Innovation through Experiential Learning: An Exploration of Maker, Hacker, and Coworking Spaces

An excerpt from research conducted by Susan Whitmer, Research Lead for Education at Herman Miller, Inc. 2014.

A growing community of makers, hackers, and coworkers are creating a learning-by-doing culture that is shifting how future workers create, design, build, and produce, and, ultimately, innovate. Spaces that support these activities are being created on academic campuses, in public libraries, and in communities where learning-by-doing is becoming the norm. The terms maker, hacker, and coworking describe movements, activities and/or spaces, and are used interchangeably. While there are activities common to all three types of spaces, the users and their intentions vary from space to space.

Defining Making, Hacking, and Coworking Movements, Activities, and Spaces

**Makerspaces**
Makers innovate through tinkering. The maker movement has been described as “what happens when the web meets the real world” (Kansara 2012). The activity of making combines the internet with desktop manufacturing tools, resulting in a democratization of access to the tools needed to make things. This brings the ability to tinker, design, and prototype products to the novice and budding innovator. With a computer, laser cutter, and 3D printer, any novice can learn to make a product in a relatively short period of time and with minimal resources. The tools and activities available in makerspaces empower users to expand their creative horizons, build new skills, and attempt new projects in a safe environment that supports risk and failure.

“Making is fundamental to what it means to be human. We must make, create, and express ourselves to feel whole” (Hatch 2014). Although making dates back millions of years, the maker movement developed a resurgence of momentum with the publication of Make Magazine in 2005 and the launch of Maker Faires in 2006. Maker Faires are annual, global, and large gatherings of people who share their knowledge and experiences of making. Today, makerspaces can be found in public libraries, church basements, high schools, community centers, and college and university campuses. As a librarian from Westport Public Library explained, “We see this makerspace as a symbol of the changing library. Our whole library is really a participatory learning space, and makerspace is just another word for that.”

**Hackerspaces**
Hackers innovate through deconstruction. Hacking is a form of tinkering with the goal of understanding how something works. In today’s hackerspaces, individuals with similar interests gather together to work on projects; deconstruct and rebuild computers, electronics, and equipment; share knowledge; and collaborate, which all lead to inventions and innovations.

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1 Interview at Westport Public Library, Westport, CT
The term hacker dates back to 1960 and the Massachusetts Institute of Technology’s (MIT) Tech Model Railroad Club (Red Hat, Inc. 2008), a group that met to design and construct large, detailed model train sets. Members who found innovative ways to solve design or construction problems were referred to each other as hackers. In the 60s and 70s, computers entered the academic landscape. At MIT’s Artificial Intelligence Laboratory, the same students who had been playing with trains started playing with computers.

A hackerspace is where individuals with similar interests gather to work together on projects, share knowledge, and collaborate on ideas. It is a community-oriented place that brings in or connects individuals looking to learn or collaborate (Foertsch and Cagnol 2013). “A school without all the structure” is how a Geek Group leader describes its hackerspace. “This building is a place for anyone with a sincere and passionate desire to learn to come and learn anything they want about anything they want at their own rate, on their own time, on their own dime.”

Hackerspaces could be considered pre-models of coworking spaces.

Coworking Spaces
Coworking members innovate through networking. Coworking exists within makerspaces, hackerspaces, and coworking spaces, but what is specific to coworking spaces is the intention behind people working alongside each other as part of a community. Curators or Community Managers in coworking spaces devote much of their time and resources to building an interdependent community.

The term coworking was coined by Bernie DeKoven in 1999 to identify a method that would facilitate collaborative work and business meetings coordinated by computers. He realized people and business were too isolated and hierarchical to be considered "working together as equals” (DeKoven 1999). He aimed to support collaborative work through a non-competitive approach while giving people the opportunity to work on their own projects (Foertsch and Cagnol 2013). Today’s definition of coworking spaces extends beyond technology. Coworking is also the social gathering of a group of people who work independently but share values and are interested in the synergy that can happen from working with like-minded talented people in the same space (Miller 2007). The most successful coworking spaces today are intentionally focused on building community. The Community Manager at NextSpace describes what differentiates it from other third spaces: “When you think about it, you can get a desk almost anywhere you can get an internet connection – you can get that at home, you can get that at a Starbucks. What we feel separates us is the community of people. People come for the space, they come for the desk, but they wind up staying for the community aspect.”

Connections to Learning Theory
Connecting the dots between what is known about contemporary learning theory as it relates to experiential learning (learning-by-doing) and the activities and spaces that support experiential learning is critical to gaining support from stakeholders who invest in innovation spaces that support and nurture making, hacking, and coworking activities.

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2 Interview at the Geek Group, Grand Rapids, MI.
3 Interview at NextSpace, San Francisco, CA.
Academic researchers have discovered that being a lifelong learner in a knowledge society requires more than simply reading about how to do something or listening to an expert explain how to do something. Instead, deep learning comes from the experience of doing, a notion rooted for decades in the learning theory espoused by Dewey, Vygotsky, and Piaget. “Learning in the 21st century also requires a capacity to learn that reflects a range of dispositions; to be curious, resilient, flexible, imaginative, critical, reflective, and self-evaluative; educators today do not want to produce ‘human encyclopedias, mere repositories of facts’” (Gustafson 2013, 35).

The theory of constructionism aligns with the culture of maker/hacker spaces, given the spatial nature, tools, and resources that are available to users (Martinez and Stager 2013, Schrock 2014). Papert extends the theory of constructivism (from Piaget and others) to include materials and tools in the learning process and posits that “learning is most effective when part of an activity the learner experiences is constructing a meaningful product” (Papert 1986, 204).

Papert’s thoughts on the use of tools in the learning process also align with other socio-cultural theories of learning. In her discussion of Fabriken, a public maker space in Sweden, Nilsson points out that tools have the ability to affect how individuals “think, act, and behave.” Tools are active objects (Nilsson 2011, 294). Drawing on the work of Wertsch and Vygotsky, Papert writes, “New tools enable new kinds of actions….Processes like remembering, problem solving, or being creative are tightly connected to the tools applied” (p. 294). Similarly, drawing on the work of Centina in his study of hacker/makerspaces, Schrock notes that “self-discovery…comes from encounters with objects” (Schrock 2014, 1).

Self-discovery, collaboration, co-learning, developing skills for future employment, and social interaction through the promotion of multidisciplinary cross-talk and critique among people are how makers, hackers, and coworkers learn and create in a “safe environment” (Kayler, Owens and Meadows 2013, 6, Gross and Do 2009, Tenebaum, et al. 2013).

Conclusion
An innovation space demands resources, takes an interdisciplinary perspective, and supports a variety of activities, ideally all within one building. Spaces for ideation, coworking, tinkering, play, prototyping, and development are critical to innovation. Spaces that foster these activities exist in public library and community makerspaces, community hackerspaces, campus maker/hackerspaces, and coworking spaces. Attributes of each of these, when incorporated into a centrally located building on campus, could elevate interdisciplinary innovative thinking and better prepare graduates to enter a world of disruptive change.

Writer William Gibson said, "The future is here, it is just not evenly distributed." For those academic and corporate institutions that have little or no exposure to innovation spaces, harvesting great ideas within the institution is a place to start. Students, faculty, and employees have creative and constructive ideas about attributes of spaces that help them learn, create, and innovate. Studying how these ideas were developed and implemented on a small scale will help leaders and planners understand how the activities might be planned, implemented, operationalized, and scaled to reach maximum potential.