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Themenheft Nr. 24: Educational Media Ecologies

## Building as Interface: Sustainable Educational Ecologies

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### Abstract

*This paper begins with the most obvious, and yet most elusive, of educational media ecologies, the buildings which are ‹home› to pedagogic communication and interaction, and considers how we might understand ‹building as interface›, construed first as a noun, (‹a structure with roof and walls› – OED) referring to places as physical structures, and then as a verb, (‹the action or trade of constructing something› – OED), referring to the activities of construction through which we can engage technologies central to theory, research and practice. Our concern is with exploring the larger question of educational sustainability: with what ‹sustainability› means when applied to a specifically educational context, and with the sustainability of the kinds of emerging educational environments in which new information and communications technologies play a significant role. This question of sustainable educational environments is driven by a need to be responsible and accountable for the impact of the technologies and practices we eagerly embrace in the name of ‹21<sup>st</sup> century learning›, even as prospects for a 22<sup>nd</sup> century are so rapidly receding from view. As one prominent media ecologist put the point: ‹we have to find the environments in which it will be possible to live with our new inventions› (McLuhan 1967, 124).*

### Sensory space and a sense of ‹place›

Why is it important in new media studies to think about environments? We have not always been environmentalists. McLuhan, for example, took a dim view of ‹environments› and ‹environmental thinkers›. Environments represented for him totalizing misconceptions, ecologies of not-seeing, because environments immerse us in ways that evade critical consciousness. Environments epitomize the taken for granted, the unquestioned, the imperceptible; they are ‹[...] not passive wrappings, but are, rather, active processes which are invisible. The ground rules, pervasive structure and overall patterns of environments elude easy perception› (McLuhan 1967, 68). Environmental thinking, based on McLuhan's view, is concept-driven while percept-blind, so it goes on, but it has no idea of where it is going. In ‹The Future of an Erosion› (1967), McLuhan speaks of environments as total, as saturating and as invisible, comparing them to what Ellul (1965) talked about

as «propaganda». The usual example offered is fish in water – if that fish can be said to know anything at all, what it absolutely cannot be said to know is that it is indeed in water. Trapped within an immersive world-view, we are, to use another McLuhan-esque metaphor, in effect «anaesthetized:» we are asleep, and worse yet, sleep-walking. What we need, he says, is to be made to «wake up» from our environmentally-induced stupor.

Required for that wake-up call are what McLuhan called «anti-environments» – configurations, actions and expressions that challenge the inertia of the environmental paradigm, disruptive means that incite critical engagement and thought, unseating our concepts and disorienting our percepts. In McLuhan's elegant if invariably cryptic style, well-formed verbal and artistic expressions, which he called «probes», aesthetic and rhetorical «counter-environments», could do the work of rousing us to critical consciousness about the environments in which we are sleepily immersed. One good, if limited, way to both «probe» and to «wake up» those who approach the use of advanced technologies for education in the spirit of fervently un-critical «true believers» is through the straightforward empirical tracking and reporting of the energy consumption and environmental costs of the tools and resources we routinely use in the course of teaching and learning. While this kind of «wake up call» has resource conservation and not education as its primary purpose, the two are not mutually exclusive; they complement each other in edging us towards a radically different view of the educational enterprise – both as physical and metaphorical structure. A specifically educational concept of sustainability, therefore, extends beyond consideration of physical resource consumption to an ecological assessment of a pedagogical «plant» and its «processes» that involves serious study of the designs, uses and conditions of the buildings in which we do our educational work. McLuhan contends that, «Environments... are not just containers, but are processes that change the content totally» (1965, 200). If media ecology is the study of media as environments, then media ecology may also legitimately extend to the study of environments as *media*.

Though he was speaking of media, and not buildings, McLuhan's insights apply as usefully to the latter as to the former. Both, after all, are «complex communication systems» (Nystrom 1973, 23) in which «communications media, technology, technique, and processes» interact with «human feeling, thought, value, and behavior» (ibid.). Both «affect human perception, understanding, feeling, and value» (Postman 1970, 162) and both function as media environments. A building «structures what we can see and say and, therefore, do», it assigns roles to us and insists on our playing them; it specifies what we are permitted to do and what we are not» (Postman, ibid). Values, actions, practices, bodies, identities and relations are mediated in and through structured spaces of special-purpose inhabitation, such as a university faculty of education.

### **An Ecology of Place: Simon Fraser University's Faculty of Education Building**

In one such structured space, we conducted a small exploratory study that speaks to this question of how a building can be a matter of concern for educational media ecologists. The study concerns itself entirely with the physical plant that is the Faculty of Education building at Simon Fraser University, where I (de Castell) had taught for nearly 35 years. After such long a time, no one could be more deeply asleep and less consciously aware of this environment than I. However, a singular provocation nudged me into wakefulness about the need to understand how this building was shaping and constraining all the work we did there, including all the ways we spoke – and failed to speak – about the building and its perceived impacts on lives and our work. I moved temporarily, for a year's term, from Professor to Dean *pro tem* of the Faculty of Education at a time when students and instructors who inhabited one particular classroom had begun to get sick – headaches, allergic reactions, nausea were all reported (they had been intermittent before, and there was some, but little, discussion of it before we all got back to «normal»). These reports prompted a physical inspection of the space, which in turn revealed how the building was interfacing with its inhabitants: significant deterioration, airborne particulates, leaks, draft, dust and toxic levels of mold. The room was required to be closed off, stripped down and restored to a «healthy» condition (in fact, now, a few years later, whole wings of the same building are being quarantined due to severely high asbestos and black mold levels). People and resources were assigned to tackle the institutionally defined problem of environmental health and safety. A second classroom proved to be in a similar condition and was also closed down, and then restored.

For some years now we had all been aware, whether by personal encounters or by hearsay, of the presence of vermin, insects and rodents co-habiting with teachers and students. In addition, cracks in the concrete meant water dripping on to and leaking into walls and floors (much of British Columbia is rain forest), fungus grew on windows and sometimes into window frames, and the Dean's office shared the problem to such an extent that the next Dean actively avoided spending time there, suffering allergic reactions in that space. Today there is an extensive process for research, reporting, and reconstruction of that building on-going, and meantime some faculty members have relocated to other sites in the university, increased their work from home, and some have refused to attend meetings held in the building. The «interface» has become aversive and dysfunctional for its users, and the value of its contribution to educational work correspondingly diminished. In North America, many other faculties of education were built around the same time as Simon Fraser University's: there was a «boom» in such building, in part due to the recently elevated status of the discipline from a field of practical knowledge to one concerned with theory and research, and with it, physical relocation of

education from «normal schools» to universities faculties. Architecturally, the design of these newly conceived faculties of education would be guided by its traditional pillars of function and form, of aesthetics and purpose – regulated by considerations of economic efficiency: public schools were not supposed to be, as a rule, lavish. And, like the public school buildings which long preceded them, education faculties were at that time guided both functionally and aesthetically by the educational ideology of «progressivism». Uncomfortably stretched between the prior era’s classicist heritage and the incoming technocratic imperatives of economy and efficiency, the design discourses of these new faculties of education featured references to cultivation, growth, student-centeredness, intimacy, small group collaboration, open-plan instructional areas and democratizing community spaces. The material execution of these ideologically progressive intentions, however, was, indeed like progressivism itself in the post-war era, largely trumped by the industrial aesthetic of the 60’s and 70’s.

No less uncomfortably, if largely unconsciously, faculty undertook to nurture the next generation of progressive teachers within factory-like environments designed for the cost-efficient induction of its novitiate. The Arthur Erikson-designed building, which we moved into in 1979, included low ceilings graced with brightly-painted factory-style heating and ventilation systems, unpainted concrete walls, covered in places with either burlap or (as this is BC, and once a logger’s paradise) with large rough cedar or finished pine panels, plenty of glass and metal, and free-standing tables and chairs, or carpeted moveable blocks for seating. Picture-window «views» looked out onto patios and gardens and deep green forest only slightly more distant, making the «natural» environment itself a kind of public art. This was our brand new education building – which we all thought wonderful light, airy and very, very much up to date.

Fast-forward to the present day, and many of these similarly designed education faculties are showing comparable signs and symptoms of their age. But now, unlike at any previous time, we have come to realize the steep environmental costs of these purpose-built facilities, in concert with their technological limitations. A faculty building is a user interface for the educational enterprise within it. The question everywhere becomes whether to «recycle», that is restore and repurpose, buildings that were designed with a bygone mindset and erected for a modernist, literate culture, to support education for a postmodern digital one or whether to demolish those old buildings, and build new environmentally conservative and technology-enabled ones. Indeed do we, in this era of online learning and mobile technologies, break out of our dependence on stable and centralized physical buildings altogether? What will produce the right kind of environment to «enable us to live with our new inventions» (McLuhan 1967, 124).

### **Sustainable Educational Ecologies (SEE): A Case Study**

How can we determine the best course of action for dealing with (and working within) deteriorating and outdated educational environments and as likely, if not so obviously, a deteriorating and outdated learning experience? It was to respond to those questions that we initiated an exploratory project called Sustainable Educational Ecologies (SEE) whose purpose was to make possible the ecological assessment of Simon Fraser University's Education building, as an *educational interface*. In the course of this project we created a multimodal documentation and analysis tool capable of making the educational constraints and affordances of our physical environment more explicit, to help us determine the kind of educational ecology our building supported, and whether, as a specifically *educational* ecology, it was indeed both sustainable, and worthy of being sustained (<http://www.sfu-see.ca/>)<sup>1</sup>.

This was a collaborative, faculty-wide project aimed at breaking new ground, both conceptually and methodologically, towards the development of a theoretical and operational model of educational sustainability. The project involved six teams of graduate research assistants, each led by a faculty member from the Faculty of Education. Faculty members' areas of specialization ranged from infrastructure sustainability, place-based education and learning environments research, to pedagogies for «learning in depth, systems of delivery and internationalization of education.»<sup>2</sup> It should be stressed that in this exploratory project we asked a diverse set of researchers to identify and pursue a question *they* felt ought to be considered in an ecological assessment of educational environments, and the resulting set of questions is by no means presented as an exhaustive or even a comprehensive set. Indeed, these particular questions about a field very new to us all can claim to be no more than randomly placed first steps, as chosen by this particular set of researchers – but they gave us, nevertheless, a way to begin this complex and unfamiliar trajectory of inquiry. Each team engaged with a specific aspect they particularly identified as contributing to an overarching notion of educational sustainability, and each was challenged to find ways of overlapping with the work and ideas of other teams (see Figure 1). We began «in place», from the outset demarcating the research field in concretely<sup>3</sup> physical terms, a starting point that suggested a metaphor of the building itself as an interface for our

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2 Faculty members involved in this SSHRC-funded project included Dr. Suzanne de Castell, Dr. Kieran Egan, Dr. Kumari Beck, Dr. Roumi Ilieva, Dr. Bonnie Waterstone, Dr. Michelle Nilson, Dr. David Paterson, Dr. Kevin O'Neill, Dr. Stephen Smith, Dr. Sean Blenkinsop, Dr. David Zandvliet, assisted by graduate research assistants Milena Droumeva, J. Melanie Young, Mathew Menzies, Greg Scutt, Olivia Zhang, Carlos Ormond, and Jacqueline Ashby.

3 Anyone who knows the university understands that speaking of «concrete» with reference to SFU is itself resonantly metaphorical: this apotheosis of late 60's education architecture remains a tribute to concrete in all its forms.

several forms of inhabitation. This gave us a way to assemble, meaningfully and in a ‹convergent› rather than simply additive way, the data the project’s six different studies were contributing. We sought to represent – through various media and visualization approaches – what it meant for diverse kinds of stakeholders to inhabit such a place. This interdisciplinary collaboration required a way for the project’s varied concepts and forms of data to both have a voice and to speak to one another.

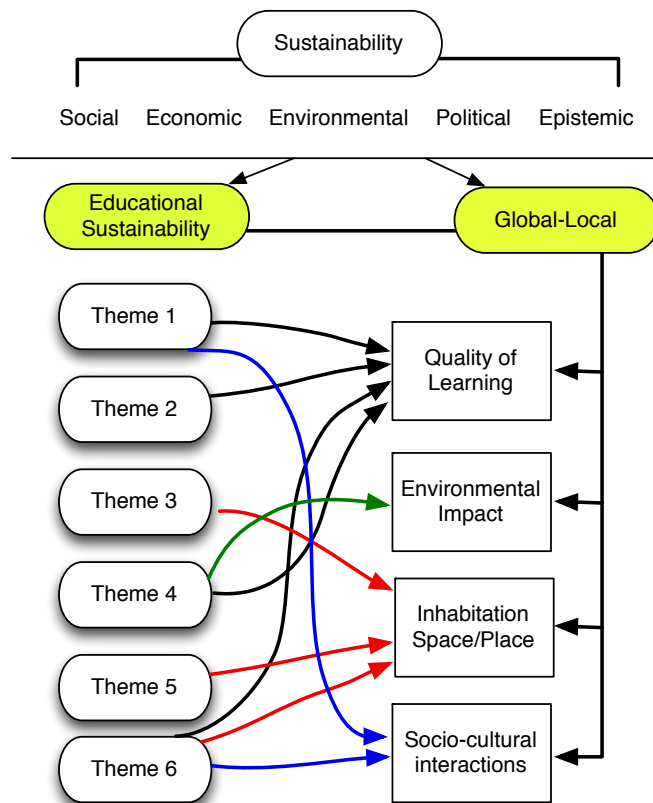


Figure 1. The array of themes and nexus of connections between our teams’ explorations of educational sustainability.

### Designing an interdisciplinary discourse

Metaphors, highly resonant and simultaneously semantically eloquent and semiotically generous (Janesick 1998), became our medium for articulating an ‹infralanguage› (Latour, 2005) for communicating across the project’s different research teams, helping us bypass and escape, temporarily at any rate, some of the normative constraints of discipline-specific discourses that impeded our varied teams’ abilities to represent their purposes and assumptions, and to work together across disciplinary lines.

The building is the interface between inhabitants and habitat, and it is at this interface that the sustainability of co-habitation practices and purposes are supportable – or not. So, we decided to utilize the building as a «semantically impoverished» and yet semiotically rich «infralanguage» to draw together from diverse kinds of work a shareable conception of educational sustainability. By directly relating our research aims to the specific locations within which the activities in question were carried out, we sought to productively align information of the diverse sorts collected by our multidisciplinary team, into a relatively cohesive interdisciplinary whole.

In the process of our team meetings, the restrictive and reductive languages within which both sustainability discourses and architectural design discourses are typically framed added to the importance of building a new, «stickier» theory, to which a greater variety of relevant ideas and information could be attracted. A different kind of intellectual «building material» is demanded for breaking open such new questions. And, we wanted to place education and the educational experience/practice, not economics, aesthetics, or environmental studies, at the center of our inquiries and from there explore connections to other material and socio-cultural dimensions of educational sustainability. This meant we needed our focus to be on teaching and learning, pedagogy and curriculum, not on greenhouse gases, emission control or architectural engineering.

The SEE *place-based* education research team's report stresses that all education happens «in place.» That focus on the educational importance of experiencing and understanding place is central to «educational sustainability» because, as that team's researchers explain, «the relational dynamics and modes of exchange that constitute educative action are essentially place bound» (Blenkinsop and Scutt 2010).

To be at all – to exist in any way – is to be somewhere, and to be somewhere is to be in some kind of place. Nothing we do is unplaced. How could it be otherwise? How could we fail to recognize this primal fact? (Casey 1997, ix)

Here place is not a backdrop to education, the physical space in which educational communications and interactions are housed, but is, in this team's words, «itself pedagogical». This idea of place-as-pedagogical construes the environment in similar terms to the educational theories of Reggio Emilia, as a «third teacher» (Gandini 1998).

Other teams concentrated on pedagogical decisions, student satisfaction, the costs and benefits of internationalization, the functions and uses of space, while the «place-based education» team's focus was on cultural practices, the «internalities» of the larger political-economic-technological processes more usually examined in sustainability studies.

Critical to our collective enterprise was a conception of our Faculty of Education as an educational place that was much more than just a physical container for its

inhabitants. We did not want to restrict our analysis to what the field of architecture has far longer and far better known how to do – design and analyze buildings as aesthetic and functional housings for human activity. We wanted to build a discourse that supported an expansion, not a reduction of the «externalizing» perspectives of mainstream approaches, whether of environmental sustainability or of economics or of architectural design, that could acknowledge education as a speaking subject. Using the concept of an «interface» allowed us to conceptualize and externalize – through the use of actual multimedia interfaces – some of the key (and oft-neglected) relationships between physical structures and pedagogical constructions, between educational edifice and educative experience. Taken as a metaphor, the interface signals both the affordances and constraints of this educational sustainability interchange. Interfaces, after all, are ways of directing, restricting and facilitating user interactions with a system (in this case, the education system both in its physical and cultural permutation). They allow and encourage certain types of actions over others, just as environmental paradigms for McLuhan (1967) predispose us to certain kinds of perception, thinking and action over others.

### **Building as Interface I: Building as a Noun**

Recalling McLuhan's insistence on the need to «wake up» from the myopia of modernist, literate schooled insensibility, our project called for a re-humanized, embodied approach that could – even if only aspirationally – encompass multimodal, multisensory information to bring very diverse kinds of information together, bridging not only the gaps in our own teams' particular sub-disciplines, but integrating qualitative and quantitative data on the sustainability of educational environments. Our project is similar to the «unique experiment» described by McLuhan aimed at establishing the «sensory thresholds of the entire population of Toronto» (McLuhan and Zingrone 1995, 228). As to the nature of the project, as McLuhan explains, it intends «to measure, quantitatively, the levels at which the entire population prefers to set its visual, auditory, tactile, visceral, and other senses as a matter of daily use and preference-how much light, how much heat, how much sound, how much movement [...]» (1995, 228).

While we weren't looking to establish *preferences* as such, the SEE project dealt with a similar kind of «experiential» question: a mapping out of the sensory and material sphere of the educational structure. To that end, our study was assisted by the ecological and ethical aspirations of the nascent field of «metadesign», in that we were attempting to gather and to draw together into productive interchange, both quantitative and qualitative information about an entire population (though of a single building, and not an entire city). So, rather than conceive of that place as a «housing», a «container», or an «enclosure», we began to think of it as the «interface», the point of connection and communication between a



physical space whose material qualities could be identified and analyzed, and the activities of its human inhabitants, whose quality of experience could be captured and studied in direct relationship to the physical features of the material space inhabited. This conception of the building helped loosen us from the reductive grip of externalizing discourse, and helped us to think within and across techno-scientific, economic and architectural design languages, in order specifically to try to encompass the multisensory quality of inhabitation and to trace how a physical structure and structures of educational experience converge and co-operate. Using a combination of light and sound readings as well as photography of typical spaces and objects as a type of ethnographic multimodal documentation of the faculty building, we developed a number of visualization tools to externalize the metaphor of <interface> and allow us to look more holistically at the various factors contributing to the faculty's overall educational sustainability (Figure 2). As well as

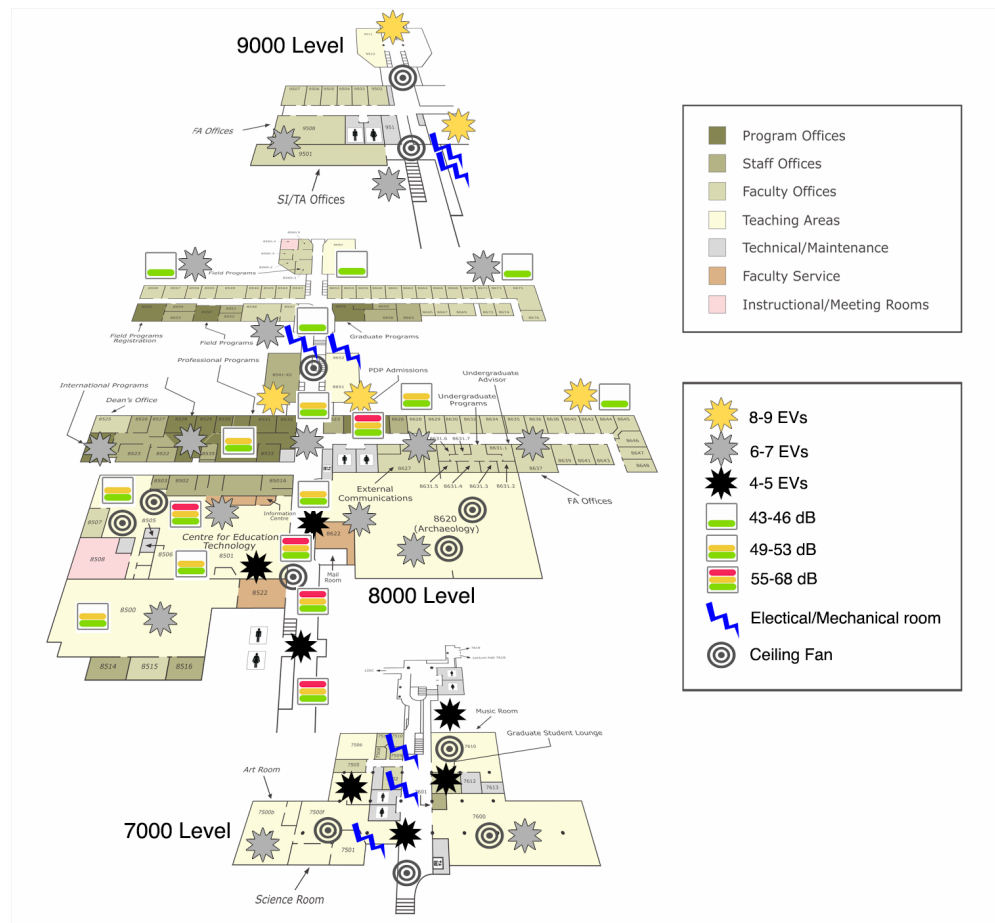
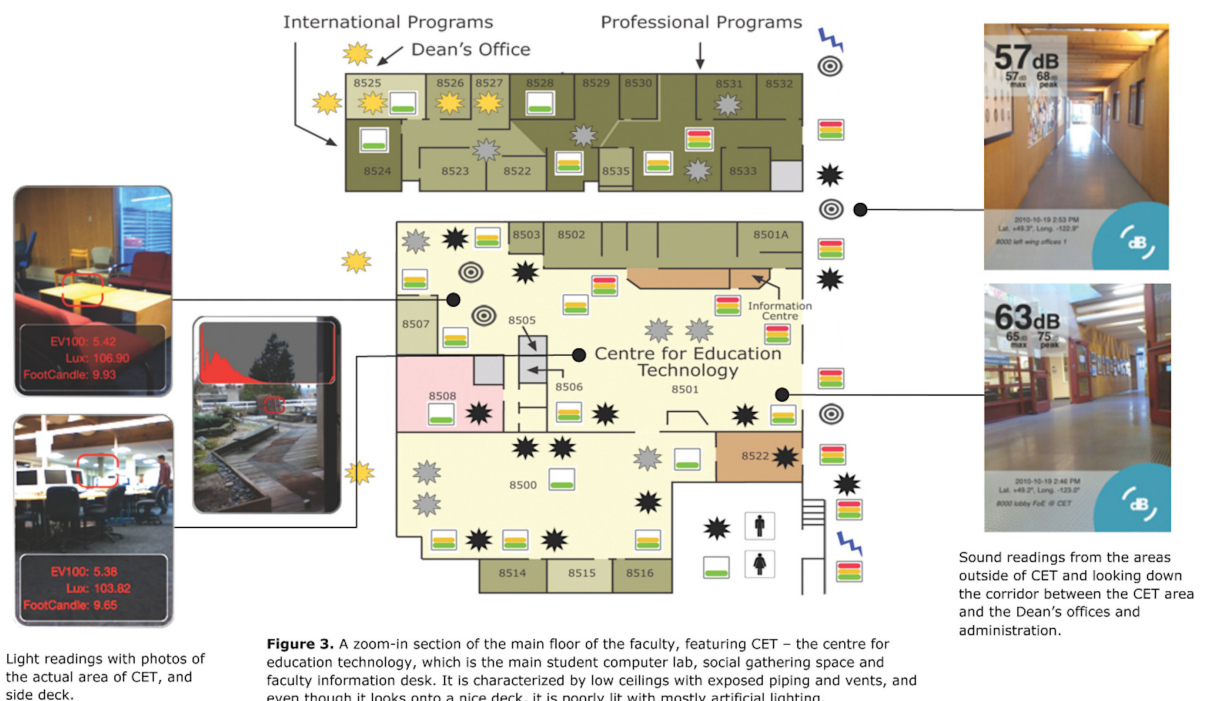


Figure 2. The 3-tier floor plan of the Faculty of Education with environmental parameters overlaid on top. Legend to side.

spatializing institutional functions, we collected and represented sound level and light meter readings for each floor, area and space of the Faculty of Education, overlaid photos from corresponding locations, and displayed gradations of each environmental parameter onto the map.



In addition, we developed an interactive Flash-based prototype representing the building-as-interface that takes the form of an annotated floor plan of the faculty's main campus, where most researchers and participants work, study and teach. The blueprints were colour-coded according to room purpose – teaching facility, faculty offices, technology center, program administration, graduate studies, professional teacher training classrooms, labs, etc. Concern over functionality is typically where institutional cost analyses of university facilities end. Our study sought to go further, specifically in the direction of how to represent and assess the quality of inhabitation, in terms of its experiential and sensory conditions for inhabitants, as well as the quality and experience of learning. Thus, in addition to photographic overlay and sound recordings from different spaces, the interactive map includes narrative data in the form of 'talk bubbles' relating to specific areas on the floor plan that contain informant quotations reflecting on their experience of inhabiting the Faculty. Furthermore, SEE's floor plan interface can support further annotation, with additional interview data from a variety of stakeholders, as well as

with additional empirical information on energy consumption, air quality, light and sound levels. For full documentation and study descriptions, please refer to our full final report, available on [www.sfu-see.ca](http://www.sfu-see.ca)<sup>4</sup> (de Castell et al., 2010).

This creative approach to construing our Faculty's building as an interface helped us see relatively straightforward ways of bringing physical and experiential information together in a way that builds on McLuhan's project to «establish sensory thresholds» of a population. Interestingly, when we compared user reports with physical measurements of light and sound, we discovered significant variability: in spaces with very high levels of objectively measured sound, subjects did NOT necessarily experience those locations as «noisy» or «distracting», as they did in other spaces whose objective sound levels were considerably lower.<sup>5</sup> This inconsistency flagged a need to learn more about the kinds of activities which appeared to mediate – and mitigate – otherwise distracting sensory conditions. A number of interviewed participants spoke of the hallways as being particularly rich spaces for social interaction as well as academic exchanges – yet such spaces are notoriously loud, resonant and dark locations. In essence, perceptions of sensory characteristics of space were shown to have much more to do with contexts of experience as well as purpose and cultural expectation, than with objective sensory qualities alone.

Liz Ellsworth's exemplary book *Places of learning: Media, architecture, pedagogy* (2004), features an important theoretical discussion of what a design is *intended* to convey or accomplish, and how a structure's design anticipates the movements and meanings made by its occupants and visitors. However, there are a myriad ways a person can take up the affordances of a place, so while we can theorize about it, we cannot explain in any objective terms how a designed space will most likely work in actuality, nor have we, therefore, any solid basis for expecting a specific experience or activity in such a place as being either ruled out or assured. Sensory experience is likely as much an individual as it is an institutionally-defined phenomenon. To that end, one of the teams focused their «learning environments» research (Zandvliet, Ashby and Ormond 2010) on trying to determine what inhabitants actually experienced in their various classroom locations.

For the most part the literature on educational environments has not told us much about objective connections identifiable between a physical environment and student reports of feeling engaged, or feeling «at home» or finding a space conducive to collaboration. Thus, possibly important connections between user experience and physical environment remain unknown. Even as we may want to infer such connections based on theories drawn from psychoanalysis, social psychology, semiotics or elsewhere, we have not yet developed any concrete methods or tools for studying these connections. Eric Klopfer (2011), in criticizing

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5 This was a pilot study; any reported results should be regarded as anecdotal.

the idea that randomized controlled clinical trials are the ‹gold standard›, for good research, explains that,

... classrooms and other learning environments are complex systems. Complex systems have a property by which very small differences in initial conditions (e.g., student or teacher attitudes and knowledge, classroom culture, schedule,) can lead to widely varying outcomes. So, the ‹same› perturbation instituted in the context of the ‹same› classroom may yield widely varying results when those similarities vary ever so slightly. (1)

To understand these complex systems, models like the one we have articulated here may, in Klopfer's words, ‹help make sense of research across interactions and methodologies. ‹The primary purpose of many of these models›, he continues, ‹is for sense-making, and integration across interactions and methodologies, not prediction› (ibid., 2).

Tools like SEE's provide a conceptually externalizing instrument for helping us think about and better understand the many interconnected systems that comprise a lived environment, and explain the variables that condition the ways inhabitants mobilize or disregard different material aspects of their environment, as they go about the business of its inhabitation.

### **Building as interface II : ‹I seem to be a verb› (Fuller, 1970)**

Turning from nouns to verbs, Ursula Franklin long ago contrasted the ‹artifactual sense› of technology with its ‹social practice› sense, stressing that it is the social context of its practical use that we are referring to when we speak of ‹technology›, but all too often that situated social practice is elided in favour of its nominal form – technology as a ‹thing›. Social practice is our interface with artifacts, it is how something becomes a ‹thing› at all for us (Latour 2005, 3). For new and emerging artifacts, that interface is design, development, and production: in a word, an engagement with building. Building, so seen, is the interface that conjoins, in a transactional relationship of mutual constitution, technology and people. In this sense, ‹building as interface› refers to how the work and play of construction mediates interconnectively between and among agents both human and not. In the most obvious of senses, education is a practice of ‹building›.<sup>6</sup>

For many of us teaching with technologies, turning from nouns to verbs means cultivating a ‹production pedagogy› a pedagogy of doing and making, and in the case of increasingly popular design disciplines – of building (Thumlert, de Castell and Jenson 2014). In terms surrounding the design, development and uses of digital tools for learning, the question is always how users can most productively realize

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<sup>6</sup> First and foremost, of course, education is about the intentional formation of a ‹self›. Who should do that building? Old sayings about teaching someone to catch fish versus giving them a fish come to mind here, and, trite as that is, it is clear which approach is more sustainable, whether of fish, or of education.

the actual and possible educational functions and uses of digital affordances. Powerful learning happens through design-based research and design-driven theory, through prototyping and testing, then remaking and re-testing digital tools. Referred to by the New London Group (1996) as «critical making», the role of design and production has been argued as key to educational reform for multimodal, 21<sup>st</sup> century literacy pedagogy. But can we take this technology-intensive educational agenda forward in a responsible and sustainable way?

Very much in line with the hegemony of consumer culture, it has long been taken for granted that the best educational software will be created not by educators or disciplinary specialists, but by technical specialists in digital design, computer science, and software engineering. The level of expertise required to create good educational software, it's argued, is far different from and far exceeds, the knowledge and skill of education professionals, and indeed parents and students more generally. They do not, after all, even do the same kinds of work. Interestingly, the question of whether school-age students can best learn through design and production is still very much on the table, at least in theory, if less present in classroom practice. But it is a question far less often asked about teachers, still consigned to occasional «how to» professional development workshops on new (commercially produced) software to support their uses of current and emerging digital resources for learning. There are plenty of reasons why we educators have been so much more disengaged than our students from the activities of design and development, (Bryson and de Castell 1998) and contesting this particular «distribution of the sensible» (Ranciere 2006), about who can and should do what with respect to building educational materials has a long history. There are important lessons already learned about reliance on the marketplace of educational materials and about what is lost, both educationally and economically when teachers no longer have «producer-like» understandings of the educational resources they are using (de Castell and Luke, 1986). Digital learning management systems are not so dissimilar to previous incarnations of text-based learning systems that teachers could «administer» to students without needing to understand, themselves, the bases on which needs analysis, diagnosis, and remediation were delivered – through such «specialized» teaching tools, teachers were long ago rendered into consumers of educational resources where they had once been producers of them. Then, as now, technology was willingly taken up in place of technique and much of pedagogical decision-making consigned to the marketplace.

### **Building Interfaces for Learning**

Designing sustainable educational ecologies, ecologies that consider building as interface for learning, as mediators of educational experience, means transitioning to a paradigm of students and teachers as designers and developers of new and

emerging technologies, not just as users and consumers of them. To understand a «production pedagogy» of doing and making means acknowledging the limitations of the modernist educational paradigm of critique as the essence of an educated person. That educational ideal of critique, as people like Gunther Kress (2003) have eloquently argued, has run its course. We do not so much need education to cultivate critical consumers as we need it to cultivate critical designers, makers, producers. In many ways, the phenomenon of Web 2.0 has, in educational circles, ideologically engendered the culture of «consumer citizenship» as a core way in which children become part of a new media market (Banet-Wise 2007, 8). At the same time, contemporary media scholars foreground the idea of «active participation of a distributed social network in the production and circulation of culture and knowledge» (Ito et al. 2010, 19). As Kress (2003) points out, whereas critique subordinates the students' creativity and intellect to, first and foremost, understanding someone else's design, out of the activity of production (building), a new and far more engaged and informed species of critique can flourish. The principle of ecological validity underlies production pedagogy – don't just learn *about* something, learn to *do* it: real doing and «critical» making, as the New London Group (1996) has named this process. (see also Boler and Ratto 2014). Courses can be production-driven. So, for example, doctoral students in contemporary curriculum theory class can design a course on contemporary curriculum theory in their own area of specialization. Students in digital games for learning courses can work in teams to prepare design documents and prototype their own learning game. Research methods students can conduct mini research projects, through each step, from conception to execution, through peer review, ethics review, fieldwork, coding, presentation, and final research report. How much more can be learned from this approach than from only reading and critiquing the research done by others?

Might not faculties of education greatly increase the interest, effort and resources given to building capacity among faculty and students to become digital curriculum designers, developers, and evaluators – *producers* of the programs students' laptops run, and in which universities are currently making considerable extra-local investment? Models of this kind of paradigm shift are currently at work in the «laptops for all» programs in South America, programs that, ironically enough, have been widely discounted as prohibitively expensive in economically far more developed European and North American jurisdictions. Specifically instructive examples are the professional development programs for teachers in Argentina and Uruguay in which teachers are being asked, and supported, to take on an active, participatory design and production roles in the creation of digital learning resources for students' (free) school laptops.

From the standpoint of educational sustainability, technology maintenance for Uruguay's free nation-wide laptop program demonstrates that supporting students in becoming technical experts could be an effective and affordable on-the-spot way to maintain vast numbers of widely dispersed and heavily child-mangled computers. If teachers were similarly to become more involved in the design and support of their own resources, while we can certainly expect things to move more slowly, it also stands to reason that the use of local resources – which requires a good deal of new learning by local inhabitants, pays off over its admittedly slower time. It is quite possible that for educational sustainability, it makes sense to move more slowly, in ways that afford teachers and learners a basic working literacy with the medium in which they are currently expected and required to receive and to process information. Public funding might be provided, not for what is built best, an object, a noun, so to speak, but in what is a more modestly processual form, building (v.), the built's slower, but ultimately more sturdily sustainable cousin. On this view it is not what is built best, but rather, in the spirit of the contemporary crafts and DIY movements, those things you can best make yourself, «what's best built», that will advance sustainability of our networked digital media ecology. This argument echoes the Habermasian refrain, no less worthy for its frequent repetition, «in a process of enlightenment, there can only be participants» (Habermas 1975, 40). Education is properly neither a spectatorial nor a consumerist engagement, it is an active, situated, knowledgeable, and skillfully productive one. Or it is no education at all.

In education, (unlike schooling, where «seat-warming» can often gain students years of credentialing) if you are not an active participant, you are not in the game at all. To be taught about and to learn about one's world is to be made aware of its «affordances», a concept by now familiar. A kind of philosophical prehistory to Gibson's (1977) formulation of this concept of affordances can be discerned in John Dewey's contention that «the organism selects its own environment», in Dewey and Bentley's (1949) supplanting of theories of organism/environment interaction with the more enactivist theory of «transactionalism», and in George Herbert Mead's (1934) concentration on the «world that is there». The key point in all these cases is that no matter what might be «objectively there», it's what is «there» for a specific actor in a given situation that is actually operative, an ontology of «what is, is what is practicable.» Mead's, long ago, was a call to attend to verbs, not nouns; it was an understanding that what can become an object for us is only that to which we make or find a relationship) For anything to be an «object» to us,<sup>7</sup> Mead argued, for it to populate our world, it must be something we are able to and prepared to *take up* a relation with, our active engagement transforms an object from its inert

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<sup>7</sup> This is a matter on which considerable light has already been shed in earlier work (Friesen, 2004) on «learning objects», work that seeks, similarly, to prod along educational thinking about technology from nouns to verbs.



condition as a noun (like «edifice»), to something more adverbial (like «habitably»). Language partly captures but also invariably reduces, and can only hint at, the complexity of the multisensory experiences it seeks always incompletely to express. «Language is the efficient ordering of the enigmatic abundance of the world ... we are imposing on reality the nouns we invent ... every noun is an abbreviation» (Borges 1999, 21).

It is the activity of building that constitutes an essential interface between digital technologies and their users, and that a producer-like, not just a consumer-driven relation to technology is no less imperative in today's networked mediascape than it used to be imperative that literacy learning entailed learning to write, and not only to read. A system that produces its own future capacity is very obviously sustainable in ways a system that depends on purchasing that capacity at ever increasing cost is not. And an ecology that demands its inhabitants learn, themselves, how to maintain it, is as intrinsically educative as it is equitable.

### **Crafting a Sustainable Education**

We have evidence at every turn that we can no longer pursue business as usual. We must learn to make more and consume less, think globally but cultivate and preserve diversity by acting and producing locally, build rather than buy capacity, and help students and their teachers become architects, designers, and well-informed agents in the building of their own lives and of those around them. In a way, this harks back to education's traditional role of subject-formation, promoting a kind of media ecological «selbsbildung», an active and productive self-fashioning of our interfaces for teaching and learning. This involves, first, being engaged as critical inhabitants of the physical environments we have inherited and those we can build for ourselves, and finding ways to invite and support ongoing user-driven assessments of the constraints and affordances for sustainable learning. Kieran Egan (2008/2011) call this «learning in depth», learning that doesn't fade away after each exam, and, no less importantly, involves finding ways to reduce these facilities' environmental costs and harms, both physical and cultural. Part of this will likely entail using these facilities – these rapidly obsolescing buildings – more efficiently than we have done, less as detention centers and more as open access, flex-time learning centers, by capitalizing on mobile technologies for learning, hybrid pedagogies of both distance and face to face learning. The era of sitting day after day in one after another small classroom with one teacher and the same group of students, year after year, is now as obsolete as its coercive attentional economy (de Castell and Jenson 2004). These buildings and practices were designed for very different times, resources, conditions and media ecologies than our own. A sustainable educational ecology involves, furthermore, concerted engagement in activities of production, teaching ourselves and our students



through critical making of the media in and through which we research, teach and learn, rather than resorting as we have been doing for too long to contracting and purchasing specialists to do the work of alienating us from the means of educative production, and entrenching relations of consumption in their place. Recognizing that the initial artifacts so produced will at first be cruder and vastly more crude, vastly more buggy and vastly less impressive than the market has on offer, we will, however, be doing the essential educational work of mastering the basic tools of our own communicative and expressive abilities, and sharing those tools with others in ways that are both sustaining and sustainable. While in no way competitive with the open market, this trajectory of development will result nevertheless in *educationally* superior interfaces, both material and procedural, and therein lies one good hope to realize a sustainable educational ecology.

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