Technological Ecologies & Sustainability

CHAPTER	2
TITLE	A Portable Ecology: Supporting New Media Writing and Laptop-ready Pedagogy
AUTHORS	Kristie S. Fleckenstein Fred Johnson Jackie Grutsch McKinney
OVERVIEW	In this chapter, we argue for the value of systemically attuned thinking in planning, implementing, and supporting curricula and infrastructure for a 21st-century writing program. We focus specifically on the development of laptop classrooms and new media pedagogy at Ball State University, a mid-sized state institution in the midwest. We show how our successes in transforming classrooms, modernizing our writing center, and offering faculty development evolved out of a series of missteps, miscommunications, and failures that taught us to think in holistic ways about the emergence of institutional change. Our narrative unfolds in three steps. First, informed by Gregory Bateson's ecology of the mind, we offer and illustrate three characteristics of systemically attuned thinking: see the complex web, understand news of difference, and emerge into change. Then we offer insights into technological sustainability, highlighting the role of faculty support and writing center collaboration. Finally, we conclude with three guidelines for enacting technological change in writing programs: think spatially, think rhetorically, and think temporally.
TAGS	Ball State University, change, classroom*, composition, configuration, context, critical literacy, curriculum, deutero-learning, ecology, first-year, Fred Johnson, Gregory Bateson, interdependent, Jackie Grutsch McKinney, Kristie Fleckenstein, laptop, literacy, mind, models of change, news of difference, portable, renovation, rhetoric*, Stuart Selber, sustain*, systematic thinking, technolog*, Writing Program, writing
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A Portable Ecology: Supporting New Media Writing and Laptop-Ready Pedagogy

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> "The most important task today is, perhaps, to learn to think in a new way" (Bateson, 1972/1987, p. 468).

At the 2007 Conference on College Composition and Communication, the writing program at Ball State University received the CCCC Writing Program Certificate of Excellence. The awards committee recognized Ball State's writing program "as exemplary due to its solid approach to teaching composition as an act of reading and writing across modes of communication"—a pedagogy made possible by the immersion of all of our 3,000-plus yearly writing program students in technology-rich classrooms. Without that immersion, we could not have fostered work with new media technologies, core to our first-year composition focus on literacy across different modalities. But to ensure immersion for all students, we had to acquire additional technology-rich classrooms. We did this by soliciting and obtaining institutional support to renovate four traditional classrooms into laptop-ready classrooms (two in summer 2005 and two more in summer 2006), an institutional commitment that required the allocation of more than $150,000 in a tight budget atmosphere.

In this chapter, we recount how we transformed a set of conventional classrooms at Ball State University, a mid-sized Indiana state institution, into laptop classrooms. We demonstrate the usefulness of systemically attuned thinking for the planning, implementation, and maintenance of both curricula and physical infrastructure for a wired, 21st-century writing program. Looking back on our experiences, we see that our success—which evolved out of missteps, miscommunication, and failures—resulted from learning to think holistically, not atomistically, about the emergence of institutional change. We crafted the portable ecology of our laptop-ready classrooms, and thus made possible our new media pedagogical emphasis.

This story is important for three reasons. Our account of stumbling into a systemically attuned way of thinking provides local-level insight into what Dànielle Nicole DeVoss, Ellen Cushman, and Jeffrey T. Grabill (2005) called the "when of new media writing." They argued that, while much composition scholarship explores the "what and why" of new media, little attention has been paid to the "when" of new-media composing, particularly the "institutional and political arrangements that—often invisibly—allow these new-media products to emerge in the first place" (p. 15). Second, our story reveals both the abstract interdependencies of institutional units and the material interdependencies of persons working together (or failing to work together) from different university departments. Third, we demonstrate how an ecological orientation privileges neither environment nor individual; rather, it fuses the two into a way of thinking with implications for effecting change at other institutions.

We begin this chapter with a brief introduction to Gregory Bateson's (1972/1987, 1979, 1991) idea of contextual, systemic evolution—evolution that is an interdependent, nonlinear process rather than an independent, unidirectional process. We then describe the renovations we gained and frame our achievements within a retrospective epiphany: that our successes stemmed from the moments when we thought and acted in tune with or in response to the

kinds of contextual systems that Bateson describes, while our failures stemmed from the moments when we thought and acted atomistically. We next explore, in Batesonian terms, what it means to see a complex web of interdependent agents communicate news of difference throughout that web, emerge into change, and sustain change. We conclude by suggesting ways in which other writing programs can adapt holistic thinking to plan for, and possibly bring about, technological change.

THINKING SYSTEMICALLY

We did not initiate this project by deliberately thinking in systemic terms; we only realized the necessity of systemic thinking as we struggled to align the various competing agendas of the writing program, the English department, and the university so that we could accomplish a specific goal: the renovation of conventional classrooms into laptop-ready, technology-enhanced classrooms. However, by the end of our initial efforts to secure funding and bring about classroom renovation in summer 2005 and summer 2006, we had become committed to what Bateson (1972/1987), quoted in the epigram at the beginning of the chapter, called thinking in a new way.

Cultural anthropologist and key contributor to the post-WWII Macy Conferences on cybernetics, Bateson argued for the necessity of what he called an "ecology of the mind." Briefly, he asserted that Darwin's focus in evolution on the unit of the species was wrong-headed. Individual species, like the horse, did not evolve in response to the existence of the grassy plains (i.e., nature did not "select" for survival those proto-horses best suited for existing on grass); rather, grassy plains and horse evolved together. As Bateson (1991) explained:

> the horse isn't the thing that evolved. What evolved actually was a relationship between horse and grass. This is ecology. If you want a lawn, which is the equivalent in the suburbs of a grassy plain, there are certain steps you have to take. First of all you go and buy a lawn mower. This is the equivalent of those front teeth of the horse. And you have to have this in order to prevent the grass from going to seed. If the grass goes to seed, it dies. It's done its thing, it thinks, and it dies. So you keep it from going to seed with a mower. Secondly, if you want to make a tight turf, you have to squash it down, so you buy a roller—at best one of those rollers with sort of fists on it all over that'll knock it down. This is a substitute for horses' hoofs. And finally, if you really want to have a good lawn, you go and buy a sack of manure and substitute it for the back end of a horse in order to deceive the grass into doing ecologically what it would do if it had hoofed animals living on it. Thus the unit of what's called evolution out there, is really not this species or that species. It is an entire interlocking business of species. (p. 276)

What is necessary, Bateson argued, is to stop thinking in atomistic terms regarding individual species, whether the species is the grass or the horse. "There is always, of course, violence to the whole system if you think about the parts separately" (p. 265), he warned. Instead, we need to think in terms of context—for it is the context, not the isolated organism, that evolves and survives. Bateson's systemic thinking emerged as essential to our efforts to design, staff, and use four laptop-ready classrooms.

EMERGING INTO VIEW

Our writing program's portable ecology emerged into view over the course of 2 years, as, in service of our larger curricular goals, four conventional classrooms were converted into laptop-ready classrooms. Our first technology proposal, submitted in spring 2005, requested that the English Department's two most cramped, least-friendly teaching spaces be reconfigured to help meet our program's new technology needs. Both of these rooms were rectangular nooks left over after previous renovations, and they were stuffed, when we began, with 25 tablet-arm chairs each. Given the long, skinny shape of these rooms, along with their cinder-block walls, poor lighting, and lack of modern technology, faculty sometimes called them coffins. But, with the help of the university interior designer, we reworked these tight spaces, first adding carpet, new lighting, a coat of paint, video projectors, and whiteboards, then bringing in new ergonomic tables with power outlets and Internet ports at every seat. ADA regulations left us few options for arranging the tables, but we did finally fit 25 seats into each room, using clusters of six seats in one room (see Figure 1) and a less flexible, conference table style arrangement in the other, even smaller room.

Figure 1. Revised room configuration: six-seat clusters.

The original inspiration for the renovation, of course, was our awkward combination of curricular goals, limited funding, and lack of suitable space for creating new classrooms equipped with desktop computers. Capitalizing on the fact that approximately half of Ball State students were arriving on campus with laptops in tow, course sections scheduled into these rooms were marked "laptop required" in the catalog, and plenty of students were ready to sign up. Rather than committing to the purchase and maintenance of more than 50 new desktop computers, we purchased 12 laptops and issued these to teachers who would need them. Teachers could carry a laptop and easily plug into the projectors when they arrived to teach in one of the new laptop classrooms. Outfitting and maintaining these rooms cost (and will cost) far less than outfitting and maintaining desktop computer-based classrooms, and so we solved the curriculum, funding, and space problems all at once.

Even better, the makeshift laptop solution turned our old coffin-like rooms into nice (if still imperfect) teaching spaces. Teachers soon discovered advantages we had not originally anticipated. The laptops allowed them to easily transport and access their data and classroom presentations, and, once they arrived in the classroom, they were running presentations, pulling up data, and displaying Internet sites using a familiar computer that performed as expected, rather than using a permanent classroom teaching station with unpredictable quirks. Because there are no permanent desktop computers in these rooms, the desks can be used alternately as computer workstations or as flexible table space for workshopping and other activities, something which was—and is—impossible in many of our desktop computer classrooms. Student laptops broke down now and then, but the hassle this created was no worse (at worst) than the hassle created by broken-down machines in our desktop computer-based classrooms, and such problems tended to be considerably less vexing than coping with the inevitable decline and obsolescence of machines in desktop computer classrooms. Students immersed in BSU's wireless computing culture tended to look after the health of their own machines. In short, then, these classrooms worked and even opened up unanticipated possibilities for teachers and students. These laptop-ready areas became the basis of our portable ecology: writing classrooms that come and go with the teachers and students.

Continuing Transformations

Because of the success of the first two classrooms, and requests from teachers in upper-division writing classes to schedule their classes into our classrooms, we sought and received funding to transform two more classrooms in the main English building in spring 2006. These more spacious laptop-ready rooms offered the same financial advantages as the original rooms, and they would regularly be shared with non-writing-program English classes. From our experience with the original laptop-ready rooms, we knew we could design these spaces so they would be suitable both for computer-intensive writing courses and for literature courses. This round of funding also included a commitment by the college to purchase 30 more laptop computers for our teachers, so that a much larger percentage of writing program faculty could be scheduled to teach in one of the four laptop-ready rooms. At the end of summer 2006, the writing program had gained four flexible, laptop-ready rooms and 41 laptop computers (still a large number of machines, but considerably less than the 104 machines that would have been required to create desktop-based workstations for every student and teacher in the classrooms).

While we are justifiably proud of these changes and the pedagogical opportunities these classrooms afford, we view with a bit of rueful dismay our stumbles and missteps in achieving these renovations. Endowed with the clarity of hindsight, we realize that we were most successful when we inadvertently relied on Bateson's (1972/1987, 1979, 1991) systemically attuned thinking, which privileges the importance of context as a complex web of interdependent relationships. We now realize that this contextual dynamic was central to our efforts to integrate laptop-ready classrooms into our writing program, and nowhere is the horse-plus-plains dynamic more evident than in our inability, even retrospectively, to pinpoint a single starting point for change. Evolution, Bateson argued, begins with the plains *and* the proto-horse, systemically linked so that one changes in response to or in unison with the other. In our situation at Ball State, we found ourselves working in a complex system made up of (at least) existing technology and facilities, a writing program in need of re-tooling and re-focusing, a diverse group of both seasoned and novice teachers, the overarching goals of Ball State as an institution, and an increasingly wired 21st century student population. The multiplicity of our starting points reveals the networked nature of our context and the futility of thinking in terms of isolated areas and goals.

Recognizing the Codependent Points of Entry

One point of entry into our story of change might be the academic year 2004–2005. During that year, the Ball State University writing program instituted a review of the goals and methods of its two required first-year composition classes, a process that had not been undertaken for more than a decade. Shuttling back and forth between the unique needs of the students entering into Ball State and the changing demands of 21st-century literacies, the Writing Committee struggled to set forth a curriculum that would be viable for the next decade.[1] Rather than focusing solely on composing as an art of language, the program would focus on composing as described in different ways by reading educator Peter Smagorinsky (2000) and composition scholar Kathleen Blake Yancey (2004): that is, as a rhetorical act involving multiple modes. The resulting changes to the first-year writing classes—after a full year of meetings, retreats, and subcommittee assignments—were dramatic.

Although Ball State offered about 90% of its first-semester, first-year composition classes in computer classrooms before these changes, it was immediately clear to the committee and writing program faculty that this percentage was no longer sufficient. To meet the new media curricular goals, 100% of classes needed access to technology in the classroom. However, we had already added desktop computers, projectors, screens, printers, and other necessary equipment to every classroom large enough to accommodate such technology, so we did not have the option of creating more desktop computer classrooms. Nor, due to the expense of supporting the necessary desktop hardware, would the institution support such a change. Therefore, instead of the standard technology-enhanced classroom, we decided to move to a laptop-ready set up.

However, if we begin there, we miss a necessary part of the story and bypass the elements that had to be in place to make the curricular change viable. Without the established tradition for teaching composition in computer classrooms at Ball State—without 90% of writing program classes already computer-assisted—the curricular changes would never have gained traction. By 2004–2005, we had momentum already, as some writing faculty were already incorporating new media assignments into the existing composition curriculum. Getting laptop classrooms in summer 2005, then, for us was tied to 1999, when the university instituted a computer literacy component and the writing program assumed responsibility for introducing all incoming first-year students to "computer competency and literacy," a promise included for the first time in the 2000 undergraduate catalog (Papper, Reynolds, & Rice, 2000). To keep that promise, the English department, through a substantial grant from the State of Indiana, had created the first set of computer classrooms. Between then and now, a continuing series of paid, voluntary workshops, run by and for writing program faculty, has helped equip our teachers to incorporate technology into their teaching in informed and meaningful ways. And thus, many of our Writing Program teachers were inclined to perceive both a portable ecology and new media pedagogy as a normal and necessary outgrowth from our earlier initiative.

But, if we begin with 1999 and the computer literacy component, we are missing yet another starting point of this narrative: the institutional attitude toward technology. Ball State, a mid-sized East Central Indiana university, was named the top wireless campus in the nation by

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[1] Ninety-eight percent of the classes in the first-year composition program are taught by contract faculty, teachers who have annual renewable contracts. Membership on the Writing Committee (WC)—an advisory unit designed to help the Director of the writing program address issues and concerns related to the writing program—reflects that fact. The WC includes four contract faculty members elected at large; three assistants to the Director, each of whom is a member of the contract faculty; the graduate assistant to the Director; and three tenure-track faculty members, excluding the director.

Intel Corporation in 2005. Wireless technology can be used anywhere on campus, and new students are encouraged to take advantage of it. Some programs, notably that of our large Teachers College, have mandated for several years that all incoming first-year students majoring in either elementary or secondary education purchase a laptop computer; BSU's architecture program has more recently followed suit. Ball State is, therefore, a laptop-friendly campus, and initiatives to capitalize on this were popular with administrators, the same administrators who made the decisions so necessary to financing the renovation of conventional classrooms into laptop-ready classrooms.

This profusion of starting points illustrates Bateson's (1991) argument about context. The individual organism—whether grassy plains or horse or writing program—does not evolve, but, rather, the context evolves. Grassy plains and horse evolve coterminously as a result of the impact of one upon the other. The dynamic is not progressive but emergent. We cannot identify a distinct beginning to our story because our story does not *begin*, any more than the modern horse can be said to have simply, one day, succeeded the proto-horse. Instead, our story *emerges* as a continuation of several stories that might—thinking atomistically—be seen as separate, but in fact—thinking holistically—are intrinsically connected. Our uncertainty concerning origins is characteristic of, and essential to, the ecological thinking that we see, in retrospect, characterized our most successful efforts to conceptualize and carry out our project.

Lessons Learned

Given this contextual thinking, how, then, does a Writing program initiate change, especially technological change? With the inevitable confusion of multiple beginnings, how do administrators and teachers know where to begin intervening in the existing ecology? Based on our experiences fumbling through two waves of renovation, we abstract three central tenets from Bateson's complex theory of systemically attuned thinking, and illustrate each of those points with short narratives from our longer, ongoing story:

1. we had to begin thinking of change as a complex web created by transacting loops of information;

2. we had to perceive information in Batesonian terms (as news of difference, or the differences that make a difference); and

3. we had to remind ourselves continually that change was emergent, not progressive; that is, environment and organism jointly interact, and from those interactions context emerges.

Lesson 1: See the Complex Web

For Bateson (1972/1987), an ecology of the mind consists of a complex web or network—"an internally interactive system" (p. 315)—within which no single element has unilateral control over an entire interaction. Rather, control is distributed throughout the whole improvisatory ensemble. Above, we suggested the multiple starting points that we might use for telling our story. We might, for any one of those starting points, identify would-be heroes—people whose influence was, for a time, extremely important to the shaping of our department. However, if we look closely, we find that at no point did we arrive precisely where a hero, or the hero's vision, intended. Instead, every intended end at any point was revised by what, in the throes of a project, felt like competing agendas, lack of resources, and miscommunication. Clearly, no one person could have controlled everything no matter how hard any one of us may have

tried. The hero position was distributed across the complex context, and sharing it was essential for responding to unexpected events.

Even as we began to understand the forces at work in our institution—existing infrastructure, university interior design goals, technology budgets, class sizes, student habits, teacher needs, curriculum development, the technology goals of other departments—we learned that we could always be tripped up by what Bateson (1979) called the *stochastic*: random or unexpected events that occur within a set of limitations so that only some components, and not others, endure. Our original laptop classroom proposal nearly died at the department level because of one such stochastic factor. When Kris first presented her plan to our department chair, she learned that, although the College of Sciences and Humanities funds technology requests, it does not fund renovation. Renovation is governed by separate processes, and, though necessary for achieving our technology goals, approval for renovation would require a separate set of efforts. Fortunately, the chair, drawing on his years of institutional experience, thought to approach the vice president of Facilities, Planning, and Management (FPM). He pitched the renovations and gained the promise of funding. That secured, the chair brought the proposal with the technology request to our dean, who committed college funds to securing data projectors for the classrooms and laptops for the teachers.

Obtaining the necessary budget approval required responsiveness to unexpected twists (stochastic twists) in labyrinthine institutional loops—Kris to the chair, chair to VP, back to Kris, back to the chair, to the dean, to Kris. And that brief synopsis hides the twisty loops within the loops (Kris to her assistants, back to Kris, then to the Writing Committee, and so on), and all the unforeseen obstacles we encountered. The conversion of our classrooms—and thus the emergence of our new curriculum and our portable ecology—could have been at any point blocked by the stochastic. Every point in this twisty process required all players to be responsive to constantly emerging forces, sometimes by leading, sometimes by following. We had to become Bateson's (1979) flexible organism because, as he argued, it is not the organism best suited to its environment which survives; the organism which survives is the organism with the most flexible responses to unexpected fluctuations in its complex environment.

Practically speaking, then, the renovation process begins with understanding, as well as we can, the people, processes, and systems that will be affected by our plan and which must, therefore, impinge on the formation of our plan, if our plan is to succeed. We must always be ready to respond to as-yet-unnoticed forces that will affect our plan, and we must always be sensitive to the distributed nature of the hero position. Of course, making a good plan is only the beginning. As we made our way through the renovation process, we learned that voicing our concerns to the right people and having them understood as we intended were two different things. Bateson's (1972/1987) notion of "news of difference" helps us describe both this problem and its solution.

Lesson 2: Understand News of Difference

A complex web coheres as a result of information circulation, and information important enough to circulate is what Bateson (1972/1987) defined as news of difference or "difference which makes a difference" (p. 315). Agents in a system perceive a bit of stimuli as important— as information—on the basis of that which is essential to their survival or their immediate concerns within the system. Thus, an unnoticed stone in the path becomes a difference that makes a difference only when it is needed to anchor a picnic blanket or when it causes a stubbed toe. We recognized the significance of such "stones" when we made the startling (if naïve) discovery that important information in one institutional loop was not necessarily important information in another loop. Along with a number of lesser difficulties, our failure to

recognize and account for differences in our complex web resulted, on the first day of fall 2005 classes, in two nicely wired, painted, carpeted classrooms without any furniture for the 25 sections of composition scheduled to meet in them.

The process seemed simple. Having received verbal budget approval, Kris's next task, she was told, was to contact the university interior designer, and she did that in early May 2005. Working with the helpful and innovative designer, she finalized configurations for the two rooms and ordered the necessary furnishings. The designer assured Kris that he would place the work orders for paint, carpet, and wiring. The work to be done, he said, would involve a number of different people, but there would be no one specific project leader. At this point, the importance of different differences began to materialize. First, Kris was oblivious to the fact that the differences guiding the scheduling of FPM work were not always the same differences informing her timeline as Director of the Writing program. For her, "the work orders are in the system" meant that renovations would be completed before the beginning of fall semester so that faculty could acclimate to the new classrooms before teaching in them. For FPM, which juggles a wide array of projects, "the work orders are in the system" meant that the work would be done when it could be conveniently scheduled during the coming fiscal year. Second, Kris did not realize that "no project leader" meant she should connect with each person in charge of the diverse aspects of the renovation: not only the interior designer but also the carpenters and painters, the electricians, computing services, and tech support. The result, eventually, of our un-communicated scheduling "differences" was empty classrooms.

We discovered through our mistakes that we had to both communicate the system of differences significant to the Writing program and discern the system of differences significant to FPM; communication had to flow in every direction. And this was not just a matter of communicating about important timeline issues. The FPM renovators did not think like teachers, and did not necessarily live so closely to the academic schedule as we do, so they were sometimes unable to envision the spaces and equipment in use. For instance, we designed the 2005 classrooms so that students could easily plug their laptops into the campus Ethernet, or so we thought. For tables against the walls, we imagined Ethernet hookups situated above desk level so that students could sit down, reach over, and connect. Simple. FPM, however, installed the hookups below desk-level, because that was the familiar arrangement used in desktop-based computer classrooms. Thus, until FPM could get back to the classrooms and do the work to raise the ports higher, students had to pull the heavy tables away from the walls and reach behind them to plug in their laptops. Conversely, once FPM has done something just the way we want it—as, for example, with the great little equipment cabinets they installed during our 2006 round of renovations—it becomes relatively easy to have them do that same thing again. They understand what we mean because they have a working model for it.

Having learned so much in 2005 about the need to communicate differences, in 2006 we were more intentional about bringing the FPM renovators into our "teacher thinking" loop. Among the important changes affecting our second round of renovations was Fred's appointment as Laptop Classroom Coordinator. His job during the renovation process was, in essence, to continually communicate about how these classrooms would be used and to work to ensure that the new classrooms would be ready before the start of school. He materially emphasized both crucial differences—teacherly design and schedule—by holding meetings in the classrooms themselves. The physical space of the rooms, emptied of furniture and filled with the mess of renovation, emphasized on a visceral level the importance of scheduling tasks so that the rooms would be prepped for teachers and students by August, and it helped all involved to communicate—sometimes by pointing and gesturing—about the ways that the technology was meant to work.

Our persistent, intentional communication with other units throughout the university helped them to understand our crucial news of difference and to serve our needs better. However, that is only part of the difference equation. We also learned to listen to and for their differences. Their communication with us—the news of difference we received—helped us to better plan for potential catastrophes, and, by anticipating them, prepare to cope more easily with them. Even with committed support from the various involved units, the more we learned about the process, the more we understood how many things could cause delays and leave us with unfinished classrooms at the start of school. One key difference that would always make a difference: new equipment for our classrooms could not be ordered until the start of the new fiscal year (July 1), and, at that time, the folks doing the purchasing are overwhelmed with requests. Another key difference: the major computer manufacturer through which BSU purchases computers would receive a massive order from the university at the start of the fiscal year, and it would take them some time to fill the whole order. What these sorts of issues meant for us—the real news of difference we needed to absorb—was that we had to have a backup plan for the first few weeks of classes in fall semester because any major snag in the purchasing, shipping, and installation process could cost us crucial weeks of delay.

The 2006 renovations were completed before the start of school—barely—but, had they not been done, we had alternative arrangements in place, with classrooms selected and both teachers and support staff informed of the potential problems. Instead of resisting the ecology of the university, we learned its rhythms, adjusted our expectations, and began to co-exist more peacefully. We had, in essence, learned to understand the news of difference. And we were most successful within this labyrinthine flow of differences when we treated change as emergent rather than linear. This, too, was a lesson we had to learn.

Lesson 3: Emerge into Change

What happens when we imagine the complex web as dynamic rather than stable, and recognize its complexity extending forward through time? The metanarrative of Darwinian evolution, like many 19th-century stories of progress, posits (in its simplest form) sure, linear movement toward higher and more perfected states of development, with the kind of orderliness suggested by that often-parodied monkey-becomes-man illustration, each successive stage supplanting and improving on the previous. Bateson (1979), however, insisted that evolution must be understood as a circular or recursive process, in which new ecological situations constantly emerge but cannot at any time be characterized uniformly as progress, because an improvement in one place may lead to complications in other places. Any emerging change must lead to re-evaluation of all previous changes. Some agent in the ecosystem evolves into a form in which it can better defend itself or meet its needs. But the rest of the ecosystem is not stable; other agents are also changing, maybe in response to independent factors, maybe in response to the first agent's new situation. And the form that served an evolving species (or technology) will at one time may, as the rest of the ecosystem changes, become untenable, or even disastrous (think of the T. Rex or, in terms of technology, the 8-track tape).

There is no perfectly stable ecosystem under ordinary circumstances. Nor is there any stable institutional ecology for writing programs, because the complex web is constantly reshaping itself over time, emerging in new and different forms. Program change is equally emergent in two ways: one, it is lodged within a material situation, and, two, that material situation coheres in a complex web of interdependencies. As with so many of the actions we describe in this chapter, we arrived at this insight into emergence by accident.

The architect Peter Blake (1977) highlighted the importance of the material situation to emergent change. Toying with the Modernist idea that, in building and planning, form should

follow function, Blake suggested that, in fact, in any practical development, form will tend to follow *fiasco*. Like Bateson's (1979) discussion of the way change emerges from the situation that exists, rather than resulting from steady, linear progress, Blake pointed out that, in practical, lived systems, one cannot typically bulldoze the terrain and start anew, making way for the establishment of an utterly alien ecology. Instead, one must fit into what exists, let new projects emerge naturally from the present ecology, and accept stochastic disruptions (even outright fiascoes) as a natural, expected part of the system moving forward. This is exactly the material dynamic characterizing our renovations. Helpfully, our laptop-classroom gambit was made viable by the increasing number of students carrying laptops, and their carrying of laptops was encouraged by Ball State's decision to make wireless Internet access ubiquitous on campus. Though no one involved in the ubiquitous wireless decision would have given any thought to it, the change they made affected the later change we made. Not so helpfully, one of the major "fiascos" plaguing our efforts to acquire a portable ecology arose from long-past architectural decisions that made our classrooms only large enough to contain tables for 25 students and a teacher desk. What our department, in a past ecological state, rightly perceived as improvement (classrooms designed to the size needed at the time) had become an inflexible barrier to further change.[2] A continually emerging ecology never reaches equilibrium, and the material situation at which we are arriving will always be formed, in part, by our co-emergence with material constraints and unexpected disruptions. (See Figure 2 and its associated movie; .mov format, 14 megs for several models of change.
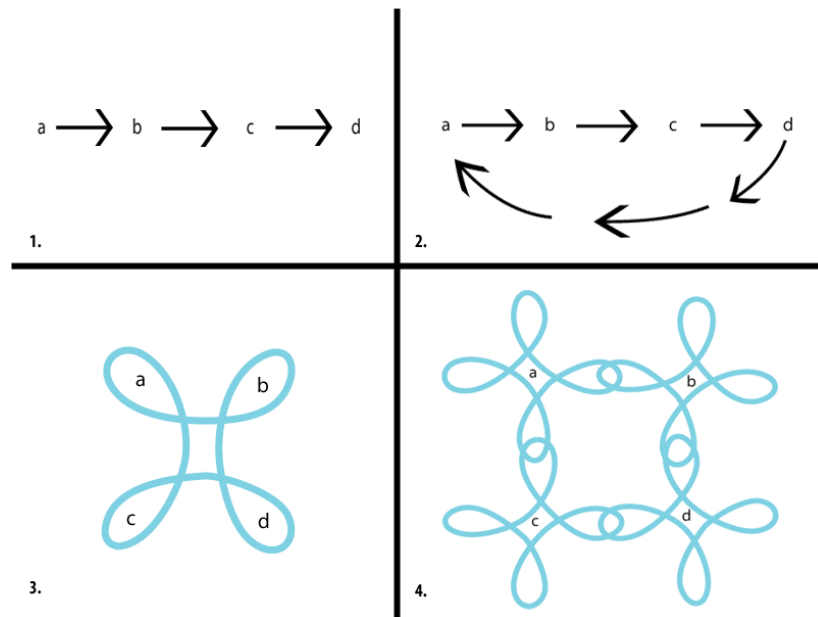

Figure 2. Models of change.
[Click for a short presentation further exploring these models.]

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[2] The size of the rooms and the number of desktop computers in our traditional computer classrooms helped physically constrain the first-year composition cap. But that move also limited our technological options in two ways. First, many spaces were too small for desktop computers for 25 students. Second, all spaces restricted the design of our laptop-ready classrooms. Our move toward laptop-ready classrooms was thus shaped by those earlier decisions.

A second aspect of emergence important to our project was the discovery that any material situation is constituted out of a complex series of co-evolving interdependencies and that change emerges out of those interdependencies. Thus, emergent change cannot be approached progressively or as a series of discrete sequential moves, which is exactly how Kris initially conceptualized the 2005 project. Like any good Newtonian, Kris began the 2005 renovation process thinking—with what she saw as goal-directed efficiency, in clear-cut, cause–effect linear terms—we do this first, then this second, then this third, and so forth, until we reach a final, set teaching situation in every classroom (see Figure 2, box 1). But, as we have described above, this logical, clean, and controllable way of progressing was quickly scuttled at the department level by an unexpected twist: the college could not fund renovation. That required the approval of Facilities, Planning, and Management. As we have said above, the introduction of FPM altered the scope of the renovations. The goal—the vision of the end—thus emerged in response to these unexpected interactions. Through this fortunate scuttling we realized that change results from—evolves from—the interdependencies of the existing situation, and that results are not necessarily what were foreseen at the beginning of the endeavor. We were forced to think of change as a kind of circular process, rather than a linear process (Figure 2, box 2). We would not just complete the steps, go through the various offices and be done. Any one of those offices could send us back to the start and make us revisit our plan. As we continued the process of changing our classrooms, we saw that what seemed to be discrete offices were actually tightly knitted together, part of a looping web where information travels around in various directions (Figure 2, box 3). What happened in one of those offices would affect the others and our interactions with the others. When we widened our view, we began to see that each office was already part of its own web with its own stakeholders and twisty paths of change (Figure 2, box 4).

Thus, although writing program directors, writing center directors, and coordinators might set goals marked by distinct ideas about where a program and its constellation of units ought to be headed, we found it wise, at the same time, to emerge gradually—and constantly—into change, taking one small, responsive, tentative step at a time, rather than pushing for radical change all at once. This way, our master plan could be altered in response to the push-and-pull of the stochastic. This emergent pattern continued as the project was completed and teachers began to use our reconfigured classrooms. Our serendipitous fall into emergence led us to recognize that working out the technology situation in our laptop classrooms had offered compact solutions with future consequences. And we were ethically bound to address those future consequences. Merely gaining our portable ecology was not enough. We had to consider how to support—how to sustain—the new portable ecology.

SUSTAINING A PORTABLE ECOLOGY

Acquiring space and technology is only part of our Batesonian inflected story, only a part of systemically attuned thinking. Using the space and technology in ways that serve curricular goals—that is, sustaining the portable ecology—is an ongoing, constantly emerging challenge as well. Hardware, software, and technology-rich spaces are not demands or orders that must be followed; rather, they are invitations that must be kept open. As Johndan Johnson-Eilola (2005) pointed out, technology does not dictate to or shape its users; rather, users, within a certain set of affordances, use the technology to enact their own agendas, or their lack of agendas. Thus, providing these laptop-ready classrooms—the environment—did not ensure that the new media pedagogy would survive as we envisioned. What was necessary to sustain our portable ecology was to provide support within the larger context of the Writing program. In fact, Bateson (1991) would argue that this was a moral imperative: "to try to alter any

variable in a homeostatic system without awareness of the supporting homeostasis must always be shortsighted and perhaps immoral" (p. 254).[3]

Once created, the laptop classrooms needed to be inhabited by students and teachers committed to and informed about new media composition. Bateson (1972/1987) noted that ecologies can survive—for some period of time, at least—with relative constancy. This sort of survival of a larger system is maintained by changes in the constituent subsystems. The relative constancy—the survival—of the relationship between animals and grass is maintained by changes in both relata. But any adaptive change in either of the relata, if uncorrected by some change in the other, will always jeopardize the relationship between them.

To support the technological adaptations we made to create our portable ecology, we also had to make analogous changes in the several other "constituent subsystems" affected by the curricular changes. Wanting our portable ecology to survive (and thrive), we knew we had to have the commitment of Writing program faculty and students. So we tried to gain this cooperation by changing the types of support we offered them, both by creating a Laptop Classroom Coordinator and by designing a Writing Center that could foster student functional and rhetorical literacies.

### Supporting Teachers: Emerging into Laptop Classrooms

Funded out of the Writing program budget, the Laptop Classroom Coordinator was charged both with addressing technological fiascoes in our new and developing classrooms and with helping the Writing program faculty adapt to their new environment. Fred, who began doing this work as the first Laptop Classroom Coordinator, saw the position evolve into Writing program Assistant Director for Technology, and when, in summer 2008, he resigned from the position, the department saw fit to appoint a replacement, signaling the demonstrated importance of this role. In his support efforts, Fred was guided by the dictum of flexibility: How could our new facilities and equipment be adapted to serve the teaching styles and needs of the most possible teachers?

Steve Jobs (1990), Apple's CEO, famously suggested that a good computer should be a "bicycle for our minds," amplifying our mental efforts the way a bicycle amplifies the physical efforts of its rider. That metaphor vividly suggests the importance of ecological thinking for administrators putting technology in the hands of teachers. Will the technology amplify the efforts of these teachers? Or will it get in the way? Will it sustain what is working and valuable in their present teaching, or will it require them to create a new teaching style (and abruptly abandon the old)? Will the effort required to learn the technology pay off in practical teaching benefits? And if the technology does amplify the efforts of teachers, how will that amplification

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[3] Reynolds (1998) also implies a moral imperative in considering the material conditions for non-tenure-track faculty. She suggests that "given the complexity of trying to make concrete or measurable changes, it seems one way to improve the status of non-tenure track faculty in composition is to examine closely the spaces in which we ask them to work, the condition of those spaces, and the assumptions about time and space that control workers' daily environments" (p. 31). First-year writing at Ball State is predominantly taught by non-tenure-track faculty, who, up until the laptop classroom renovations, were allotted one, often old, desktop computer per office (two faculty members per office). The laptop classroom renovations allowed us to get new computers to writing program faculty that they could use in their offices, classrooms, or homes.

change the work they do? As teachers ourselves, we knew from the start that our decisions had to be governed not by what teachers in the department *might* do with technology and teaching spaces but, instead, by what they most likely *would* do with technology and teaching spaces, given not only the natural limits on their time and energy but also their individual preferences as teachers. We needed to make sure that our new laptop-ready rooms, though novel, would feel like a naturally emerging development in the ecology of our program, rather than a sudden, terrain-wrecking cataclysm, and we hoped, also, that our solutions might help teachers in our program to emerge—gradually and naturally—from the present ecology as they discovered unanticipated ways to make use of our portable ecology.

In addition to trying to make initial equipment choices that would both sustain our current teaching and encourage emergence into new teaching paradigms, Fred began a series of efforts to spread news of teaching with laptops. He took advantage of our Writing program's existing series of faculty workshops and its annual orientation, which for years have been our most effective means for creating colleague-to-colleague interaction and information exchange, supporting, for example, our earlier move to the Blackboard course-management system and our push to have every writing program faculty member create a course Web site. Fred also stayed in contact with our pool of laptop classroom teachers through emails addressing both practical issues—like how to manage mundane computer maintenance—and general news about laptops and education. All of those emails were archived at a blog, where they could easily be accessed, and their occasional appearance served as a reminder (another bit of news of difference) that the Writing program was committed to supporting the laptop classrooms and the teachers making use of them. Fred also set up a help Web site using much the same philosophy we had used in our convertible notebook decision (see Figures 3a and 3b; Johnson, 2006). Tabs across the top of the page linked to various kinds of help information, with the tabs to the left linking to information about the most basic convertible notebook applications (e.g., for inking and annotation), and tabs further to the right suggesting less traditional applications with laptop classroom potential. Those who wanted to experiment and innovate could choose to learn more; those not interested in innovating did not have to dig deep until or unless they wanted to do so.
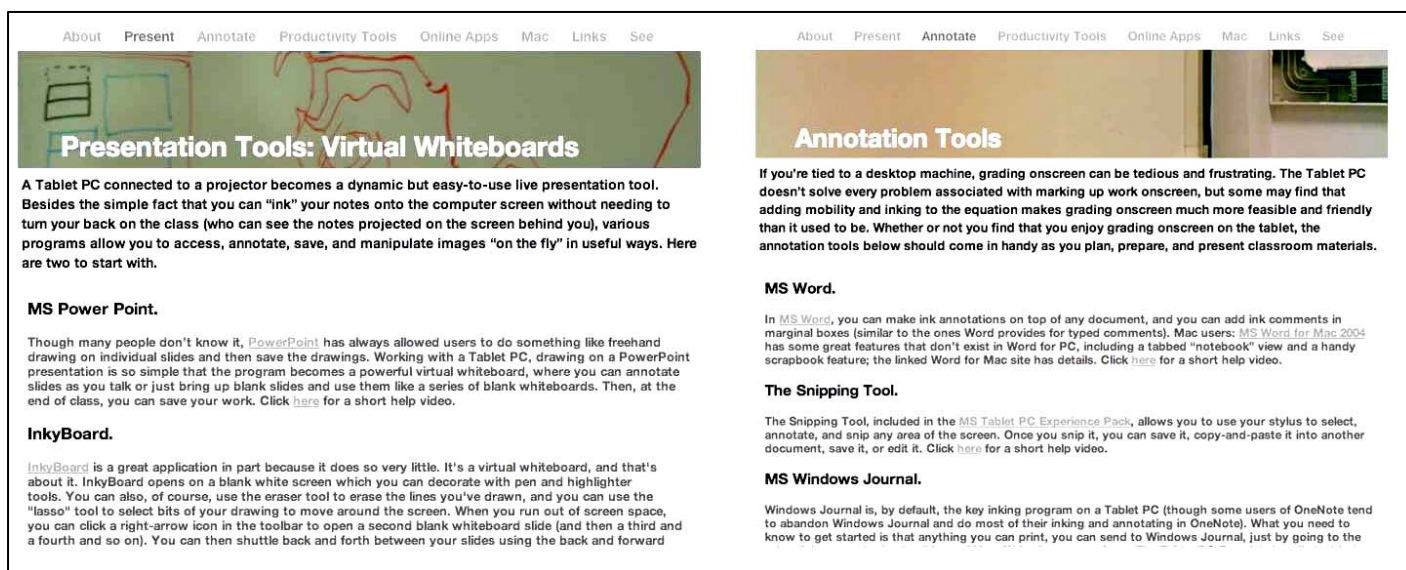
Figures 3a and 3b. Screen captures of Fred's original help site.

Sustaining our portable ecology has triggered compensatory changes both in our portable ecology itself and in our older desktop classrooms. Fred saw that a natural next move would be to make laptop hookups available in all of our traditional desktop computer-based classrooms. Such a move would both amplify the usefulness of all our new laptops and allow faculty members to have a more consistent teaching experience from classroom to classroom. When Fred investigated the possibilities, he discovered that nearly all of our classrooms already contained hookups for laptops, but installed in such a way that few realized the hookups were there and, even for those who knew, plugging in meant coping with a bewildering snarl of cables. This situation was, certainly, another instance where news of difference had not been spread, resulting in faculty members not knowing what the classrooms could do and that the folks maintaining the classrooms did not know about the practical difficulties that made their upgrades useless for the many teachers who had only a few seconds to spare for wrangling with technology at the start of class. Here, sustainability relies on news of difference flowing inside the department, outside, and in between. And sustainability relies on constantly looking for the next small, logical step, so that—in the context of the complex web—there is continual feedback, clarification, and course correction. Without this flow of information, the ecology cannot be sustained.

Moving forward, we have begun the process of rebuilding our teacher stations for quick, hassle-free laptop access and for greater ease of use in general. We have also begun to plan the addition of laptop hookups for teachers in all of our departmental classrooms, even the ones that will not be converted into fully laptop-ready spaces with plugs and ports for every student. These other classroom spaces were designed in the 1980s for classes of no more than 30 students, and there is no room for a typical computer teacher station in them, something that has made their ecology seem unchangeable for years. But our experiments with laptop classrooms have taught us to successfully incorporate projectors, video players, document cameras, and laptop hookups in small spaces; now we have a sensible, natural, low-budget way to give these rooms an upgrade. That upgrade will allow teachers to employ technology without lugging equipment from floor-to-floor, and, once again, it will amplify the usefulness of our present pool of teacher laptops. It will no doubt take several years, moving in small steps, to add technology to every teaching space in the department, but slow, steady, significant progress is good. It gives us a chance to adjust our focus between bouts of renovation, tweaking our designs and responding to the responses of our teachers as one adjustment or innovation leads naturally to another.

Supporting Students: Toward Functional, Rhetorical, and Critical Literacy

Although we recognized that first-year writing curriculum should evolve as time goes on, we did want our focus on new media composing to survive with relative constancy for at least a few years. However, as soon as we began to discuss new media composing with Writing program faculty at Writing Committee meetings, different faculty members voiced two primary concerns about students. First, students, they worried, would not have or know how to use the technology necessary to create new media texts. And, second, teachers feared that students would not understand that composing in new media was something significantly different than sticking a picture into an otherwise "regular" paper. In other words, students needed support understanding the capabilities of technology—a functional literacy—and needed to understand when and why to compose in new media—a rhetorical and critical literacy (Selber, 2004). These were valid concerns based on the changes we were asking teachers and students to make, concerns we had to address if we hoped to have the curriculum enacted in the classroom.

One way that we help students with their technology questions is by teaching their Writing program teachers how to tap into the various sites of support available on campus—its own

complex web. For example, through Computing Services, Ball State students can get help with their user accounts, set up Web space, get secure server space, and make appointments for one-on-one help with their computers through a service called TechTime. Online, students can get help through Web-based tutorials, product and program manuals, tip sheets, and email advice. Additionally, because all education students must purchase Apple computers, there is an Apple help desk located in the Teachers College to troubleshoot Apple hardware and software issues. The university also has a number of corporate partnerships that permit students to purchase computers and peripherals at a discount and to obtain low-cost (or no cost) software. Currently, for instance, students and faculty can download the latest version of Microsoft Office for free. Further, the library has become a leader in supporting technology use by having top-of-the-line computers loaded with cutting-edge software for designing texts or Web sites, by giving students access to color laser printing for a small fee, and by providing training and support services, with workshops on various software programs and tailor-made workshops for classes.

Practically speaking, this means that instructors in laptop classrooms do not have to know how to solve every software or hardware problem for each student, and it means that the Writing program does not have to require that all students use the same kind of machines as their teachers. Faculty can direct students to the help already available within the university ecology. Additionally, having corporate agreements means that faculty can require students to have Microsoft Office, for instance, knowing that it will not place a financial burden on students. Finally, many faculty take advantage of technology training workshops by having an expert walk students through a digital movie application or podcasting tool; occasionally, faculty require students to work through Web-based tutorials outside of class time. Without this range of resources available to support students, it would be quite difficult for teachers to sustain the new media curriculum, because students would lack basic understanding of the tools at their disposal.

The second concern that faculty had involves what Selber (2004) called rhetorical literacy: knowing enough to be critical about when to use what technology. The concerns of rhetorical literacy are not necessarily addressed in the functional literacy outlets just mentioned. For example, during one class, a trainer came to show students how to use Microsoft Publisher. The trainer walked students through a number of types of documents (flyers, brochures, and so forth) and had students create practice documents using Publisher's built-in template collection. The trainer did not talk with students about making rhetorical choices among types of texts or the implications of making such choices; she talked in terms of shortcuts and expediency. In other words, the trainers are quite good at showing students how to use a program, but not as effective at helping students decide when to use which program or which features in a program to meet a particular rhetorical end.

Writing program faculty were astute in realizing that students needed readers who could respond to multimodal writing outside of the classroom, too. Luckily, through its own twisting path towards transformation, the Writing Center co-emerged as a site of support for composition students working on new media writing. Back in 2003, Jackie was hired as the first tenure-line faculty director of the Writing Center. One of Jackie's first objectives was to get the Center equipped with reliable, current technologies to improve recordkeeping and tutoring capabilities. With Kris, she composed a formal computer request for both hardware and software that would improve the pedagogical and administrative work in the Writing Center. The request included new computers with large monitors for on-screen tutoring, software to replace the paper and pencil databases and appointment books, and software to create and maintain an improved Writing Center Web site. After a few small setbacks and, of course, delays, the Writing Center was granted over $10,000 in hardware and software.

In 2004, once the technology was in place, Jackie began to train tutors to work with students on multimodal texts. This training, similar to the workshops later offered to the Writing program faculty, taught tutors to talk with students about rhetorical issues of design. In particular, tutors were taught elements of design from the ever-useful *Non-Designer's Design Book* (Williams, 1994) and learned how multiple modes can be combined to different effects based on Karen Schriver's (1997) schema in *Dynamics in Document Design*. Tutors practiced offering feedback to texts written in multiple modes, which required them to learn to "read" the other modes at work. Tutors also practiced giving recommendations on texts written primarily in one mode (e.g., written) or medium (e.g., paper) where an idea might be better expressed incorporating a visual element (e.g., image, graph, timeline) or using a different medium. Months later, when proposed writing program changes had faculty buzzing with anxiety about teaching new media composing, we were able to assure instructors that the Writing Center staff was trained and the center was equipped to help their students—a fortunate moment of co-emergence.

Some scholars in Writing Center work, most notably Michael Pemberton (2003), suggest that writing centers might focus on what they know best (old media) and leave new media to someone else. But having a Writing Center that works rhetorically with new media texts is important for the campus community and especially important in helping sustain the new media curriculum in Ball State's writing program. As an added plus, the transformation of the Writing Center from a place that worked only in pencil and paper, only on traditional "papers," to a Center that works on-screen and online allowed it to further integrate itself into the ecology of writing at Ball State. Whereas the Writing Center was once a bit distant from the writing program—the Writing Center director was not on the Writing Committee, the Writing Center did not get technology upgrades along with the writing classrooms—the Writing Center is now richly connected to the writing program. Its connections to the writing program mission are now more apparent to all parties, which gives the Writing Center a better position to work from for its continual evolution.

DEUTERO-LEARNING: THE CONTEXT OF CONTEXTS

An organism in its environment is, by nature, unique, operating by its own set of rules to survive and adapt to its environment. However, Bateson (1972/1987) argued that what organisms learn to do or be in one context to survive can also apply in other contexts. He claimed that we suss out the "rules" that guide behavior in a particular situation and act in response to those discoveries to survive, if not flourish, in that situation. An experimental subject, Bateson pointed out, "not only solves the problems set him by the experimenter, where each solving is a piece of simple learning; but, more than this, he becomes more and more skilled in the solving of problems" (p. 166). He coined the term *deutero-learning* to refer to learning not in a context but, instead, *about* contexts.[4] On the basis of one classroom, students begin to extend those lessons—they generalize—about all classrooms.[5]

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[4] Likewise, Norgaard (2004) noted that although we participate in the fiction of a "fresh" classroom each time we begin a new semester, "the classroom has, beneath its surface, vertical strata of institutional and pedagogical sedimentation and horizontal networks of connections that remember for us, that structure teaching and learning even as we hold dear to the fiction that we teach and learn afresh" (p. 155).

[5] Bateson (1972/1987) also revised deutero-learning to *trito-learning*: "the changes whereby an individual comes to expect his world to be structured in one way rather than another" (p. 249). First-level learning is perception of and response to a signal (such as a student's recognition of a teacher's call for attention); second-level learning is response to a kind of

We end this chapter with a bit of deutero-learning, extending to other contexts the ecological thinking that helped us in our goals. We offer three suggestions for thinking about technological change in a writing program that addresses from various perspectives the intertwining loops of technological change, institutional dynamics, and writing program pedagogy.

First, **think spatially**. Michel Foucault (1986) noted that

> we are in the epoch of juxtaposition, the epoch of the near and far, of the side-by-side, of the dispersed. We are at a moment, I believe, when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein. (p. 22)

Because any change is situated within a complex web, innovators have to think in terms of a network, and this kind of thinking is important both for getting a change approved and for supporting that change once it has been effected. For instance, thinking spatially is absolutely essential to herding a change through the institutional body. It is not enough to think in terms of "two classrooms for the writing program" and "two more classrooms for the writing program"; that kind of thinking left us in fall 2005 with two unfurnished classrooms and more than 25 sections of composition to relocate. Instead, change requires the simultaneous activities of individuals and institutional units spread throughout the campus. Those units become a network as they work together and exchange information, and they will exist as an ecology only as long as they remain united by that flow of information. In addition, supporting change requires the same spatial thinking; it cannot be limited solely to two or four new classrooms, but, rather, requires a change in the spatial web of classrooms. Change must be diffused throughout the entire array of constitutive loops, or it can neither emerge nor be sustained. To be viable, the ecology must be perceived as a network of interdependent processes.

Second, **think rhetorically**. The discovery we made about the importance of information as differences that make a difference led us to reaffirm the importance of thinking rhetorically throughout the entire process. As scholars trained in rhetoric, we acknowledge that this dictum is ostensibly self-evident. Kris, Jackie, and Fred each knew that effecting change through language relies on the rhetor's sensitivity to the agendas of diverse audiences in their particular situations. It was a crucial component in Kris's draft of the original technology proposal. But thinking rhetorically is important not just for eliciting change but also for effecting change. This was Kris's discovery in her 2005 efforts; she had to consider the existence of diverse audiences and the particularities of their unique situations in rhetorical terms. She had to learn how to think like her audiences and simultaneously devise strategies to help her audiences think like writing teachers. In addition, thinking rhetorically bound us to the ethical implications of our rhetorical actions. By bringing about change, we were responsible for the consequences of those changes because we, too, were part of the ecology of that change. We were organisms in the environment who would be altered by our own renovations. Therefore, we had to commit ourselves to ensuring not only the health of the portable ecology but also the health of the larger matrix from which that ecology emerged.

Third, **think temporally**. A temporal attitude has two aspects: the *when* of change and the *how* of change. The rhetorical concept of *kairos* helps us with the when of change; *kairos*, or

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activity (such as a student's response to a teacher's request to memorize a list of prepositions); third-level learning results when students derive a generalization based on a category of activities (for instance, the belief that learning consists of memorization). Bateson also held out the hope for fourth-level learning: learning to change the generalizations that structure one's expectations and behaviors.

timeliness—choosing the right moment for speaking to an issue—requires that we consider change as always already embedded in a complex web. The kairotic moments of change are dependent on the dynamic interactions of participants in that web. Those interactions continually realign, and the possibility of change is linked to—indeed, arises out of—those alignments. Thus, as *kairos* teaches us, we must be timely; we must recognize the best moment to jump. In addition to recognizing such moments, the dictum of timeliness implicates the *how* of change. As Bateson (1979) warned us, "what is good for a short time (the symptomatic cure) may be addictive or lethal over long time" (p. 148). Emergent change requires us to think temporally along a short- and long-term continuum, both in terms of the immediate goals for renovation and the long-term results of that renovation. A key element of emergent change is the potential for small changes to have large effects. So it is incumbent upon renovators to think of time as folding back on itself. For example, the first renovation, a small change, really, in the ecology of the English department and seemingly isolated to the writing program, initiated a minor tsunami of change, for literature folks using archaic portable technology (i.e., a tech cart that they dragged from classroom to classroom, frequently between floors) have embraced the idea of just such portability. They were integrated into the 2006 innovations in such a way that the classrooms no longer are perceived as writing program spaces but as English department spaces, a shift in perception that also has consequences for the university technology initiative. Small changes have large consequences.

Bateson (1979) argued that change must "fit the organism's [here, the writing program's] internal demands for coherence, and it must fit the external requirements of environment" (p. 144), because change is always about relationships. Thus, the suggestions and the stories we offer do not dictate particular steps to initiate and follow. Instead, they provide an entry point into contextual thinking, into a double requirement of coherence and flexibility. Based on our experiences with transforming classrooms, writing program pedagogy, and writing center protocols, we found such thinking essential to gaining and sustaining our portable ecology. Contextual thinking implicates not only what we might envision as a viable change but also what strategies we might employ to achieve (and carry out) that change. Bateson cautioned us that if we wish to live in a sustainable natural environment—if we wish to survive as a species without destroying the physical world that supports that survival—then we need to think in this new ecological way. The three of us believe that this orientation is also crucial to the evolution and sustainability of a new media rich, technologically oriented writing program.

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