A Different Possibility

You might think that I am overwhelmingly negative about the possibilities for WBI and IT tools. In fact, I am not. I am very concerned about the power of "an education-industrial complex" to control. I am concerned about the number of voices that currently counter this power. I am concerned that the voices attempting to counter this (e.g. see American Association of University Women, 1998, 2000; Apple & Jungck, 1998; Bromley, 1995, 1998; Bromley & Apple, 1998; Bryson & de Castell, 1995, 1997; Garrison & Burton, 1995) are not noticed as much as the voices promoting the power structures.

I am concerned that other voices are dwarfed by the power of money and might. Having written many pages developing a tool and then using that tool to examine WBI, I now seek an alternative possibility for WBI and its source IT tools. After deconstructing WBI, I turn my efforts toward reconstructing it. I develop a new vision of WBI. This vision involves the body, respects nature, provides for students' embodied needs, redistributes power, and acknowledges experience. This vision includes day care, recreation, health care, and the free flow of information. This vision is not an easy way out. It involves hard work and relentless pursuit of new paradigms. In this chapter, I can only point a way not forge the trail**.**

Remember in chapter 1 I promised a sustainable technology, one that was holistic, connected, and contextual. This technology evades the control, certainty, and power of a mechanistic worldview. I seek a technology that fits an organic holistic worldview. Here I speculate on what it will take to achieve such a technology. Some of my suggestions are more developed than others. Some are conjecture and others refined from my years as a programmer and systems analyst. Here again, I consider my weft threads of control of nature, loss of bodies, gendered experience, transactions of bodies, and tools, and organic holism and incorporate them for considering a sustainable technology. My goal is to use my feminist-pragmatic tool and other sources of literature and eventually find my way back to the responsible technology of John

Dewey (Hickman, 1992, pp. 196-203). On the way, I examine a feminist-pedagogy of WBI and other tools that serve my goals of easing the problems represented in Chapter 4.

Sustainable Technology, a Prolegomenon

The first question I would ask a proponent of sustainable technology is what are you trying to sustain. Here I want to sustain a number of things. Thinking again about the projection and reciprocation of technology or put more simply, the social aspects of technology, I want to use technology to sustain social relationships. My image of sustainable technology supports rich concepts of community and contextuality of humanity. Sustainable technology works with and enhances the dynamic equilibrium of organic holism to strengthen the diversity and plasticity of humanity. Sustainable technology encourages the best of human talents such as communication, creativity, action, and reflection. The over arching goal of sustainable technology is meliorism, the use of human action to improve the human condition. Recall how Dewey sees humans living not in an environment but through one. Therefore, if sustainable technology is melioristic it must sustain the environment that courses through us.

In general, sustainability refers to ecosystems. For instance, the Oxford English defines sustainability as "… management of both individual wild species and ecosystems..is critical to human welfare" (Oxford English Dictionary, 1992) and sustain as "Capable of being upheld or defended; maintainable" (Oxford English Dictionary, 1992). I see the meaning of sustainable technology in two ways. First, it must sustain humanity by preserving ecosystems. Second, it must preserve itself by being compatible with the things that sustain humanity. Think for a moment of other instances of sustainable technology. I am very familiar with one of these, sustainable agriculture. Sustainable agriculture often uses a sophisticated level of knowledge to minimize intrusive technological interventions (e.g. see Plant & Stone, 1991). In a sense it uses one or several technologies, such as computer modelling or computer planning (Buick, Stone, Scheckler, & Roach, 1992; Stone, Buick, Roach, Scheckler, & Rupani, 1992), to save itself from

using other technologies, such as use of herbicides and pesticides. The point is that technology and sustainability are not mutually exclusive. Digital technologies, intelligently and imaginatively used, may be our best hopes for the long-term survival of humanity. I see technology as sustainable when it is contextualized, located, and ecological.

The approach to viewing technology as ecological (Gibson, 1996; Ihde, 1990) places technology in the melieu of the complex transactions between teachers, students, curricula, and other contextual influences. I regard this metaphorically ecological system as affecting our material ecology. I am not alone in my concerns for the effect of education on ecological degradation. In particular C. A. Bowers (Bowers, 1994) and M. Heim (1998) write about this effect with trepidation. As I developed in Chapter 2, John Dewey saw the world as organically holistic. I suggest he would have been comfortable with looking at the tools of WBI in both these ecological ways.

Larry Hickman (2000) recently made predictions about how Dewey would have felt about the Internet. Hickman (2000) says

> He would have applauded the high level of participation it elicits, the access it provides to living issues and alternative ways of conceiving them, and the enhanced opportunities it provides for teacher-student interaction. At the same time, however he would have been concerned about the amount of fragmentary and unsubstantiated material on the Internet, its tendency to honor participation over discrimination, and its potential to further the power of those who already possess it. (p. 1)

With Hickman, I see the tools of WBI as imbued with positive and negative values, as enhancing positive and negative possibilities. It is our task as instructional technologists to promote the positive and minimize the negative. This is complicated by lack of agreement as to what constitutes the desirable and undesirable aspects of IT tools.

A recent American Association of University Women (AAUW) report (2000) gives added insight into women's acceptance of some of the tools of WBI. The executive summary of this report called Tech-Savvy: educating girls in the new computer age (2000) highlights the importance of images of WBI tools. It says what many of us have suspected for a long time,

> Girls have reservations about the computer culture-and with good reason. In its inquiries into gender issues in computers and education, the commission found that girls are concerned about the passivity of their interactions with the computer as a "tool"; they reject the violence, redundancy, and tedium of computer games; and they dislike the narrowly and technically focused programming classes. Too often, these concerns are dismissed as symptoms of anxiety or incompetence that will diminish once girls "catch up" with the technology. The commission sees it differently: In some important ways, the computer culture would do well to catch up with the girls. In other words the girls are pointing to important deficits in the technology and in the culture in which it is embedded that need to be integrated into our general thinking about computer and education. (p. 1)

I concur and I get additional support from the feminist-pragmatic framework. To integrate girls, women, (and other marginalized populations) into the technologies of computers and education, we as instructional technologists must seriously consider changing the culture and the tools. We are not omnipotent and cannot easily affect all layers of the complicated and interacting technologies that compose the tools of WBI. That however doe not give us the freedom to ignore the problems and do what we can do.

I am not arguing for the dismantling of WBI. I am arguing for a model of WBI that keeps it connected to materiality, and that stresses the need for students to have contextualized and situated instruction in whatever mode that instuction is delivered.

Individuality of students and individuality of their educational goals

In terms of the triad of mode, media, and methodology, I mainly focus here on mode and media. This is not to discount the importance of teaching methodology but to recognize that it is very dependent upon and limited by mode and media. All instructional media and modes of delivery are possible when teaching methodology is chosen independently of these issues. However that is seldom the case and certainly not in a discussion of WBI. Some methods of instructional design (Shambaugh & Magliaro, 1997) are process oriented and view the recognizing of media constraints as part of the design process. In my opinion, this is a very reasonable step in ID that accepts the dependencies within this triad (Head, Lockee, & Oliver, Unpublished).

There are a number of caveats to what I say about sustainable technology. The first is to discriminate between different kinds of students and different uses of WBI. A faculty report from the University of Illinois recognized seven contexts for online instruction (1999) discriminating between training, education, continuing education and, graduate education and dividing students between traditional and non-traditional types. In terms of their typology, I limit the rest of this discussion to traditional and non-traditional students involved in education rather than in training .

I also want to differentiate between totally online instruction and use of online technologies as adjunct to other methodologies. There is no doubt that digital technologies are a wonderful adjunct to copresent situations. Use of class list serves, web sites, chat rooms, VR, and computer models are useful if not essential in conjunction with more traditional lectures,

discussions, labs, and field trips. Other authors have noted these advantages (Harasim et al., 1995; Mayberry & Rose, 1999; McCaughey & Burger, 1999; Ruberg et al., 1996; Schank & Cleary, 1995; University of Illinois faculty seminar, 1999). They include encouraging shy students to participate in discussion, requiring more reflection in the writing of discussion responses, giving practice in writing skills, freeing students from time and place restrictions, fostering a different kind of discourse than takes place face to face, allowing more interaction with the teacher, and providing ready access to visual displays.

Concerning totally online instruction, I unequivocally would reserve this for those who have no other means of education. For the rest, students might consider going through quite a bit of inconvenience to obtain an education that is not totally online. Education is a social process, one that requires speaking and listening as well as reading and writing and seeing. From a Deweyan perspective, I claim that the more communication channels engaged the more powerful the educational experience. I also rely on Dewey's notion that the development of an environment for learning motivates the selective interest of students to focus on their growth and development. Recall in Chapter 2 that I discussed Dewey's use of the term "situation" to save us from a spreading holism that knew no bounds. Here I invoke situation not as a bounding feature but as a motivating feature of education. The pedagogical "situation", when it includes means for provoking disequilibrium then guides students' selective interest to growth supporting inquiry.

The process of education involves the embodiment of new habits, emotional responses to disequilibrium and restoration of equilibrium, learning of new speech registers, dialoguing across difference, modeling teachers and other students, and learning by doing. The best education starts in a cultural place of familiarity and expands from there into new paradigms and practices. Occasional online courses will not stymie student growth. A mix of learning paradigms might even be beneficial to many students if for no reason other than demonstrating the value of alternative learning situations. I also take counsel from those who feel that WBI encourages

collaborative work among students (Hiltz, 1997). Let us use WBI to engage multiple communication channels and multiple teaching paradigms.

I note that mature, motivated students, and technologically skillful students will do well in almost any educational situation. WGU recognizes this. It provides an optional online quiz for prospective students assessing maturity, organization skills, and motivation to accomplish online courses. Computer generated results from this quiz counsels students, judged as immature, disorganized, or unmotivated to think about other modes of education. What this quiz and proponents of WBI sometimes neglect is the possibility for mature and dedicated students to achieve even more in different environments than WBI provides. Mature motivated students will succeed almost anywhere but I claim that they will achieve more personal growth in environments that stimulate such growth. TUI recognizes this and provides mature and motivated students with alternative routes to graduate ant undergraduate degrees. We must continue these programs that provide options for place bound adults.

Having said all that, I now make suggestions for what I call sustainable technology in the service of WBI. I believe that adoption of these practices will improve all educational technology, whether mixed with co-present situations or stand-alone. I also focus my comments further to education in biology, a field with which I am very familiar. I shift from talking only about WBI to also discussing its sources, IT tools, and ID. This is a necessary step since I want to talk about some technological alternatives and therefore have to delve below the surface of WBI. Some components below the surface of WBI are IT tools, which both emerge from ID and constrain ID.

Women into Digital Technology

There is a problem of limited perspectives in WBI and the ID and tools of IT that support it. A solution to the problem of limited perspectives is getting more variety in the cultural background of instructional designers. A common approach to getting more women, African-

Americans, or "others" involved in a particular pursuit, as ID, is to recruit these minorities into the field (Eisenhart & Finkel, 1998; Furger, 1998; Hacker, 1990; Orenstein, 1994; Rosser, 1997). This is an important but insufficient step for increasing diversity. I first explain why this is important and then discuss its insufficiency.

Getting more diversity in ID designers is useful because allowing new perspectives into the field will change it in unexpected ways. Recall Dewey's words (Dewey, 1919, p. 45),

> When women who are not mere students of other persons' philosophy set out to write it, we cannot conceive that it will be the same in viewpoint or tenor as that composed from the standpoint of the different masculine experience of things.

Replacing philosophy with ID (or any other discipline) and replacing women with other excluded groups give the result I seek. Recall that Dewey, a neo-Darwinian, saw diversity as a "good", one that buffered populations in times of stress. It follows that ID, use of IT tools, and WBI should encourage diversity. A large problem hindering diversity in these technologies are the rules of programming. These rules are invariant and built upon Boolean logic. [67] The Boolean logic of programming enforces dichotomy in the rules that create IT tools. Fuzzy logic is an example of an attempt to overcome Boolean logic. It is only partially successful (Adam, 1998).

There is no guarantee that a diverse pool of instructional designers will create more varied ID, IT tools, and WBI. There is the danger that indoctrination into the field of ID by means of the usual educational channels serves to dampen individuality and variability so that a

[67] Boolean logic allows only two states, true and false. Therefor, it lends itself to dualistic either/or determinations.

standardized version of a designer results. This is why I suggest a culturally sensitive model of ID in addition to the recruitment of varied students into the field of ID and IT.

As discussed and quoted earlier in this chapter, the American Association of University Women (AAUW) recently released a report addressing this issue (2000). They note that women are severely under-represented in the culture of computing and that girls rather than fearing the computer choose not to participate. AAUW recognized the inadequacy of merely getting more women into computing fields. They make the dual recommendation of recruitment of girls into the computer ”pipeline” **and** the transformation of computer culture. They see these two goals as mutually supportive, a conclusion I heartily support. ID and IT tools are critical to this effort of including more girls and women in technology because these educational technologies are ones experienced in the early lives of many girls. Early impressions are often long lasting. Girls make lasting career decisions in middle school or before (American Association of University Women, 1998; Orenstein, 1994). Technology used in elementary schools must support girls’ needs, desires, and experience. In particular it must not discourage them from becoming the creators of future ID, IT tools, computer science, or any of the other digital technologies that are now so important to education and business.

Increasing diversity in the design of WBI relates to the plurality of my pragmatic ethos. Plurality has many possible instantiations (Bernstein, 1992, p. 335). The one I promote here is an "engaged fallibilistic pluralism" requires responsible listening to others without denying or suppressing their otherness while admitting our own fallibility. In terms of promoting diversity in the field of ID, this supports the AAUW contention that the field must be flexible and changeable in response to new viewpoints. Just admitting women into the field but not incorporating the needs of women is not sufficient toward developing the plurality that AAUW recommends.

Two themes in Chapter 1 were the gendering of technologies and the invisibility of women in computer technologies. A large amount of social research supports the gendering of

computer technologies as male (Adam, 1998; Gill & Grint, 1995; Grint & Woolgar, 1995; Ormrod, 1995). From the viewpoint of WBI and the technologies that support it, I suggest the need to both include diverse viewpoints among the designers. I also encourage designers to use an engaged fallibilistic pluralism, allowing fluidity and diversity into the design process for the tools of WBI.

Balance of Power

I return to the issue of power hierarchies raised in the last section of this chapter and again in the discussion of feminist-pedagogy of WBI. Decentering the power of the classroom is a goal of feminist pedagogies, of feminism, and of organic holism. From a neo-Darwinian perspective that Dewey supported, a sustainable technology must include viewpoints that are not dominant in order to allow survival under adverse conditions. I have already discussed how the rule bound nature of WBI enforces a top down power hierarchy. Ways of evading this power hierarchy include allowing students to amend the web site content, and assigning students as chat room moderators on a revolving basis. Amending web sites might mean giving students the ability to add hypertext links, commentaries, alternative readings, and alternative viewpoints. Feminist pedagogy classrooms often use an abbreviated syllabus (Mayberry & Rees, 1999, p. 197). A syllabus represents and enforces a power hierarchy, making it difficult to share power within the classroom. The rule bound and predetermined nature of WBI makes it difficult to dispense with a syllabus. Students, already separated by time and space, might feel terribly insecure without a class syllabus.

There are other ways to rebalance power within WBI. WIEU encourages users to propose their own courses. Although requiring much effort, this allows the presentation of alternative positions and experimental teaching strategies. I would love to see this feature included in traditional universities along with enthusiastic support for such efforts.

I call your attention to another example of WBI. The Women's International Electronic University (WIEU) acts as a clearinghouse as well as an initiator of WBI courses. Originating from a server at University of West Virginia, it attempts to empower women by allowing them to access and initiate WBI courses. WIEU recognizes the place boundedness and inaccessibility to education that limits women's possibilities. I particularly applaud its attempt to de-center the authority of education, a real contrast to the top down rule driven operation of most online institutions. Reviewing the web site of WIEU, I do not see any evidence of wide ranging success or vigor. I can only guess at the reasons that it is floundering. I suspect that it does not reach the women most in need of education in the international realm. These women, in rural areas of Africa, Asia, and North and South America, and in sub-Saharan Africa do not have access to the technology and skills that WBI requires. These women, some very poor and some illiterate, require situated education and resources way beyond the scope that WIEU seems able to deliver.

In Chapter 1, there were strong images of power, certainty, and control. WBI tools that control, standardize and observe are plentiful. My pragmatic ethos attempts to evade certainty and to promote anti-foundationalism. Contingency and chance are also part of this ethos. I recommend promoting a fluidity in WBI by encouraging student input and modification of the tools of WBI. Giving up authority in the classroom, co-present or on-line, is difficult for teachers. This often creates more work since the teacher may need to negotiate differences between students, enforce standards of civility, and monitor student initiated inputs.

Dewey's Responsible Technology

Dewey's interest in responsible technology related to his interest in the consequences of actions and accepting responsibility for the consequences of those actions (Hickman, 1992, p. 196-7). For Dewey, the consequences of technology were determined by productive inquiry. According to Hickman, other characteristics of Dewey's responsible technology were flexibility,

variability, value ladenness, understanding of means as ends, lack of guarantee of success, and lack of enduring metaphysical goals (1992, pp. 202-203).

Of particular interest to my arguments, Hickman (1992) writes,

> Dewey argues that human beings are organisms within nature and that their tool use is one of the developmental edges of natural activity. Tools and artifacts are no more neutral than are plants, nonhuman animals, or human beings themselves: they are interactive within situations that teem with values. (p. 202)

I see this as aiding my argument for sustainable technology in its understanding of the connections of tools and nature. This connection is explicitly explored in the next section where I once again look at the problems of Cartesian dualisms.

Cartesian Paradigm

I return to an important concern of both pragmatism and feminism. A major goal of feminist-pragmatism is the unification of dualisms. In Chapter 3, I claimed that pragmatism saves feminism from essentialism and allows it to evade the dichotomy of nature and culture. I now approach one of the most important aspects of sustainable technology, the unification of the dualism of virtuality and reality. I use my critique of the Cartesian paradigm to unify reality and virtuality, a dualistic trap of the tools of WBI, IT, and computer science and one I am often in danger of falling into.

This is a critical step in the construction of sustainable technology because it unifies bodies and tools, and models of nature and nature. In so doing, it requires consideration of both the material and the constructed in ID and use of WBI. This allows us to be cyborgs without forgetting our dependence upon material conditions. It allows projection and reciprocation of

artifacts without destruction of environments. If there is a punch line in this dissertation, this is it, the need to unify virtuality and reality.

> Garrison and Scheckler (In Press) discuss this in relation to other tools of IT,
>
> Finally, one may just point out that we should not confuse simulation with reality. Surprisingly, the last alternative is not an option for a Deweyan.… all experience is experience of reality; what else could it be? We may, nonetheless, make false inferences from experience, but that is a logical not a metaphysical, mistake. For instance, in Zöller's " illusion" the lines appear to converge although they are "truly" parallel. The "illusion" is, nonetheless, "real," even if we make a flawed inference. Likewise, virtual reality is "real," even if we should mistakenly infer we are not in a flight simulator. It is a question of determining the correct context.

Deweyan pragmatism insists in this unification and feminism equally supports it. This is perhaps why a feminist can be humiliated and violated by a rape in cyberspace (Star, 1996). He/she does not differentiate between reality and virtuality.

Throughout this dissertation, I have been pleading in various ways to keep virtuality from destroying nature. That is why I say that I have been contributing to the very dualism I need to subvert. Virtuality can only destroy nature if it destroys itself for they are the same, intimately tied, inter-dependant and coexistent. As with any dualism, it is appropriate to distinguish between the two as long as one recognizes this is a distinction for practical rather than ontological reasons. Distinctions are useful as long as they do not become instantiated as metaphysical oppositions that are mutually exclusive, hierarchical, or hostile.

I continue to act as a pragmatist and ask what are the consequences of unifying this dualism. First, making clear this connection allows the creator of WBI tools such as virtual reality and simulations to think of these tools in their context of human usage. Then the designer might ask what are the effects of this simulation on the bodily reality of this student. Dewey

promoted this functional continuity. Second, forefronting this connection makes the user realize there are connections. If I sit at my computer all day long doing WBI instead of running back and forth to various buildings on campus for my classes, I may suffer in bodily and emotional fitness. Third, this forces cognizance of the need to compare models with what they are modeling, to notice synecdoche for what it is. Fourth, this prevents the virtual escape of science fiction such as the movie Matrix and the novel Exit to reality or Proteus and Euclid: A love story (Forbes, 1997) from impinging on our minds as a substitute for materiality. We still have bodies in need of care with their material needs of food, water, shelter, and waste disposal. Fifth, there will always be a body to take into consideration. This answers MCI and Nortel's attempts to create tools for solely the mind. We can indeed create those tools but they are only useful as long as the mind they serve is in a material body.

Conclusions

I finally come to the point of ending this dissertation. I wish I had complex conclusions and definite answers. I have neither. I conclude that there is much that can be done to make the tools of WBI sustainable and less controlled certain, and limiting. I conclude that feminism and pragmatism create a useful tool for examining WBI, ID, and the tools of IT. I have given a few suggestions for moving WBI toward a greater sustainability. This is not an end but a beginning, a mere start in an effort toward my goal of promoting sustainable technology in education. I wish I could end this document with great optimism and predictions for a bright future. I only predict hard work and the need for retooling some of the artifacts of educational technology. I claim the need for retooling and restructuring in order to make the tools of educational technologies more inclusive, more holistic, and more supportive of the materiality that sustains us. Many of the tools of WBI already meet these goals. Let us now work on the rest and those tools yet to be.

Epilogue

Dreams and Fears

This epilogue is about dreaming and fears, dreaming of solutions and fear of dystopian possibilities. First, I take my fears of WBI several steps further and suggest a dystopia. I do this not to be nihilistic but on the contrary to set the stage for a melioristic alternative. This dystopia involves a world on the edge of environmental collapse, where technology is used to dole out limited resources, where information is proprietary, where the power of commercial interests provide an unremitting hierarchy, where the body is subsumed in efforts to educate, standardize, and control the mind WBI is not directly responsible for such a possibility. WBI is just one cog in this mechanistic view of the world where profit margin and power trump sustainability and other human needs.

Life in the Bubble of Privilege

The time of this story is the late information age. I present you with two scenarios of a world where survival requires constant negotiation for the necessities of life. These scenes are in the United States. I let you, the reader, imagine the consequences in countries without the technological resources of North America, Western Europe, and Australia.

Liz is the center of the first scenario. She attends college from her home. Her classes include biology from Cornell, calculus from MIT, music history from Eastman school of music, and British literature from Oxford University. She never leaves her town, a small environmentally gated suburb of New York City. [68] She wanted to attend a branch of the State

[68] Environmentally gated communities take pains to maintain clean air, water, and food supplies for their wealthy residents. An atmospheric bubble usually covers them. Air locks protect the entrances and filters extending many kilometers below the soil surface protect their ground water. In an effort to ward off contagious disease, health certificates or rapid blood chemistries are sometimes required for admittance. Most restrictive are the bodily

University of New York at New Paltz but her parents objected. First, they said she would have the pick of the very best teachers in the world via distance education so why look further. Second, they feared that the current sexually transmitted disease epidemic or some newly evolved virus would infect her if they let her out of their gated bubble environment. Third, they would have to replace her income if they allowed her to leave home[69]. Fourth, they did not trust that the university would provide as clean water, air, and food as they were able to provide in their bubble covered suburb. Fifth, they were afraid that her verbal skills would not be sufficient if she left home to attend co-present classes since all her classes had been text based through high school. [70] Lastly, their greatest fear, unvoiced to Liz, was that she might have physical contact with someone outside their known to be healthy list.

While Liz frequently has group projects with her classmates, the group often has no way to request help in understanding the often conflicting information in their web based libraries. They usually vote on what information to consider true. Since they have no communal experience with existence and consequences, it is extremely difficult for them to reach any consensus based on valuing the common "good". They can send e-mail for help but the

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trajectory clearances. Those people who have traveled to certain contaminated sectors are banned from gated communities for many months, years, or sometimes even for their entire life. Every person's flesh contains a passport chip. This chip automatically records entrances and exits from sectors, making evasion of bodily trajectory rules extremely difficult. The homeless, mentally unstable, and poor often find no place to live expect for contaminated sectors.

[69] Middle class families at this time require 3-4 incomes to pay the computer, networking, clean water, and clean air bills. In order to earn money, women frequently do low paid computer programming or system's maintenance, considered women's work.

[70] Liz was very fortunate that she had any verbal skills. Her parents had insisted that she participate in forensics classes in high school. They provided this at tremendous hardship to the family. It was a hardship because it required that they provide portable air tanks and transportation so she could leave the safety of her community atmospheric bubble to attend a co-present school. She did get to mix with the elite of the area at this co-present school since they were the only ones who could afford fulltime co-present education. She had to carry bottled water, sterile food packs, and oxygen tanks with her at all times when she left the bubble and her parents worried about casual contact that would lead to incurable viral infections.

instructors find the large class sizes so overwhelming that they rarely reply to e-mail. If an instructor does reply, she/he is likely to deduct points because they asked for help.

These classes have extensive and elaborate web sites, which are meant to supply a complete and inclusive learning environment. The instructors spend years developing and fine-tuning these web sites with all the tools available to the late information age. They copyright these materials, thus profit from their use, literally by the metered byte. Any other use of their time detracts from their money making potential and thus they only reluctantly participate in direct communication with students. If they have advanced degrees, they earned them by creating on-line "websertations" (evolved from portfolios of the early information age). Promotion in their field depends upon the price they can negotiate for this, for future web creations, and for the number of bytes they sell in any academic year.

Liz never gets to work with another student a second time since there are thousands of students in each of her classes. Therefore, each project requires a lot of introductory time where the group gets some feeling for who has been outside their community bubbles and has some "world" smarts. Liz often feels silenced by the manner of other students who are more assertive than she and she worries that future employers might see her class postings and judge her negatively for her current opinions. [71] Consequently, she confines her comments to non-controversial and politically correct statements that she feels present her in a good light. Even when her classmates say ugly things about other nationalities, religions, or sexual preferences she will not protest since she does not want to be branded as a malcontent. Besides, all her information about people different from herself comes from network sites. She is never quite sure that people different from her are not be hazardous.

Liz is white, Protestant, and presumed heterosexual. She has never talked to a person of color and has rarely seen Jews or Moslems. Her greatest regret at not being able to go away to

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[71] The archived text from all courses is part of a student's permanent record.

school is the opportunities to meet and talk to people different from her small community. She has hopes of being a physician but feels disadvantaged by her lack of contact with people. Liz's passionate dream is to study psychiatry. However, this field of medical study is not available on line. Early artificial intelligence expert systems, treating psychiatric disorders, were so disastrous that such software was banned from psychiatry in perpetuity. Liz feels it is very unfair she will never be able to study medicine with real people. Her parents will only allow her to study medicine on line where she will learn to interpret test results and make diagnoses from physical findings recorded by low paid technicians. These dispensable technicians, usually migrant workers, risk infection in order to protect the physicians.

If the community air supply is sufficient, Liz may exercise for about 20 minutes a day [72]. She looks forward to getting out of the house but finds pedaling the stationary bike to be very boring. Liz wishes her parents would allow her to ride a mobile bike. Her parents fear that access to transportation would lead to Liz's departure from the safety of their bubbled community.[73] When Liz is lucky, an itinerant computer repairperson comes by as she is riding her bike and then Liz can practice talking with someone other than her parents.

All Liz's classes have frequent virtual field trips to foreign places and elaborate virtual simulations of lab exercises. On the virtual field trips Liz frequently views people who communicate by talking to strangers and who are not confined to bubble atmospheres. Her parents say these "third world people" are at great risk for viral pandemics. If they escape fatal viral infections, polluted air and water and insufficient food shorten their life spans. The virtual simulations leave Liz wondering as to how close these scenes map to the world of forests and rivers that Liz thinks once existed.

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[72] Twenty minutes is considered the minimum amount of aerobic exercise that keeps the heart and lungs healthy, Any more exercise that this would be considered wasteful of breathing air.

[73] These evolved from the walled communities prevalent in California and New York.

As desperate and trapped as Liz feels, she has much freedom compared to Ron, the subject of my second scenario and a student in neighboring New York City. Ron is in elementary school in a borough that is deemed an extreme infection risk. He attends school since his parents cannot afford a home computer and associated expenses. His school is broken up into tiny high walled computer cubicles. Except for the students, no other people come into that school. All instruction comes from the computer. Disruptive students are forced to sit in chairs with restraints that keep them immobile except for their hands and eyes. Screens between cubicles keep other students from view so that all attention must be paid to the computer. Cameras play across the students as they work so teachers can monitor them from the safety of a clean space.

Fear of infection is so great that there is no time when students may gather in a central place and talk to each other. Students eat lunch in their cubicle, delivered by robots on sterile stainless steel trays. Physical education is limited to short stints on stationary bikes that robots also distribute. The electricity generated from these bikes helps defray the high electricity costs of the computers and robots.

Ron's school gets computers discarded from the suburbs. They are often not capable of receiving elaborate graphics and simulations. If children cannot read the text on their screens, they spend dreadfully dull days trying to make sense of the text-based instruction. Only the youngest children have audio recordings of the words on the screen. These recordings sometimes get out of synch with the text making the learning of reading particularly difficult until repair crews can don clean suits and air tanks and venture into the school. Ron has the same opportunities as Liz to take college courses. However, it is unlikely that he or any of his peers will persist in their education once released [74] from school. Because all instruction is individualized and promotion to the next lesson is only done upon successful completion of achievement tests, some of these kids never progress past a second or third grade level by the

[74] Some kids are literally released from restraints at the age of 15.

time they reach 15. College entry requires a grade 12 diploma and access to a computer and network connection. The network connections have meters that charge by the byte of information input and output. Thus, children as poor as Ron must severely ration their words and information searches even if they can afford a secondhand computer.

Many large corporations buy children at the age of ten or younger and put them into on-line schools to train them for jobs in their corporation. Parents are willing to sell their children since it sometimes seems like the only escape from the open city into safe environments. Children must pass rigorous health tests before being admitted into a corporation school. If a person leaves a corporation after being trained, they receive amnesiac drugs so they can not take proprietary secrets with them. Thus, dissidents are sent out of the protective factory environments with the same level of education they arrived with. It is common to see adult men and women who can barely read and write after being "de-informed" by the security medical officer of a corporation.

Life in this late information age is dull and long or exciting and short. The sameness of life in a bubble is excruciating. There are no long walks on the beach or in the mountains possible without risking lung damage and viral infection. Those who risk venturing out of their bubble find the land inhabited by nothing more than giant cockroaches, poison ivy, and ragweed. Remnants of forest and unpolluted waterways mainly exist in virtual reality reconstructions created by those old enough to remember the early information age when computers and networks first got their foothold in the world and enforced a remove from nature.

Technological issues for greater user agency

I now turn to some technological innovations. I suggest these as ways of supporting a sustainable technology. Most of them involve greater agency for the user of the technology, which is also a rebalance of power inequities. In terms of indexing and search of the Internet they are meant to address some of the power problems noticed so eloquently by Garrison and Burton

(1995). They are my own dreams. Any similarity with extant projects is coincidental. I first present a little background of client server issues. The Internet works on a client server principal. Computers called servers provide images, text, software downloads, audio, and video to desktop computers called clients. The conduit of delivery is the Internet. In general, client software must match server software so that they can communicate via common protocols. Usually, the onus is on the user to obtain appropriate software to make contact with desired servers.

For instance, if you wish to use e-mail at my university, Virginia Tech, you must have a POP mail client, properly configured, and a VA Tech PID. [75] Proper configuration of a POP client requires knowledge of server names such as mail.vt.edu and ns.vt.edu, addresses of domain name servers, and come other assorted information. Surely, a university server could do this configuration for a client. When users have trouble connecting to the mail server, it is usually the result of an incorrect configuration.

I believe we should automate delivery of WBI so that servers would recognize and customize their interface for the user. Java and Java script allow a certain amount of testing for a particular client. Dynamic Host Configuration Protocol (DHCP) servers currently serve TCP/IP configuration information. [76] I would like to see more of this functionality embedded in the server software. Users of the WBI must negotiate many layers of technology. Smarter servers could provide configured clients and accessory software in a seamless way. Unfortunately, the people who have the least access to traditional education also have the least access to WBI. Part

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[75] POP stands for post office protocol. Eudora a common POP client is named for Eudora Welty who wrote a short story called "My life at the post office". PID, used to access e-mail accounts and other services at Virginia Tech stands for personal id. This is automatically assigned to all students, staff, and faculty upon entrance into student database or payroll system.

[76] TCP/IP is the protocol of the Internet. A computer requires an IP address, the address of a name server (a server that translates numerical Internet addresses into domain names), a subnet mask (only allows a subnetwork of addresses to be accessed from a large network), the address of a gateway (a device that translates between protocols).

of this difficulty in accessing WBI concerns lack of computer literacy. Smarter servers would prevent some of the roadblocks of lack of computer skills.

Specifically referring to Garrison and Burton's critique of indexing (1995), a vexing technological problem that cements extant power relations is the limitations of Internet search. I explained the problem of control of categorization in the last chapter. Particularly problematic is the restriction in Internet search results as the result of previous indexing. Think of the consequences of a young lesbian searching the Internet for information and support and instead retrieving many vituperative attacks against homosexuality. [77] Here, I suggest some solutions. Solving computer problems is usually a matter of appropriate representation and search. Either facet could constrain computer searches in order to reinforce extant power hierarchies. In order to allow free and flexible searches of the Internet or of a database, both must remain unfettered by dominant power hierarchies. My suggestions involve client side control of Internet searches so that Indexing of items is not a search constraint.

My first suggestion relies on the paradigm of Geographical Information systems (GIS). GIS, a technology used for landuse planning, overlays layers of pixels or vectors to search for geographical features that meet multiple constraints. For instance, sinkholes are characteristic of certain soil types, topographies, and mineral substrates. Combining these three map layers allows you to predict likely locations of sinkholes. Similarly, if representation of knowledge on the Internet was by pixels, perhaps overlays of several layers could locate knowledge sources.

My second suggestion for Internet search involves relational databases. Haraway makes a significant point about databases being truly democratic because as she reports from personal communication with Andrew Dumit, "A database "is an ideal place where all elements are equal in the grid--and everyone can access all of them." The database is a condensed site for

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[77] I did such an internet search and mainly retrieved web sites of a religious nature condemning homosexuality and pornographic sites. There were some informative and supportive sites but they were few and far between in a sea of condemnation and predation.

contestations over technoscientific versions of democracy and freedom (cited in Haraway , 1997, pp. 129,130)."

Normalized relational databases are a possible alternative approach to organizing data over the Internet. This organization of data allows the query to be the creative part of the inquiry rather than the organization of data into preordained knowledge. Other forms of databases such as hierarchical, networked and object oriented databases are not as appropriate for the organization of the Internet because they require a context or a connectivity between distributed sites that the normalized relational database avoids. Therefore, the relational database is the only database form that I will investigate in this paper.

Relational data bases are composed of tables of rows or tuples where each table is a special case of the mathematical construct known as a relation (Date, 1981,p.65). Each tuple is of degree n, meaning that it is composed of n attributes. Relational algebra is used to manipulate one or more relations to create a new relation. The traditional set operators (union, intersection, difference, and Cartesian product) are used along with some special relational operators (selection, projection, join, and division) to manipulate relational database tables.

Normalized relational databases have the further restriction over relational databases that no data be repeated. Many of us have no doubt been frustrated by non-normalized databases where we might, for instance, change our address in one part of an organization, only to find it incorrect in other places of the same organization. This would be impossible in a normalized database since there would be one and only one representation of a particular person's address. Therefore, changing that address once would maintain a consistent and accurate database even if that database were composed of thousands of relations. Keeping the database normalized would require the agreement to consistent application of some standard rules of normalization (Date, 1981). It is beyond the scope of this paper to discuss the technicalities of those rules.

Below are two relations of degree 3. They are very different in their nature. The emotion relation is quite subjective while the flower relation is much more objective. Both might be considered partial relations that could be expanded to include many more fields and many more tuples. They both contain the field color allowing some interesting operations over the two relations. The color field, although it has the same name, is unique to each relation such that we have flower.color and emotion.color

emotion	need	color
love	love_returned	red
envy	understanding	green
hope	confirmation	white
despair	hope	black

Table 5.1 Emotion, need, color relation

flower	color	use
violet	violet	potted_plants
rose	red	cut_flowers
rose	red	perfume
rose	pink	corsage
tulip	black	bedding_plant

Table 5.1 Flower, color, use relation

Using relational calculus we could form a query such as: emotion , flower, emotion.color where ∃ flower (flower.color = emotion.color) which means give the emotion and flower and

emotion.color for flowers where the flower color is the same as the emotion color. The join yields the new relation:

emotion	flower	color
love	rose	red
despair	tulip	black

Table 5.3 New relation formed from join on color

This relation could inspire a poet to write something like "My love is like a red, red rose." or "...into a tulip cup overflowing with deepest black despair ....". While clearly very simplistic and contrived examples, they still give some indication of how such queries could be a creative activity or enterprise producing the raw materials for metaphors.

My last suggestion for user control of WBI involves a greater plasticity of interface. We can currently control the look and feel of our computer desktop to some extent. We can also control the look of our web browser interface but to a smaller degree. It would be useful to disabled users if they could customize their web interface for their individual needs.

Feminist pedagogy of WBI

Although this is not a usual topic of IT, I make the claim that the tools of WBI must support feminist pedagogies. Feminist pedagogy is simply an extension of the feminist movement into education. It's root are often attributed to the critical pedagogy Paulo Freire (hooks, 1994). A holistic technology must be inclusive. Feminist pedagogy is a strong ally for increasing diversity in WBI. While feminist pedagogies differ across the disciplines, there is generally overlap in the use of the classroom to develop political awareness of feminist issues, decentralization of the teacher's authority, use of experience as a source of theory, attention to the needs of women students, and development of a community of learners (Maher & Tetreault, 1994; Schniedwind & Maher, 1993). I refer to feminist-pedagogy because there is considerable

overlap between feminist-pedagogy of WBI and the issues of Chapter 1. In addition, feminist pedagogy is an extant feminist framework in which to examine WBI. Areas of overlap between the concerns of Chapter 1 and feminist-pedagogy include enforced power hierarchies, inclusion of issues relevant to women, unification of the public/private dualism. I now investigate specific characteristics of WBI that support or weaken feminist pedagogy. Since I have limited my topic to biology courses, I investigate ways of enhancing feminist pedagogy for on-line biology courses.

One important goal of feminist pedagogy of science class is for the students to understand the cultural situatedness of science (Fausto-Sterling, 1991; Harding, 1991; Kohlstedt & Longino, 1997). This requires deconstructing truth statements of science and interrogating them for bias. As I have previously explored this refers to Harding's strong objectivity. Strong objectivity assumes a standpoint for any inquiry. Querying that standpoint reveals the situatedness of scientific statements. This is frequently a difficult task because students are so convinced of an absolute sense of an objective truth.

Some biology instructors use problem based learning (PBL) as a tool for creating feminist pedagogy of science (Lederman, Submitted). PBL entails allowing the students to experience the problem solving of the scientist. With adequate scaffolding to encourage success, students are presented with scenarios and asked to present hypothesis, ask questions, design experiments and in other ways to collaboratively solve a set of increasingly complex problems over a semester. Case based reasoning, similar to PBL, and used in medical education involves presentation of a specific patient, their symptoms, and test results. PBL and other forms of collaborative learning support a feminist goal of cooperative learning, and develop knowledge from experience.

PBL is collaborative learning. Hiltz specifically recommends WBI in support of collaborative learning (1997). She cautions that collaborative learning via WBI or asynchronous learning networks (in her terminology) requires a high degree of faculty support, should be

limited to sections of no more than 30 students, requires excellent technical support, and is generally more expensive than co-present education. Under these circumstances, Hiltz views WBI as superior to co-present education. She attributes this to ease of communication among collaborating groups

Ania Lian (2000) disputes Hiltz's claim,

> In the case of on-line learning, peer group discussion exploit a very narrow avenue of communication. While such discussions may form learning support for some learners, the limited scope of such discussion and the artificiality of the environment which tells learners that now is the time to talk and learn reduce the potential of communication that otherwise could be exploited through computer and other means.

Lian continues further in this essay to plead for multiple and redundant communication channels and recommends the use of computer technologies such as WBI in conjunction with co-present situations to from a complete learning environment. Lian also has an interesting twist on distance education viewing it as distance from real world problems education needs to deal with. Lian views much traditional classroom instruction as distance education in this regard. I see this plea for a complete teaching environment as very similar to my plea for organic holism where distance for Lian is equivalent to what I call disembodied and decontextualized.

The increased cost of WBI reminds me of the image in Chapter 1 of education as a business. Will state legislatures support WBI if it is more expensive than co-present education? Indeed, I do not know the answer to this. I suspect that WBI is viewed as scalable to a point where it is less expensive than co-present education and this is part of its political appeal.

The subject of Hiltz's classes is computer technologies. In a biology class, there are other considerations surrounding WBI and PBL. These are particularly pertinent to my plea for connection with nature. I suggest a hybrid of co-present and WBI makes the most sense for many

biology classes. Laurie Ruberg (1996) reports on just such a situation at Virginia Tech. Ruberg studied a botany lab that used Daedulus, a computerized text based conferencing system, as an adjunct to the classroom discussion. The teacher in this lab used the conferencing system in order to encourage multiple and building responses to difficult "thought" questions. In other parts of the lab, they had plant specimens, microscopes and other "more traditional" laboratory items. The concept was to allow embodied contact with plants, expand that experience with multimedia presentations of habitats, available on CD-ROM (Scheckler, Taylor, & Hill, 1998), and have discussion both on-line and face-to-face. I view this mixing of media and expansion of communication channels as an excellent exemplar for WBI.

In terms of PBL in biology, I envision an embodied situation of exposure to a problem, followed by use of WBI to record and share observations and small group discussion on-line and off. For the collaborative student group, on-line discussion provides a written record of decisions and considerations. In this way, the best of many worlds could be used to provide a holistic learning environment. This does not deal with the needs of the place bound adult who may need to do WBI exclusively. Even then, every attempt should be made to supplement online activities with field observations. I view this as similar to MTD requiring students to interview several people of different ages and race than the student. It is a hybrid approach to contextualizing and embodying WBI. This takes very literally Dewey's concept of experience as experimenting with the world.

The Teachable Moment

A wonderful test for efficacy of WBI is see if it supports the teachable moment. The teachable moment according to Jim Garrison is "… the almost ineffable experience of getting through to our students, of connecting and of students learning and not just getting ready to take a test. " (Garrison, 1997, p. 115). It seems to me that the teachable moment is a highly sought after connection between student and teacher when both are intensely interested and in synch as

to the value of the topic under study. The teachable moment is important because it brings spontaneous joy to both teacher and student who instantaneously share a moment of common interest and intimacy so powerful that the memory of such moments can bring pleasure long afterwards. Teachable moments occur when interest in the topic is high and new shared understanding suddenly becomes evident to both student and teacher.

Teachable moments require great flexibility and attention to selective interest, imagination and intuition (Garrison, 1997). Flexibility is required because it is very hard to predict when the right combination of conditions will occur and if attention is not paid to the phenomenon, it disappears as quickly as it appeared without giving the participants either the rush of enjoyment or the satisfaction of co-constructed understanding.

How does one use WBI to encourage teachable moments? My answer is to encourage openness to spontaneity and creativity in teaching. This is perhaps the opposite of a military model of education because the intent is to free the body and mind by allowing trope category mistakes rather than to control and discipline minds to a set concept of knowledge. Such an approach allows fallibility in academic facts so that new approaches and understandings may be explored.

Another way to look at the teachable moment is to ask what kind of ID would make teachable moments unlikely. Rigid control of the teaching environment so spontaneous events can not arise, inducement of fear in students so that vulnerability will not be displayed, creating competitiveness between students so insights will not be shared, and being deceitful so that trust will not be established are all sure ways to make teachable moments impossible. These conditions were all present in the computer science program I graduated from, a totally co-present situation. They are **not** the assumed "bad" of WBI, that is avoided in co-present situations. This is far from the case as my example shows. MTD had many more moments of understanding and joy at discovery than all my computer science courses put together. My point is that WBI must aim and can aim to promote the teachable moment.

There are no solutions here, just dreams and nightmares that lurk in the back of my mind and motivate my work.

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Young, I. M. (1990). Throwing like a girl and other essays in feminist philosophy and social theory. Bloomington, Indiana: Indiana University Press.

Curriculum Vitae

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Ph.D. Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, in Instructional Technology and Educational Foundations, May 2000.
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Grants and Awards Funding:

Funded Competitive External Grant Proposals:

Alscher, R, Cennamo, K., Burger,C., Grady, J, Science and Gender Equity of Virginia. *National Science Foundation* 1997-1999, $200,000. *I helped write this grant proposal and I was the technology resource person on it.*

Stone, N.D., Buick, R.D., and Scheckler, R.K. Total Resource Conservation Planning: Linking CROPS, the Crop Rotation Planning System, to GRASS/CAMPS (FOCS). *United States Department of Agriculture, Soil Conservation Service*, 1992-1993, $47,000.

Stone, N.D., Buick, R.D., and Scheckler, R.K. Adapting CROPS for Use in Nutrient Management Planning. *United States Department of Conservation and Recreation, Division of Soil and Water Conservation (DSWC)*, 1992-1993, $41,000

Stone, N.D., J.M. Luna, R.D. Buick, J. Roach, J.W. Pease, L. Daniels, and R. Scheckler. CROPS, the Crop Rotation Planning System for Whole-Farm Environmental and Economic Planning. *United States Department of Agriculture, Southern Region Sustainable Agriculture Research and Education Program*, 1992-1994, $140,000.

Funded Competitive Internal Grant Proposals:

Scheckler, R.K. and Burton, J. K. Women and Technology Belong Together. *EOAA/VPI&SU*, 1997-1998, $2,500 *This grant funded bringing Professor Sandra Harding to Virginia Tech for a workshop/seminar*.

Honors and Awards

1999- American Educational Research Association (AERA) Special Interest Group on Research on Women and Education - scholarship to attend American Educational Research Association Conference in Montreal, Quebec.

1998- Virginia Tech Graduate Student Assembly Award - to attend International Federation of Information Processing 98 World Computer Congress in Vienna/Budapest.

1998- Association of Computing Machinery FOCUS award for transportation to International Federation of Information Processing 98 World Computer Congress in Vienna/Budapest.

1997- USDA certificate of appreciation for work on CROPS programming system.

1966-Elected to Women and Science National Honor Society.

1964-National Merit Letter of Commendation.

1963- National Honor Society.

1962- Grand Champion Westchester County (NY) Science Fair.

Title: Using Zone Electrophoresis to Detect Artificial Food Coloring.

Publications:

Book chapters

Garrison, J. and Scheckler, R.K. (in press). Participatory Simulation: Prospects and Possibilities. Miyake, N., Hall, R., & Koschmann, T., Eds. CSCL2: Carrying the conversation forward. Mahwah, NJ: Lawrence Erlbaum.

Refereed Journal Articles

Scheckler, R. K. (in press). Locating Feminist Pragmatism with EcoFeminism. Proceedings of the Forty-Fourth Annual Meeting of the South Atlantic Philosophy of Education Society.

Scheckler, R.K. 1999. Rethinking Distance Education: A Prolegomenon. Proceedings of the Forty-Third Annual Meeting of the South Atlantic Philosophy of Education Society. 57-69

Scheckler, R.K. 1998. Disembodiment as a characteristic of cyberculture. Proceedings of International Federation of Information Processing World Computer Congress, Vienna/Budapest.

Stone, N.D., Buick, R.D., Roach, J.W., Scheckler, R. K., and Rupani, R. 1992. The planning problem in agriculture: farm-level crop rotation planning as an example. AI Applications 6(1) :59-75.

Buick, R.D., Stone, N.D., Scheckler, R.K. and Roach, J.W. 199X. CROPS, a Crop Rotation Planning System for management of whole-farm resources implementing low-input sustainable agriculture. AI Applications 6(3): 29-50.

Proceedings

Stone, N.D., Faulkner, D., Scheckler, R.K., Pease, J.W., and Roach, J.W. 1995. CROPS: A Constraint satisfaction System for Whole Farm Planning. Proceedings of National Agricultural Ecosystem Management Conference, New Orleans, LA.

Buick. R.D., Stone, N.D., Scheckler, R.K., Luna, J.M., Daniels, W.L., Pease, J., and Roach, J.W., 1992. CROPS, a planning approach to farming sustainability and reducing pollution. Proceedings of the Third Annual Environment Virginia Symposium: A Forum on Pollution Prevention and Economic Implications, April 7-8th. pp.64-68. Virginia Military Institute Research Laboratories, c/o Civil & Environmental Engineering Department, VMI, Lexington, VA 24450.

Stone, N.D., Buick, R.D., Scheckler, R.K., and Roach, J. 1992. Environmentally sound agricultural planning using artificial intelligence. Proceedings of the Joint Convention for the XVII Congress of the International Society for Photogrammetry and Remote Sensing, the American Congress on Surveying and Mapping, and Resource Technology, August 3-8th, Washington D.C.

Stone, N.D., Faulkner, D., Scheckler, R.K., Pease, J.W., and Roach, J.W. 1995. CROPS: A Constraint satisfaction System for Whole Farm Planning. Proceedings of National Agricultural Ecosystem Management Conference, New Orleans, LA.

Talks and Presentations

Invited Lectures

1998 STS 5424 Computerization in Society, Distance Education and pragmatic-feminist philosophy.

1998 Women's Studies Lecture Series, Do we need a feminist critique of the Internet? Virginia Polytechnic Institute and State University.

1998 EDCI 5784 Media and Education, A feminist looks at distance education, Virginia Polytechnic Institute and State University.

International

Scheckler, R. K., 1999. A Feminist Pragmatic View of Distance Education. American Association of Educational Research, Montreal, Quebec.

Scheckler, R. K, 1998. Teaching the Mind without the Body. International Federation of Information Processing 98 World Computer Congress. , Vienna/Budapest.

Scheckler, R.K., 1998. Affects of Information Technology and Communication Panel, a feminist perspective. . International Federation of Information Processing 98 World Computer Congress Vienna/Budapest.

Scheckler, R.K. and N.D. Stone, 1995. "Multi-Objective Decision Making in Whole Farm Planing", International Conference on Multi-Objective Decision Support Systems in Agriculture, Honolulu, HI.

National

Scheckler, R. K, Kirk,M., Cone,C., Allen,L. Accepted. Young girls and computers: Ethnography of an elementary school computer club. Panel: From Girls to Women: Computing from K-12 to Higher Ed. Grace Hopper Celebration, Cape Cod, MA.

Scheckler, R. K, Kirk,M., Cone,C., Allen,L. 1999. Young girls and computers: Ethnography of an elementary school computer club. Panel: computer learning in women and girls. National Women's Studies Association, Albuquerque, NM.

Scheckler, R. K.1999. Gender constructs in young girls learning computer skills Ethnography of Education Society. Philadelphia, PA.

Scheckler, R.K. 1994. Genetic Algorithms in Whole Farm Planning, Artificial Intelligence Research In Environmental Sudies, Biloxi, MI

Buick, R.D. and Scheckler, R. K. 1992. CROPS (Crop Rotation Planning System): A whole-farm system to generate environmentally-sound and economically-viable crop rotation and tillage

plans. Presentation of poster and computer demonstration at a Computer Model Exposition, at the conference on 'Resource Management in a Dynamic World', Soil and Water Conservation Society 47th Annual Meeting, July 9-12th, Baltimore, MD.

Buick, R.D., N.D. Stone, R.K. Scheckler, A. Shakoor, and J.W. Roach. 1992. A comparison of problem solving techniques in whole-farm planning: constraint satisfaction, simulated annealing and genetic algorithms. Presented at the Workshop on Artificial Intelligence in Natural and Agricultural Resource Development, the American Association of Artificial Intelligence, July 12-16th, San Jose, CA.

Buick, R.D., N.D. Stone, and R.K Scheckler. 1992. CROPS: A whole-farm crop rotation planning system for implementing sustainable agriculture. Presentation of poster and computer demonstration, National Integrated Pest Management Forum, June 17-19th, Arlington, VA.

Buick, R.D.; Stone, N.D.; Scheckler, R.K. and Roach, J.W. 1991. CROPS, a Crop Rotation Planning System for management of whole-farm resources implementing low-input sustainable agriculture. Presented at the Workshop on AI in Natural Resource Management, the American Association of Artificial Intelligence, July 1991, Anaheim, CA.

Regional

Scheckler, R. K., 2000. Weaving Feminism, Pragmatism, and Distance Education, Third Annual Graduate Student Research Day, Virginia Tech, Blacksburg, VA

Scheckler, R. K. 1999. Locating Feminist Pragmatism with Eco-Feminism. Forty-Fourth Annual Meeting of the South Atlantic Philosophy of Education Society, Baltimore, MD

Scheckler, R, K., 1999. Feminist Pragmatic View of Distance Education, Roundtable, Second Annual Graduate Student Research Day, Virginia Tech, Blacksburg, VA

Scheckler, R. K., 1999. What does it take to envision a cyberseder? South Eastern Philosophy of Education Society, Atlanta, GA

Scheckler, R. K., 1999. Engaging the Other on the Internet. Eastern Educational Research Association, Hilton Head, NC.

Scheckler, R. K., 1999. Ethnography of young Girls Learning Computer Club. Eastern Educational Research Association, Hilton Head, NC.

Scheckler, R.K. 1998. Rethinking Distance Education: A Prolegomenon. South Atlantic Philosophy of Education Society, Raleigh, NC.

Scheckler, R.K. 1998. Pedagogical Dialogue and Distance Education, Eastern Educational Research Association, Tampa, FL.

Scheckler, R. K. 1998. Women and the Internet, Radford Student Conference on Gender, March 21, 1998, Radford University, Radford, VA.

Scheckler, R. K., 1998. Rethinking Distance Education: A Prolegomenon. The South Atlantic Philosophy of Education Society. September 25-26, North Carolina State University, Raleigh, NC.

Scheckler, R.K. 1997. The Ironic Disembodiment of the Internet, Virginia Educational Studies Association , University of Virginia, Charlottesville, VA.

Buick. R.D., Stone, N.D., Scheckler, R.K., Luna, J.M., Daniels, W.L., Pease, J., and Roach, J.W., 1992. CROPS, a planning approach to farming sustainability and reducing pollution. Presented at the Third Annual Environment Virginia Symposium: A Forum on Pollution Prevention and Economic Implications, April 7-8th, Virginia Military Institute, Lexington, VA.

Local

Scheckler. R.K, Hausman, B., Lederman, M., Graham, L., 2000, Panel: Feminist Pedagogies across the Disciplines. Feminist Pedagogy of Computer Science and Instructional Technology, Women's History Month.

Conference Participation

Reviewer, 2000 American Education Research Association, New Orleans, LA.

Session Chair, 1999 Internet and Education, Philosophy of Education Society, New Orleans, LA.

Session Chair, 1998, Eastern Education Research Association, Tampa, FL.

Chair of Book Roundtable, 1998 Philosophy of Education Society Meeting, Cambridge, MA..

Professional Service

1999-Present, Executive Committee-South Atlantic Philosophy of Education Society.

University Service (at Virginia Polytechnic Institute and State University.)

1996-1999, Eating Disorders Task Force, Virginia Polytechnic Institute and State University.

1995-1997, Equal Opportunity/ Affirmative Action Committee, Virginia Polytechnic Institute and State University.

College Service (at Virginia Polytechnic Institute and State University.)

1994-1995, President College of Agriculture and Life Sciences Staff Association.

Departmental Service (at Virginia Polytechnic Institute and State University)

1998-Present, Instructional Technology Professional Seminar Planning Committee.

1998-Present, Department of Teaching and Learning Curriculum Committee.

1997-1998, Department of Teaching and Learning Graduate Policy Committee.

1996-1997, Department of Entomology Finance Committee.

1995-1997, Department of Entomology Computer Committee.

1993-1994, President of Department of Entomology staff Association.

Community Service

1992- Present, Human Relations Council of Montgomery County.

1993- organizer of religion in the schools community forum.

1993- vice president.

1998, Cooper House Discussion group on morality and university life – Discussion of *Moral Imagination* by Mark Johnson.

1995-1997, Planned Parenthood of the Blue Ridge Advisory Council.

1993 -1994 Goals 2006 Diversity Committee, Montgomery County, VA.

1994-95 Women Work Organizing Committee and Publicity Committee –Habitat for Humanity - Woman built house, Montgomery County, VA.

1992-1994, President of Blacksburg Jewish Community Center.

1991-1993, Coalition for Community School Committee.

Professional Societies / Organizations:

Member of: Association of Education and Computer Technology (AECT).

American Educational Research Association (AERA).

Eastern Educational Research Association (EERA).

International Forum of Educational Technology and Society.

Philosophy of Education Society.

South Eastern Philosophy of Education Society.

South Atlantic Philosophy of Education Society.

International Philosophy of Education Society.

National Women's Studies Association.

Society for the Advancement of American Philosophy.