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Green Lab:Designing Environmentally Sustainable Computer Classrooms during Economic Downturns

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Abstract

This article offers a detailed design and concrete plan for the stewardship of an environmentally sustainable computer classroom that employs a thin client approach to power management. Though greener computer labs might seem financially out of reach during the current economic crisis, this article explains how writing programs can align efforts to reduce energy consumption with efforts to weather the current financial downturn while providing up-to-date communications technologies instruction.

Keywords: Sustainability; Computer classroom design; Energy; Environment

1. The environmental impacts of computer classrooms

Logistical concerns dominated many of the earliest conversations about writing instruction and computer classroom design, appropriately enough: Which programs should be used? (Britton & Glynn, 1989). How should these rooms be arranged? (Myers, 1993). Who gets to decide? (Selfe, 1989). *Sustainability* figured in these discussions only so much as it referred to the *resilience* of these arrangements (for example, see Holdstein's, 1993, chapter about forging political alliances with staff and administrators or Kata Coffield et al's, 2000, chapter about continuing fiscal support). Richard Selfe (2005) provided one of the most recent and comprehensive treatments of the social, technological, and institutional arrangements that underpin resilient computer writing classrooms in his book, *Sustainable Computer Environments.* The natural environment remained outside the scope of his rich discussion of support structures, though as M. Jimmie Killingsworth (2010) observed, Selfe's title invoked its metaphors.

Much like *sustainability, ecology* has acted as a prominent metaphor for composition scholars encountering writing-as-system (Coe, 1975; Cooper, 1986; Edbauer, 2005). Danielle Nicole DeVoss, Heidi McKee, and Richard Selfe (2009) expanded on the valuable work of these metaphors in the introduction to their edited collection, *Technological Ecologies and Sustainability:*

> The terms *ecologies* and *sustainability* are meant to suggest the important task of maintaining the richly textured technological environments in which composition teachers and students learn, study, and communicate. These environments—which include both human and technological actors—are akin, as many scholars have suggested, to ecological systems and deserve to be studied in all their layered, interconnected complexity. (my emphasis, p. 1)

Ecology and *sustainability*, as they are used by here, do not necessary engage natural environment.

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In the late 1990s, ecocomposition galvanized into a push to introduce the natural environment into composition instruction (professional writing remained outside of ecocomposition's boundaries, as the movement's name implies). Sidney Dobrin (2012), one of ecocomposition's founders, later distinguished between ecocomposition and rhetorical ecology scholarship, noting that ecocomposition "has never really been about ecology, per se" (p. 2). That is, ecocomposition's topics did not inherently lend themselves to understanding writing as a networked, hypercirculatory, dynamic system populated by post-human and human agents. Studying rhetorical ecologies *can* give us insight into the reciprocity between writing and the natural environment (Strasma, 2009; Sackey & DeVoss, 2012) but does not guarantee that experience. *Ecology*, a science of relations, is a rich well-spring of metaphors and methodologies (Dobrin, 2012). But as Killingsworth (2010) warned, these metaphors and methodologies can sometimes obscure or even deny the literal environment. Killingsworth argued that techno-rhetoric's metaphorical erasure of bodily presence and geographic place have very real consequences for the natural environment. Among them he listed the tendency to overlook computers and compositions' energy demands and waste products. This article puts those consequences and demands front and center.

Engaging with communication technologies places a significant burden on electrical grids, increases greenhouse gas emissions, and requires hardware whose production, use, and disposal produces hazardous byproducts. The raw materials that comprise communication technologies have significant environmental and health impacts well before assembled computers ever find their way into writing classrooms. Consider eutectic tin-lead (SnPb) solder, the main solder used for assembling electronics (Geibig & Socolof, 2005). The United Nations Environment Programme (UNEP) reported that even at very low exposure levels, lead has acute and chronic effects on human neurological, cardiovascular, renal, gastrointestinal, haematological and reproductive health ("Lead & Cadmium Home Page," n.d.). Lead combines with cadmium, and mercury in the ICT manufacturing process to poison places and people. Cadmium, a known carcinogen, compromises bone and kidney health. Mercury accumulates in ecosystems and their inhabitants to irreversibly damage the nervous systems' of unborn children, infants, children, and women of child bearing age. Those outside these particularly vulnerable populations are not immune to Mercury's effects either ("Reducing Risk," n.d.). Though the UNEP has campaigned to regulate lead, cadmium, and mercury, triangulating international regulations that govern IT supply chains is particularly complicated because IT manufacturing processes, like UNEP itself, are a global enterprise.

Shawn Apostel and Kristi Apostel (2009) mapped e-waste's global "toxic trail" and its hazardous effects in the U.S. and abroad. China, India, Africa and developing countries are especially vulnerable as wealthier countries ship their obsolete electronics to facilities and workers that are ill-equipped to dispose of toxic materials. After leaving the United States and Canada, e-waste is often manually processed by the most impoverished workers in developing countries, compromising their wellbeing and the health of their surroundings (Lepawsky & McNabb, 2009).

Professional writing programs, under constant pressure to keep up with industry, often discard outdated computers, only three- or four-years old. After they leave campus, obsolete computers and their peripherals find their way into the e-waste stream along with another estimated 55 million computers disposed of each year (Klatt, 2003). Computer classrooms are defined by commodities that are usually unsustainably produced, briefly consumed, and then discarded. During their stay on campus, each computer generates about a ton of carbon dioxide annually (Murugesan, 2008, p. 25). According to International Telecommunication Union, a global organization that coordinates standards for telecommunications, information communication technologies produce about 2.5% of global carbon emissions directly. They account for as much as 14% of total emissions if indirect energy is included in their calculations ("ICTs and Climate Change," 2007). Operating a hypothetical computer writing classroom with 25 student stations and one instructor's station is an energy-intensive proposition. Twenty-six conventional PCs in use for 8 hours per day consume 174 watts per computer each hour. In sleep mode for another 16 hours, these same computers consume 155 watts per computer per hour. In one 24 hour cycle, twenty-six computers consume 100,672 watts. Multiply these numbers to account for the open-use computer labs and dedicated computer classrooms at larger universities, and they add up quickly.

Though communications technologies' environmental impacts are considerable, there are multiple opportunities to mitigate them. This article offers a design for a greener computer lab, one of the latest developments in the push for more environmentally-friendly material arrangements surrounding information technologies. This model can scale up or down to accommodate the needs of users at various types of institutions. It focuses primarily on strategically deploying energy efficient hardware and software to conserve environmental resources, money, and personnel efforts. And while buying the organic strawberries at the Whole Foods may be cost-prohibitive, this environmentally sustainable approach to computer lab design has the potential to save considerable amounts of money, reducing hardware costs by