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In our part of Nevada, there is a wind they call "the Washoe Zephyr." Every afternoon at two o'clock, a breeze springs up in the valley that lies between Carson City and Reno. It quickly whips up gusts of thirty or forty miles an hour, and it regularly topples trailers and camper buses that ignore travel advisory signs posted at either end of the valley on highway 395.

The Washoe Zephyr is not something recent in these parts, not a byproduct of global warming or the greenhouse effect. Mark Twain experienced and wrote about it during his stay in Nevada. Having witnessed a shooting (an everyday occurence in the territorial capital of Carson City according to Twain), he then wrote: "That was all we saw that day, for it was two o'clock, now, and according to custom, the daily 'Washoe Zephyr' set in; a soaring dust-drift about the size of the United States set up edgewise came with it, and the capital of Nevada Territory disappeared from view" (179).

In education, we seldom experience winds of change as predictable as the Washoe Zephyr. Our winds are more like those of Candlestick Park in San Francisco, where erratic breezes come up so fast they can change the direction of a pitch between the time it leaves the mound and before it arrives at home plate. In education, one year "accountability" is all the big gust; the next year we're puffing about "site based management." One decade "vocational education" is blowing strong; in the next, "cultural illiteracy" or "outcomes based education" are the whirlwinds. We talk about that mythical "pendulum" that swings back and forth, but much educational change is less like clockwork than it is like trying to play catch at Candlestick Park or to boss a flat-sided eighteen wheeler through Washoe Valley, Nevada after two in the afternoon.

Yet, despite the fickle winds of educational fashion, as the two of us have discussed the history of American education from roughly Mark Twain's time to our own, we do see some steady winds blowing. If one looks at the writings of some of the early progressives — Horace Mann, Francis Parker, Gertrude Buck, Samuel Thurber, and, of course, John Dewey — and if one compares the teachings of some of the twentieth century intellectual leaders in our profession, James Britton, James Moffett, Louise Rosenblatt, Jerome Bruner, Suzanne Langer, Ann Berthoff, and others, one can sense a steady breeze a–blowin'. (See in particular Applebee, 1974; Berthoff, 1982; Tchudi [Judy], 1967).

In our own discussions of pedagogy and other matters of the world, we have come to see that the prevailing winds are in the direction of interdisciplinary, holistic, student–centered, developmentally–guided teaching that is inquiry–based, reflecting the constructivist nature of learning, and firmly rooted in an understanding of the role language plays in perceiving one's world, thinking about it analytically and intuitively, and communicating one's understanding of that world to a community of fellow learners. The interdisciplinary nature of our discussions has reshaped our perceptions and led us to new understandings and new questions about things we had taken for granted: the sources of our knowing, for instance. We learned from one another in a powerful way, and this was the experience we wanted to share with students.

These experiences and the shared understandings of the nature of thought and learning brought us together to teach in the PACE program at the University of Nevada, Reno: the Program for Adult College Education. PACE was created to offer an undergraduate degree for adult learners who work full time. Its courses are taught either in the evenings or (as in our case) through intensive weekend blocks. As a matter of practicality and pedagogy, PACE has become interdisciplinary: Because most of the students need to take two courses a term, courses from different disciplines are paired, sometimes in a mere marriage of convenience where courses share a room and a meeting schedule, or, sometimes, as with us, in a genuinely interdisciplinary effort.

PACE offered us a laboratory to test out some of our ideas about holistic, interdisciplinary learning. We linked a course in English to one in Curriculum and Instruction. We have literally forgotten the titles of the original courses, since we largely ignored the catalog descriptions in order to create a new course: "Exploring the Unknown." We intended to explore the nature of inquiry itself —how it is that people figure out unfamiliar phenomena for themselves. (See also Tchudi, 1990.) The aim was to seek answers to questions like the following:

- When faced with the unfamiliar or something which defies easy explanation, how do people respond?
- How do they interpret and learn from new phenomena?
- What does it mean to "learn" from experience?
- How is the unfamiliar turned into something we call knowledge?
- Where have people arrived when they have *come to know?* (This loaded minuscule question really asks the blockbuster: "What is the nature of knowledge?")
- How does one know *when* or *if* he or she has arrived? (Another blockbuster: "When does tentativeness or certainty replace doubt?)

Our aim for our students was to have them develop an increased awareness of the thought processes they employ to make sense of the world, to analyze their own learning styles, and to inquire into the nature of the information and resources they rely upon to make sense of things. At the same time, while developing and contending with the ramifications of this awareness, they would be engaged in an exploration of a research question of their own design. Understanding how they come to their answers would be as important a result as the answers themselves.

The twenty students in the course were predictably and unpredictably varied. Among them were a legal secretary, a children's librarian, a hospital technician who was also a part-time computer whiz and part-time astronomer, a semi-professional archaeologist who paid her bills by teaching in the Job Corps, a woman who was schooling her children at home, and an old guy who had been working on his bachelor's degree for twenty or thirty years and who had no intention of finishing it, not as long as the university offered new courses for him to take. Some of the students were attracted by our course description; many showed up because it was the only PACE offering that fit their schedules of job, home, and school.

This was an unusual assemblage for a university course, but a perfectly wonderful group to demonstrate the constructivist tendencies of learners, the effect of life experiences on the meanings people derive from their encounters with the world. The diversity of backgrounds led to a range of perceptions and predilections that fueled heated discussions of the kind we had hoped for: Our students and we were seeing the same things differently, and this continuously fed the question of where "reality" might "really" reside, of how we know that we actually do know.

After the usual introduction we plunged into a series of activities intended to strategically interfere with intellectual complacency. We played these games of the mind for sixteen contact hours each weekend over the four weekends of the course in February, March, April, and May. We deliberately made the course something of a kaleidoscope, not always linking every activity to our course theme, but regularly coming back to the question of what each experience meant in relation to the question "What does this tell us about how people know?" At the risk of seeming eclectic we will only briefly describe some of the major organized course activities.

Early on we played Tchudi's "Interdisciplinary Nontrivial Pursuit" game (1984), where people design questions on what they regard as significant issues, not the trivia of the *Jeopardy* sort. The purpose of the game is to determine what people think is *worth* knowing and what others know about these worthy items. The observation that arises is that the questions one person understands to be *essential* often hold less value for others, and that others possess questions that we have never thought to ask, but become *essential* to us once posed. Thus we concluded that human interactions often redefine our universe by allowing others to pose for us questions that lead us into new realms of the unknown. In the

same vein, another activity titled "Some Questions Worth Asking" forced us to consider current issues and problems facing humankind and to boldly determine which are the most important questions humanity needs to be asking.

"The Pleasure of Proving Things Wrong" asked students to take widely held but unquestioned truths and to prove them wrong, e.g., "The world is round"; "The sun rises in the east and sets in the west"; "Ghosts do not exist"; "The sun will rise tomorrow"; "School makes people wiser." Of course, the students immediately objected that some of these truisms were not widely accepted at all. One of our students held out strongly for not only the possibility for ghosts, but for the veracity of the whole parapsychological world, a topic she later chose to explore for her term project. Others, including our student who was educating her own kids at home, expressed doubt about the equating of school with intelligence. And the "truth" about the sun depends on what you mean by "rise." Reality, we had begun to prove to ourselves, is a slippery (and often idiosyncratically contrived) entity.

For "Mapping the Unknown," we blindfolded the students and asked them to create a map of an unfamiliar area of campus by "dead reckoning" — what you bump into and where it seems to be are relative to your starting point, the blindfold helping them to "visualize" how early explorers must have felt when they were probing the unknown.

We played several games with information. In "History in the Making," students read *that morning's* newspaper, speculated about which current issues are truly history making and which will wind up in the ash can of history along with today's newspaper. This activity launched students on starting and maintaining a clipping file on current issues, a survey of the unpredictability of world affairs and the difficulty with making historical predictions.

The use of the newspaper also became closely tied to "Campaign '92," which was progressing through the presidential primaries as we met. Continuing our theme of understanding history in the making, and adapting an idea we heard about from a colleague, we issued stock certificates in the then candidates for the presidency of the United States, including such now–fallen warriors as Patrick Buchanan, Ross Perot, and George Bush. Students bartered their shares of stock at each monthly gathering of the class, basing their trades on their knowledge and best predictions of the historical evolution of the campaign. At the time, few stockpiled shares in Bill Clinton.

The "Intellectual Scavenger Hunt" took us to the university library, where a particularly knowledgeable librarian showed us that a factor in knowing what we know is making choices as to what we can allow ourselves to know about. She introduced us to the use of the computer for tapping into topic upon topic and the piles of information that accompany each. One cannot know how much one doesn't know until one knows how many things exist to know about!

We read and discussed Phillip and Phyllis Morrison's book *The Ring of Truth* (1987), which grew from the PBS series of the same title. In it, two inquiring minds explain how science "discovers" things, puzzles ranging from the geocentric universe to how it is that bicyclists stay so skinny. It brilliantly discusses the nature of inquiry, certainty, and doubt in science, with concrete examples that are understandable by the non-specialist. We also looked at excerpts from Stephen Jay Gould's *The Mismeasure of Man* (1981), in which the author describes how science, over the centuries, has worked to describe the nature of human intelligence. In doing so, Gould demonstrates how false or misapplied science can convincingly prove as absolutely true that which is not. We reviewed some of the ideas from Darrell Huff's classic, *How to Lie with Statistics* (1954), as well, and spent some time discussing Lakoff and Johnson's *Metaphors We Live By* (1988) as a way of exploring how metaphors or schema affect how we perceive the truth.

Following up on our discussion of knowing in the sciences, we took our students to the Fleishman Planetarium on the University of Nevada campus to be briefed on "what's in the universe." One of the Planetarium's directors not only showed us the stars, but helped us understand the ways in which astronomers use telescopes, radio telescopes, inference, cleverness, and a whole lot of mathematics to create such theories as "The Big Bang." If a new telescope allows us to see things that could never be seen before, does this mean that the reality that existed before its introduction was an invalid reality? Will new or future astronomical tools invalidate our reality sooner or later? And what does this say about any conception of reality we might hold at any moment?

A second field trip took us to a science classroom in the College of Education where Dr. Ken Johns, a professor who specializes in spectacular and magical science demonstrations — great bursts of flame, magnetic curiosities, eggs squeezed through the necks of bottles — which can be understood if one is willing to stop believ-

ing one's eyes and begin using intellect, inference, and deduction.

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We also followed up on our discussions of the nature of knowing in history and the social sciences with a field trip to the Nevada Historical Society. There we learned how scholars make sense of artifacts, how they use these pieces of the past — old bottles and barbed wire and maps and old newspapers and diaries — to reconstruct "the" past and thus to create a version of the "truth." (Whether we are describing "the" past or "a" past obviously becomes the important question.)

As we were pursuing the truth about the truth through the various sciences, we were also getting a different kind of perspective from the two novels we were reading, Phillip K. Dick's science fiction classic *Time Out of Joint* (1959), and Toni Morrison's *Beloved* (1987), a powerful story about the effects of slavery on the lives of people who presumably escaped from it. The Dick book led us into a discussion of conceptual and constructed universes. "Every fool has his paradise," the cliche rightly tells us, and it could be that, like the central character in Dick's novel, we are all living in a universe of knowledge and culture that we didn't create. Who pulls the strings—creates the statistics, assembles the facts and the artifacts that tell us what our lives are about? In working with Toni Morrison's book, we asked our students to use their powers of imagination to see whether or not they — white and 20th century — could, in fact, imagine the universe of Morrison's characters.

While all this was going on over the four weekends (please remember, readers, that we were filling up *sixteen* hours of class time on weekends — our commitment to active learning was not merely pedagogical; it was essential to keep people awake), we had students beginning a search for questions they wanted to answer for themselves. That is, we wanted them to move from *thinking about* learning and the construction of knowledge into *creating knowledge* for themselves, an interesting proposition, we thought, considering the doubts we were deliberately trying to generate in our students' view of

"the truth." Our question to them was "What do you think is important enough that you want to spend some serious time thinking and learning about it?"

The topics chosen were as diverse as our students. Marianne was interested in getting some of her writing published and looked into avenues open to the free lancer. Ginger wanted to do historical research into Skedaddle Dam, a northern California dam that had burst in the late nineteenth century and now remains only as a sagebrush mound in the desert. Brenda, a nurse at a local hospital, decided to look into why AIDS instruction was proving ineffectual with minority gang members. Javier, our astronomer/computer scientist, wanted to look at nothing less significant than the origins of the universe; he had significant reservations about the validity of the "Big Bang" theory.

For this research, we put a spin on Ken Macrorie's "I-search" method (1988), combining it with a form of portfolio assessment. Students were to maintain a course notebook or portfolio filled with the various materials they obtained in their research: notes on reading, interview notes and tapes, videos, pamphlets and brochures from public agencies, posters, and any other "data" that is related to the project and the course. (The portfolio quickly required a storage box for most of our students.) From time to time students would sort through the portfolio/notebook/carton, label its contents, and write progress reports and self assessments of their work.

We asked each student to synthesize his or her learning in two ways: through a paper (which could be a conventional academic paper or imaginative paper) and by means of a presentation to the group, in which they were to work with various media to best present their learning.

The presentations, done during a marathon final weekend for the course, were a highlight. Don, who works for the California Forestry Department, brought in slices of Sierra pines to help us understand how scientists are using the width of tree rings and records of more recent climatic history to determine cycles of drought and wetness through antiquity. Jan showed us slides of tree carvings — graffiti, in a sense — done by lonely Basque shepherds in the mountains and related this to her study of life in Nevada during the early part of this century. Ellen presented a series of poems and chants she had written as a way of exploring the Wintu Indians of Washington State, her ancient ancestors.

Perhaps the most dramatic presentation, and one that best demonstrated the aims of our course, was done by C.C. (that's what she calls

herself), a children's librarian. Her unlikely project topic was "The English Foxhunt," triggered by a childhood spent in England and a romantic oil portrait of a foxhunt that presently hangs in her home. C.C. wanted to discover her roots and did considerable research into the history of foxhunting, particularly its social and humanitarian implications, including interviews with Nevada foxhunters (We hadn't known there were such people in Nevada!).

She began her presentation by having us sit in a circle on the floor while she, librarian fashion, read to us from some children's stories about foxes. She helped us see that in older books, foxes are often portrayed as sly and "foxy," where more modern children's authors recognize that foxes are simply *animals*, doing their best to get along in the world, with many qualities that humans find admirable in wildlife that has been portrayed more positively in literature. C.C. went on to opine that the negative portrayal of foxes may well be a result of the English need to defend their patrician bloodsport, and her presentation then became an indictment of foxhunting and a discussion of how the painting on her wall has changed in its meaning for her. "I will still keep that painting on the wall," she told us, "but I will never look on it in the same way."

"What do you think is important enough that you want to spend some serious time thinking and learning about it?"

That last phrase neatly sums up our aims for the course and the reactions of many of our students. Herman (who did an investigation into the aims of liberal education in contrast to extant university curricula, a suitable project for his last semester at our university) wrote: "How do we know that the articles we read, speeches we hear, or pictures we see are really expressing the truth? Maybe we have actually experienced a situation, therefore knowing it to be true, but sometimes we have to rely on our perceptions and our own personal knowledge in order to reach some conclusion. This conclusion may be accurate or it may not. We may perceive things from the use of our senses to be one way, but in reality they are different."

The students, echoing Herman's thoughts, actually accused us of trying to turn the whole class into a bunch of cynics and "doubting Thomases." We protested and told them we hoped that our venture into "exploring the unknown" had helped them sharpen their critical senses, and we explained to them (as we have at the beginning of this paper) our beliefs about the nature of educational and learning processes (Lafer, 1993).

So we ended the course contentedly, but by no means complacently or apathetically. We felt that our course did implement a "winds of change" model, reflecting the most practical manifestation of our teaching philosophy that we could generate under the conditions. Our students had begun to help us answer the questions that we had raised about the nature of knowing, and in doing so, they had allowed us to bring into practice a principle in which we both strongly believed: that students learn best when they learn to teach themselves and become capable of teaching others what they have learned. One can presumably learn from listening to the wise. But determining who is wise and which ideas have credence and are to be acted upon is a more essential act. For this reason, the course tested problematic assumptions that many people in our culture take for granted as being true. Examining the "accepted" quite naturally led to questions of what was true.

We looked forward to teaching in future PACE courses, having found in the program's students a remarkable (but by no means rare) group of dedicated learners. But the winds of change, as we have observed, are subject to gusts and puffs.

The PACE program is now in jeopardy, on the books one week, the victim of budget cuts the next. Some administrators regard it as "a delivery system," that is, a way of providing courses, "not a program" that offers a unique set of experiences for a unique set of learners. And one of our efforts to team teach an interdisciplinary course on "The Language and Lore of Childhood" to English and education undergraduates during the regular academic year was thwarted by bureaucratic red tape over scheduling problems and rejected by a university curriculum committee as "too narrow" (the assumption apparently being that any two unrelated courses taught by any two professors anywhere on campus would somehow give undergraduates more breadth than a carefully planned, interdisciplinary, team-taught course. Such are the "truths" that some people hold.)

So we know it will be a long time before the winds of pedagogy blow steadily in the interdisciplinary directions we see as important. And, as Bob Seeger sings, it's no fun "runnin' against the wind." But when faced with a headwind, sailors (and pedagogues) have several choices. They can change course and run with the wind, wherever

that leads; they can drop sails and drift onto the rocks of educationism or the paradise of retirement; or they can figure out how to tack into the wind to get where they're going. It may take longer and there may be considerable zigging and zagging to go upwind, but at least tacking gets one moving toward the real objective.

"[S]tudents learn best when they learn to teach themselves and become capable of teaching others what they have learned"

But even as we stuggle to find interdisciplinary settings within the university, we are attempting to apply what we've learned in all our courses. We have discovered, perhaps to the teachers' surprise, that we can implement many of the same strategies in many different kinds of school and college classes for students of diverse ages, abilities, and interests. So we continue our interdisciplinary work in area middle and senior high schools and work to make our teaching in our own disciplines genuinely inquiry-centered and interdisciplinary.

What we learned from our students in PACE is that as long as there are mysteries in the world and people to think about them, learning will happen.

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