections with their previous experiences and with each other. The conversations were no longer focused on the facts and figures of the text, but rather how these facts and figures would affect the students they would soon be teaching. As I learned more about socio-cultural approaches to language and literacy learning, I could see that the discourse practices among our classroom community were changing. These reflective writings and conversations were mediating our learning in a deeper and more transformational way than I had seen before. These deeper responses triggered even more questions and sustained our further inquiry.

Act. The success with this different approach to reflections and discussions led me to a new commitment to inviting my students to take an inquiry stance within this course. I realized my responsibility as a teacher was to invite students to write and talk about what they were learning and then to allow them to peek into one other's thinking through oral presentations, gallery walks, and debates. What I found during this action research cycle surprised me—the students were becoming more and more engaged, learning and sharing with others. They no longer sat back quietly but became involved in the dialogue. They wrote from their own perspectives and shared critical and deep thinking. For example, students were bringing in and distributing articles from local and national newspapers that related to our readings, e-mailing students about newscasts that related to our topic of the week, and making practical connections to how their readings would impact their teaching. One student wrote, "I have to defy the odds (of failure) and do everything I can to help all my students, I have to enhance the education of all

my learners.” Another student commented, “After our conversations in class I have realized that there is no easy answer, when making and implementing policies, especially those pertaining to education.” One student said, “I like the way I feel here. Your Socratic method allows us to think for ourselves.”

I began thinking of my students as co-inquirers. Taking an inquiry stance provided us the authority to question, to wonder about what we were learning. The answers were not always within the text. Although sometimes we became frustrated that one question led to more questions, many appreciated and understood why it was important to have these kinds of discussions. This stance afforded us the opportunity to move our conversations to a global and critical perspective; as we looked, thought, and acted on our learning we adapted to each others’ inquiries. The questions and answers became more explicit, both for us individually and collectively, which led to sustained learning in and out of our class.

Conclusion

We have argued that action research engages teachers and students in multiple, recursive "Look, Think, Act" cycles that lead to adaptive action and, therefore, to sustainability in complex adaptive systems. Each of these case studies provides a brief description of one complex, adapting network of relationships. Each case reveals the power of three seemingly simple rules: Look; Think; and Act. These simple directives set the conditions for adaptation and, therefore, for sustainability in complex social systems. In other words, these three simple rules make it possible for those of us "inside" such a system to acknowledge and negotiate the realities of our complex classroom and campus ecologies, including the interdependence of multiple components or agents within the system, the self-organizing emergence of realities that cannot be predicted or controlled, the ongoing search for coherence or meaning; the sometimes overwhelming influence of context, the power of transformative feedback loops, and the potential for sustaining the system through simple rules that lead to adaptive action. If we want to set the conditions for our complex adaptive teaching/learning ecologies to self-organize in sustainable and productive ways--if we want to sustain innovation and reform--we must look carefully, think deeply, and take informed, decisive, and responsive action. It's that simple.

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