

Rethinking Technology & Creativity in the 21st Century

Learning to See: Perceiving as a Trans-disciplinary Habit of Mind

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“The world is full of obvious things which nobody by any chance ever observes...”

You see, but you do not observe. The distinction is clear.”

– Sherlock Holmes
(Sir Arthur Conan Doyle)

“We do not see the world as it is. We see the word as we are.”

– Anaïs Nin

“You only see what your eyes want to see.”

– Madonna

In their book, *Sparks of Genius*, Michele and Robert Root-Bernstein (1999) described the ways that creative scientists and artists generally use a key set of cognitive skills that cut across disciplinary boundaries. As they wrote:

...at the level of the creative process, scientists, artists, mathematicians, composers, writers, and sculptors use...what we call “tools for thinking,” including emotional feelings, visual images, bodily sensations, reproducible patterns, and analogies. And all imaginative thinkers

learn to translate ideas generated by these subjective thinking tools into public languages to express their insights, which can then give rise to new ideas in others’ minds. (pg. 11)

Inspired in part by the Root-Bernstein’s we have analyzed and listed seven such “tools for thinking” as being key trans-disciplinary skills needed for creativity. These skills encapsulate the ways in which creative people and effective learners think. They include, Perceiving, Patterning, Abstracting, Embodied Thinking, Modeling, Play, and Synthesizing. Each skill will be covered in a forthcoming column, as we go along.

In this column we will look deeper at one specific trans-disciplinary skill – that of perceiving.

Perceiving Perception

The cognitive tool of perception is critical to all disciplines, spanning the arts and the sciences, language and politics, psychology and music, and more. We see it as a two-layered process, requiring both observing and imaging.

Observing is the first step to understanding anything. It is a carefully honed skill based on “intent focus on,

attention to, and curiosity about information gathered through the five senses.” (Mishra, Koehler, & Henriksen, 2011, pg. 25) For example, an ornithologist might identify bird species by sound, and chefs can identify spices or flavors by sense of smell. Technicians and mechanics develop a hands-on experience of observation with tools and machines - relying on physical feel to know how tightly a part should be screwed in, or how far to twist a knob.

Another aspect of observation calls for imaging, which means evoking, or calling to mind the impressions and sensations we have observed, without the physical presence of these things. For example, a physicist or an artist will visualize problems or pictures, just as a dancer or a musician will enact music or movement in mental terms, and possibly use this information to “see” even further. Such visualization is essential to sense memory and mental imagination; and professionals across disciplines from engineering to art all have well-developed imaging skills based upon their disciplinary lenses and skills. While perceiving plays out differently depending on the rules, norms and knowledge of a discipline, at a meta-level it is always essential to creativity.

Disciplinary Lenses Shape Our Personal Worlds

Creative thinking requires a “prepared mind” (Henriksen, Mishra & the Deep-Play Research Group, 2014). Implicit here, is the fact that disciplinary lenses influence our perception, and how we view the world. For better or worse (and everything in between) our own disciplinary expertise influences what we observe and what we do not – the possibilities that we can imagine and those that we miss.

As author William S. Burroughs once said, “Nothing exists until or unless it is observed. An artist is making something exist by observing it. And his hope for other people is that they will also make it exist by observing it. I call it ‘creative observation.’ Creative viewing.” (Sobieszek, 1996)

As it turns out, there is even a term for this psychological tendency to see things based upon one’s professional knowledge and experience. The idea of “deformation professionnelle” – meaning “professional deformation” or “job conditioning” has been described as “the tendency to look at every context from the point of view of one’s profession” (Horowitz, 2013). Alex Carell a French scientist and Nobel laureate, described this as follows: “Every specialist, owing to a well-known professional bias, believes that he understands the entire human being, while in reality he only grasps a tiny part of him” (Carrel, 1935, p. 43).

In other words, the kinds of education and training we have (as well as the norms of and socialization in our fields) frequently shape, enhance, or even distort, the manner in which we view the world. Or perhaps more simply, as the old colloquialism goes, “If you’ve got a hammer, everything looks like a nail.” And in this, there are implications for creativity – since how we see the world impacts our understanding, thinking, and imagination. This speaks to the power of observation and mental imaging – or the first trans-disciplinary skill of perceiving.

The challenge is that one’s disciplinary lens can become a set of

blinders restricting our viewpoint and preventing us from seeing the world as is. So even as we value the importance of seeing through disciplinary lenses, we need to be sensitive to the fact that we may just be seeing “a tiny part of the world” and mistaking it for the “entire” world.

On Looking: A Framework for Perceiving

One recent example that comes to mind of someone who both explored the value of disciplinary lenses, but also attempted to see the world through different lenses, is the book “On Looking: Eleven Walks with Expert Eyes” by Alexandra Horowitz. Horowitz (2013) focused on the fact that we all perceive the world in subjective terms, as framed by our own experiences, and in particular by our own disciplinary expertise and ways of knowing and yet managed to overcome its limitations by in a creative manner.

Horowitz’s book is organized around a series of eleven walks that she takes through her neighborhood in Manhattan, each with an expert from a different subject area. There is such diversity between each of the people she takes a walk with (from an urban sociologist, to a noted artist, to a doctor, a scientist, a sound designer, and others), that it becomes clear that disciplinary lenses and personal identity create a tremendous variance in observations and viewpoints. As she records what is observed by each person, she notes how what they do influences the specifics and generalities of what they see and experience – even in the simple act of a walk through the city. The things they notice show us something about issues of attention and cognition related to being an “expert observer.” (Horowitz, 2013)

This reflects how people gain expertise in their fields, in that experts train their thinking to deal with specific problem solving capabilities. They tune their brains to perceive things with a different approach, even when these things are not available in plain sight. Experts in the arts,

mathematics, science and engineering, all have well developed higher-order observation skills, or perceiving skills, which they find integral to their work (Mishra, Koehler, & Henriksen, 2011).

This expert perception is not limited to disciplines like the arts or medicine. In the book *The Mind at Work*, Rose (2004) found differences in the ability to observe and visualize among experts in skill and training-based jobs too. For instance, expert plumber and carpenters could tell the flaw in a bathroom fitting or a windowsill just by looking at it, because their observation was so carefully honed as to pick up on subtle details effortlessly. In some instances, these experts could tell the dimensions of the equipment with a glance. In simpler terms – anyone who is good at something has learned to see the world through a disciplinary lens.

Horowitz (2013) emphasized this claim with certain examples. For instance, she described that in the field of chess, “An expert chess player, in a glance, sees more and different things as compared to a novice. They see several advance moves and link them with the old moves. Experts find more meaning than novices. They familiarize the chess pieces like their friends. This is a display of their extensive memory and expertise. Having expertise in chess changes their perspective towards things.” (p. 49)

All of this speaks to the power of observational prowess and visual thinking, combined with the way that disciplinary knowledge and experiences shape and prime our minds, along with our own personal “micro-cultures”. This helps expand a persons thinking and creative possibilities, by enriching their pool of mental resources. Creativity requires deep disciplinary knowledge – but at the same time it requires one to think broadly, across disciplines. This requires an “(in)disciplined” approach (Mishra, Henriksen, & the Deep-Play Research Group, 2012), which emphasizes sensitivity to the fact that creativity happens within a particular discipline or context, but is also “indisciplined” (unbounded, and cutting across disciplinary limits

to emphasize divergent thinking and imagination). To navigate this kind of creative thinking within and across disciplines, a person must not only continuously work to deepen their specific disciplinary knowledge (which experts already do), but also broaden and enrich the kinds of experiences, ideas and personal interests they engage in outside of their discipline.

After every walk with an expert, Horowitz (2013) found a transformed perspective of the world bestowed upon her. These fresh visions also opened her to new experiences. After spending time with the experts, she started noticing things that she either did not know existed in the first place, or had ignored the existence of. She was exposed to the world from different experts' perspectives and became more aware of aspects of the world that never meant anything to her before these walks. After spending time with these different disciplinary lenses, Horowitz (2013) acknowledged changes in her "vision". She notes that "the more she stopped in one spot, she started seeing more things." (p. 122)

Perceiving in Educative Terms

Since perceiving has value across disciplines in the real world, it clearly has significance for how disciplines are taught and learned in the classroom. In our Master of Arts in Educational Technology program at Michigan State University, we have a course focused around creativity in teaching, in which our Masters students (who are also teachers) develop lessons and/or classroom artifacts based around the seven trans-disciplinary skills. Whether they are teaching high school drama, elementary school math, or any other subject or level, they tailor activities or practices for their context around the seven skills, starting with perceiving. By having teachers consider perceiving through observing/imaging in their own teaching practices, we see a nice range (across the class) of examples of the perceiving skill in different disciplines and teaching settings.

For example, one high school English teacher created a perceiving lesson focused on the genre of memoir writing. She wrote a lesson in which students did a memoir project beginning with a key image or memory in mind (preferably a tangible object). They would observe the object with all of their senses and bring as many memories to mind as possible. These tactile and sensory memories were then re-imagined using words, to create a new short story of their own. The teacher who created this went so far as to try the lesson for herself, so that she could observe how it worked before using it with students. She chose her grandfather's fly-fishing rod from the early 1920's as her object. In her own words she noted, "I spent a great deal of time observing this object, and in the process, many, many memories flooded my mind. Primarily observing it in a tangible way through touch and feel, I began to have feelings that I hadn't felt in a very long time regarding this object, as well as my grandfather." Her short story entitled, "A Habit Never Broken" was something that, as she put it, "allowed me to progress from touch to sight in the form of the written word – a vital step in the memoir writing process."

Another example is in an art teacher who explored the topic of portraiture through the skill of perceiving. She used different ways of having her students draw portraits by drawing not simply what they initially see, but instead using strategies to strengthen their perception. She described the use of a blind contour drawing exercise, or a continuous line drawing in which the artist never picks up the pencil and never looks at the paper. This forces an artist to move their drawing hand along with every shape curve and contour they observe, without looking for an accurate end result. She added some unique variations on this, in which sense of touch might be used to help the artist visually translate the face, or in which the blind contour would be done upside down, to further challenge the artist to carefully attend to observing details and then imagining them into form. While these leads to rather

atypical portraits, it is the learning experience of perceiving that is key to the art students. She noted that, "Learning to 'see' seems like a task for only those who suddenly gain sight after blindness, but as an art teacher (and student) I have certainly noticed that people can learn to 'see' the details, depth cues, shapes, light and shadow."

These are just a couple of examples of how our students apply perceiving to the teaching of different subjects and contexts. Whether in physical sciences, arts, humanities, or language learning, there is a wide variability of ways that teachers can instantiate perceiving in their teaching. Like experts, taking the time to learn and practice higher-order observation skills can improve one's disciplinary knowledge or expertise.

Expanding Our Lenses and Walking in the World

We all have our own uniquely created arrays of knowledge, experiences, and expertise. This gives us a certain individualized perspective of the world around us. We take this with us wherever we go in what we see and imagine, even in things that don't conform to our expertise. These are our unique spectacles of perception.

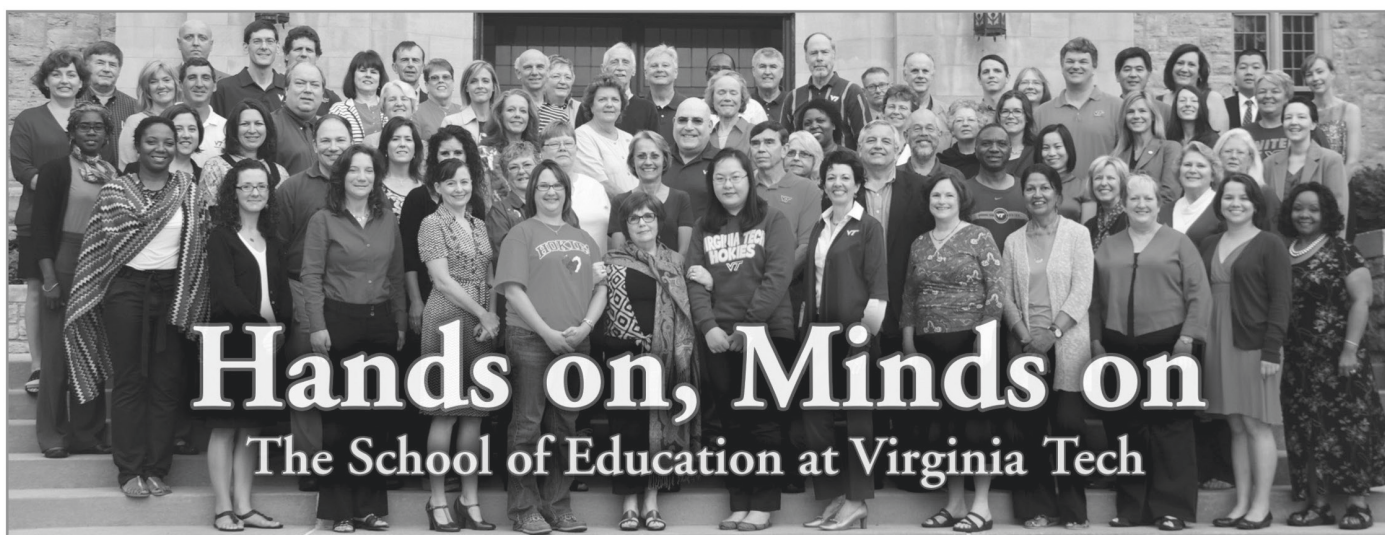
Our different perspectives stem from the choices that we make. Things that we choose to see and choose to ignore are based on our disciplinary experiences (Horowitz, 2013). This speaks again to the power of disciplinary lenses for seeing and imagining the world in dramatically different ways, and to the value of broadening our personal lenses by expanding on our experiences, interests, and disciplinary knowledge. As we have previously discussed with regard to combinatorial creativity (Henriksen, Mishra & the Deep-Play Research Group, 2014), adding to and expanding upon personal experiences, interests, and knowledge of widely varied subject matters is a way to develop these micro-cultures of the mind, and expand our pools of mental resources (Popova, 2012). These mental resources are what

offer us opportunities to try out new lenses, and perhaps new ways of “walking in the world”.

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References

- Carell, A. (1935). *Man, The Unknown*. New York: Harper and Brothers
- Henriksen, D., & Mishra, P. (2013). Learning from creative teachers. *Educational Leadership*, 70(5).
- Henriksen, D., Mishra, P., & the Deep-Play Research Group (2014). Twisting knobs and connecting things: Rethinking Technology & Creativity in the 21st Century. *Tech Trends*, (58)1, P. 15-19.
- Horowitz, A. (2013). On Looking: Eleven Walks with Expert Eyes. Simon and Schuster.
- Mishra, P., Koehler, M.J., & Henriksen, D. (2011). The Seven Trans-Disciplinary Habits of Mind: Extending the TPACK Framework Towards 21st Century learning. *Educational Technology*, 51(2) 22-28.
- Mishra, P., Henriksen, D. & The Deep-Play Research Group (2012). Rethinking Technology & Creativity in the 21st Century: On being (in)disciplined. *Tech Trends* 56(6), 18-21.
- Popova, M. (2012, June, 6). Combinatorial creativity and the myth of originality. *Innovations: How human ingenuity is changing the way we live*. Retrieved from <http://blogs.smithsonianmag.com/ideas/2012/06/combinatorial-creativity-and-the-myth-of-originality/>
- Root-Bernstein, R. S., & Root-Bernstein, M. M. (2013). *Sparks of genius: The thirteen thinking tools of the world's most creative people*. New York: Houghton Mifflin.
- Rose, M. (2004). *The mind at work: Valuing the intelligence of the American worker*. Penguin.
- Sobieszek, R.A. (1996). *Ports of entry: William S. Burroughs and the arts*. Los Angeles, CA: Los Angeles County Museum of Art.



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