

Natural History in the Digital Age?

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A Reluctant Introduction

I teathed on chalk. I think primary thoughts through pencil on yellow lined paper. But my professional life has been negotiated via keyboard. Half my life is pre-computer, half is post; at 43 I straddle the boundary between two worlds.

Yet with the ever-increasing growth of digital technology, more and more of us live in an increasingly virtual world. Some will argue that this technology has great scope for facilitating engagement and learning on many levels. However, a clear negative effect can be seen by society's growing disengagement with nature (Pyle 2003). Access to computers (from desktop hard-drives to hand-held devices), availability of the Internet, and a growing addiction to digital entertainment (in addition to increasingly urbanized landscapes and a risk-averse society) combine to keep the young in particular from exploring the outdoors (Coon and Tucker 2002, He et al. 2009, Davison et al. 2011).

Even in nations where most people still don't have access to digital technology, most people want it, thanks to the mass marketing of modern techno-culture. Desire ruins contentment; it can inhibit natural inclinations to explore and enjoy what is at hand just as much as owning the digital device can. The effect is now described as an "extinction of experience" (Miller 2005, Samways 2007), such that "... *children are disappearing from the outdoors at a rate that would make the top of any conservationist's list of endangered species ...*" (Gill 2005). The knock-on effects in terms of physical, mental, and social health are many and complex. One effect that is just beginning to be understood is that screen-mediated activities are far more structured and timetabled, and less physical & experiential than outdoor exploration (Pascoe 2009). Not only does this impair learning, but it contributes to a perpetuated disengagement with nature (from a lack of valuing to full-blown fear) and a general lack of empathy for the environment (King 2007).

I love ink on paper, and I hate my monitor and keyboard (and daily dose of repetitive strain injury). But my students don't; their fingers and eye movements fly

across these surfaces, utterly at home. Even those eclectic few who have adopted some sort of retro-nostalgia – using old typewriter fonts for emails and toting about a pen and small black leather notebook – say there is no going back. Many of them would argue that the only way forward in reawakening a natural history connection is via digital technology. Moving into this brave new world will require open-minded exploration of a rather bittersweet virtual landscape of digital natural history.

Exploring the Virtual Landscape

We can approach this new landscape from many angles. From a philosophical perspective, we can ask the question: When we infer "natural" as being without human influence, how can one pixelate "Nature"? Yet human ecology teaches us that there is little (physical or biotic) on this earth not under our influence, so if we've already had an effect, then what's the problem with adding another layer of distortion? Big concepts like "Nature," "Place," and "Identity" have all undergone fundamental redefinition (creatively, critically, even cynically) in the 21st century. Can "natural history" be similarly redefined to include indoor digital pursuit? Indeed, can one even make the presumption now, with the spread of hand-held devices, that digital worlds correlate with indoor (versus outdoor) environments? New "augmented reality" environments are collisions of virtual and real world situation. What is gained or lost when indoors and outdoors mix? Might more be lost than gained? And for whom, when, and where? Digital platforms are often claimed to enhance engagement, through aesthetic and/or interactivity, but when compared to the real thing, do they? Studies in natural history provide ample testing ground for these questions.

From a pedagogical perspective, one can ask, how do digital media help or hinder learning about natural history? There is much research to support the merits of screen media as tools for education and raising environmental awareness (de Jong et al. 2008, Uzunboylu et al. 2009, Hwang et al. 2012). Digital devices can be seen as valuable support tools for identification and sharing observations and questions,

and as platforms for comparing data and generating hypotheses. Many citizen science programs that are focused on natural history observation appear to be strengthened by such digital platforms. How can they be best used to increase interactivity, whether it is for analysis, idea generation, or situating local or global relevance? Is digital the secret to co-creation of a more democratic and inclusive natural science?

On the other hand, what might be missing from the real world experience of natural history observation that does not translate digitally? Outdoors, in “the field,” one relinquishes control. There are chance observations of novel behaviors and random encounters with new species or different perspectives of landscape. The reward of the truly serendipitous that can befall at any time in the field is not a feature of most digital worlds, where functionality is programmed to be delivered at the intentional touch of a button. Even the random negative aspects – extreme weather, biting creatures, rashes from plants and blisters from uneven terrain – all form part of the sensory experience that builds patience and capacity for perseverance through discomfort. Successfully negotiating a preprogrammed obstacle or challenge is not the same as sticking out chaos in the field for a generally random and fleeting reward. Even when the digital is moved into the outdoors, conditions are limited. The best backlit mobile devices with glare resistant screens are still restricted to certain angles of sun, to the life of a battery, and often to the absence of rain.

Arguably most effective learning is highly experiential and immersive. A diversity of contemporary studies support the fact that hands-on sensory encounters have the most emotional and cognitive impact (e.g., haptics; Boroditsky and Ramscar 2002), and that, in some ways, humans may be hardwired for this kind of direct experiential learning (ecopsychology; Kahn and Hasbach 2012). But while there appears to be a heartening rebirth of back-to-nature approaches, this is overwhelmed by the tide of technological advance that immerses younger generations in increasingly virtual worlds.

There are also important socio-economic issues to consider. Globally, more children are being raised in urban settings, where encouraging exploration out-of-doors may actually be harmful, particularly where that environment is heavily polluted (e.g., with contaminated soil and water). This is particularly significant for poorer communities even within developed countries, which are more likely to live in highly industrialized environments (Landrigan et al. 2010). In these situations, perhaps virtual explorations of natural history

are the most humane and democratic access points for exploring natural history. While cities do not necessarily preclude the exploration of local “natural” history, the scales of urbanization encompass an extreme spectrum in most cities, and at the upper extreme encountering natural history may really only be achievable on a digital screen. Although the viral story of the “light-starved” citizens of heavily polluted Beijing flocking daily to huge television screens to see the sunrise was proved a hoax (Smith 2014), the scenario is plausible even now, let alone in the future. In some places, digitally presented natural phenomena may come to be the only means for people to see what they are missing, and a digital proxy may make real encounters with natural history a desired goal.

A Summary and Challenge

Wordsworth bid us, “Come forth into the light of things, let Nature be your teacher.” Can the 50-lux light of a digital screen really deliver to the same degree? I penned this editorial sitting on a rather rough log at the edge of bush and stream. I thought more creatively and clearly on that log, scribbling on paper on my knee, than I could at my office swivel chair and computer screen behind blinds. I was more sincere in reflection there, and exuberant in intent. We need to think carefully about where digital media can assist and where it will impair a future generation’s valuing of natural history, and ultimately their level of environmental awareness and responsibility.

How does digital technology help or hinder learning about or practice of natural history? Can “natural history” observation include indoor digital pursuit? What is gained or lost when virtual and real mix? Are digital tools and platforms the secret to more democratic and inclusive natural sciences? Come join us in bravely tackling these distinctly 21st century questions. The *Journal of Natural History Education and Experience* is issuing a call for papers devoted to exploring this theme. An on-line forum associated with this two-year special series will be dedicated to discussing its varied issues: <http://naturendigitalage.wordpress.com>. We hope you will share our excitement about this thought-provoking project and look forward to hearing your views on ways in which it can develop.

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