

## 7

## OPEN-SOURCE CULTURE AS INSPIRATION FOR DESIGN OF EDUCATOR LEARNING NETWORKS

*Rafi Santo*

### Introduction

Open-source culture and the notion of “open networks” has led to important shifts in the ways that learning, collaboration, and invention occur in fields ranging from science (Anderson, Cobb, Korpela, Lebofsky, & Werthimer, 2002; Eiben et al., 2012; Nielsen, 2012) to journalism (Gillmor, 2004) to business (Chesbrough, 2006; Von Hippel, 2001; Von Hippel & Krogh, 2003). However, there is limited work that has explored how education might leverage ideas of open networks and associated open work practices. While the movement to promote development of open educational resources (OER, OECD, 2007) has drawn on open-source culture to argue for more extensible and available educational materials, its conception of “open” has focused on the “content” of education—curricula, assessments, syllabi—but has not actively looked at the practices of open learning and design by collectives of educators. Such exploration is worthwhile, especially given the increasing downward pressure on teachers in the age of accountability, associated deprofessionalization, and decreasing valuation of educator creativity and collaboration. I believe that the open work practices I describe in this chapter provide a needed contrast to these trends in the professional life of educators.

In this chapter, I explore how a designed organizational network of more than 70 informal learning organizations, Mozilla Hive NYC Learning Network, drew on open-source cultural practices as a means to promote socially driven collaborative learning among its educators. I explore the notion of “Working in the Open” (Santo, 2017; Santo, Ching, Hoadley, & Pepler, 2014, 2016), a set of work practices that value transparency, an experimental stance and open contribution, and I argue that it represents a departure from existing industrial influences of scientific management and Taylorism in education. I’ll discuss five core practices associated

with “Working Open”—(1) *Public Storytelling and Context Setting*, (2) *Rapid Prototyping “in the Wild,”* (3) *Enabling Community Contribution*, (4) *Public Reflection and Documentation*, and, last, (5) *Creating Remixable Work Products*, and will share how these practices are distinctive in their emphasis on promoting open participation in learning and design activities within networks of educators. Following this, I’ll share how Hive NYC stewards supported educators in the network to engage in working-open practices both through enculturation and modeling these practice and through providing a consistent “platform” of participation structures in which educators could work openly with one another.

### ***Open-Source Culture and Peer Production***

Open-source modes of production emerged from the free/open-source software (F/OSS) movement, in which new forms of collaborative creativity became possible through digitally connected networks and computer code that was easy to view, copy and “remix.” As a contrast to traditional modes of production with more strict divisions between producers and consumers of goods, open source blurred these lines, first in the world of software and eventually in other domains. Scholars have framed these ways of working as *commons-based peer production* (Benkler, 2002, 2006) and *open collaboration* (Forte & Lampe, 2013). Benkler defines commons-based peer production as a socioeconomic model of production, aided through internet-based coordination, wherein many distributed and often volunteer actors self-organize to contribute to larger projects in a relatively decentralized manner (Benkler, 2002). Forte and Lampe (2013) speak about open collaboration systems as ones “that (a) support the collective production of an artifact (b) through a technologically mediated collaboration platform (c) that presents a low barrier to entry and exit and (d) supports the emergence of persistent but malleable social structures” (p. 536).

These open practices have been used to produce widespread software projects such as the Firefox web browser and Linux operating system but have also found their way into domains and disciplines that go far beyond the production of computer code. Most famously, the online encyclopedia Wikipedia is continually produced through open collaboration practices among a global network of volunteer editors who cocreate knowledge rather than software. Such open practices have found their ways into many sectors, as mentioned earlier, reshaping each to suit the purposes and existing cultures at play, while at the same time shifting existing ways of organizing work. Within education, the movement of open educational resources has drawn off of open-source culture but has been oriented toward open “content”—freely available and remixable curricula, assessments, course syllabi, and so forth—but not oriented toward the work practices of open innovation that I address in this chapter, ones that focus more on ways of connecting educators through routines of creativity, experimentation and circulation of new approaches to learning.

One distinctive feature of open-source production practices is that social capital plays a key role. Production is seen as a collaborative and social achievement among communities that are passionate about a particular interest, one characterized by relationship development, trust formation, and the circulation and remix of ideas via networks of actors. In this chapter, I look at how these practices coming from F/OSS culture circulated their way into education by investigating how they were at play in the Hive NYC Learning Network.

### ***Prior Influences of Industry on the Organization of Education—Taylorism and Scientific Management***

In considering open work practices as an emerging way to organize the professional activities of educators, it's helpful to contextualize and contrast them with how education has been historically influenced by industry-linked modes of production. Most notably, the logics of Taylorism and scientific management (Taylor, 1914, 2004)—which emphasize values of efficiency, productivity, measurable results, reducing task complexity, and increasing surveillance of labor by management (Noble, 1977)—stand in stark contrast to open-source practices valuing creativity, experimentation, and collaboration among educators.

The incorporation of Taylorism and scientific management in education is linked to what are pejoratively referred to as “factory modes of schooling” or “one-size-fits-all” learning, logics that educational historians and curriculum theorists have substantively documented in schooling throughout the 20th century and into our current era (see Callahan, 1964; Kliebard, 1975, 2004; Labaree, 2010; Tyack & Tobin, 1994). Education leaders promoting scientific management, such as John Franklin Bobbit, David Snedden, and Edward Thorndyke, explicitly saw pedagogical choices as too complex for educators themselves and other experts as more equipped to do so, with educators simply being vehicles for the designs of others. As Bobbitt (1913, as cited in Au, 2011) noted,

The burden of finding the best methods is too large and too complicated to be laid on the shoulders of the teachers . . . The ultimate worker, the teacher in our case, must be a specialist in the performance of the labour that will produce the product.

*(pp. 52–53)*

Critical education scholars such as Au (2011) mince no words as they characterize how Taylorist reformers like Bobbitt conceptualized the project of education under the logic of scientific management:

Students are the “raw materials” to be produced like commodities according to specified standards and objectives. Teachers are the workers who

employ the most efficient methods to get students to meet the pre-determined standards and objectives. Administrators are the managers who determine and dictate to teachers the most efficient methods in the production process. The school is the factory assembly line where this process takes place.

(p. 27)

Within this logic, the reduction in educator agency also prompted a reduction in their creativity and intellectual engagement with their profession (Kliebard, 1975).

Taylorism in education has arguably come in three waves. In the first, policy elites, state officials, university professors, and district superintendents in the first half of the 20th century enshrined these views into the now taken for granted “grammar of schooling” encompassed by policies such as the Carnegie unit, age-segregated and standard-sized classrooms, and educators who teach largely in isolation (Tyack & Tobin, 1994). Au (2007, 2011) argues that the more contemporary movement towards high-stakes tests, associated narrowing of curricula, and accountability mechanisms associated with No Child Left Behind represent a second wave of influence, a “New Taylorism” (Au, 2011, p. 25). Finally, emerging scholarship on “personalized learning” technology and adaptive learning platforms argues that such approaches “mirror reform efforts in the early twentieth century that sought to apply the managerial logic and organizational structure of the factory in order to rationalize all aspects of mass public education” through reducing the teacher role to that of facilitator while an algorithm makes most of the substantive decisions about pedagogy (Roberts-Mahoney, Means, & Garrison, 2016, p. 3).

Notably, some scholarship on open-source culture argues that open practices originally emerged themselves as a response to the incorporation of scientific management practices into the software industry. Hannemyr (1999) outlines how Taylorism took shape during industry professionalization in the form of “code reviews, structured walkthroughs and miscellaneous programming productivity metrics” (p. 3), practices put in place in order to ensure managerial control over what had been a more freewheeling and informal culture of production that had existed prior to the growing market for computing. In a similar vein, then, I interpret the engagement with open-source practices in education outlined in this chapter in light of the history laid out earlier regarding educational modes of production: as a reaction to the dominant logics of Taylorism and scientific management and an embracing of a contrastive mode of production coming from open source that values collaboration, agency, and creativity. In the next section, I describe the context in which I observed those practices at play—the Hive NYC Learning Network.

## Hive NYC: a Network of Informal Digital Learning Organizations

Hive NYC was one of several Hive Learning Networks stewarded by the Mozilla Foundation and initially funded by the John D. and Catherine T. MacArthur Foundation. It describes itself as

a city-wide laboratory for educators, technologists and mentors to design innovative, connected educational experiences for youth . . . Together, they create an ecosystem of equitable and accessible education opportunities for young people to explore their interests and develop skills that prepare them for success in the digital information age.

(HiveNYC.org, March 2017)

AuQ34

This description encompasses two functions used to describe Hive networks. They act as “networks *for learning*”—helping to create a broad ecosystem of learning experiences for young people to support their learning trajectories across different institutions within a city. They are also “networks *that learn*”—a context in which educators and the organizations they’re part of collaborate, share, and learn from one another as a means to develop new educational initiatives and collectively build expertise.

Made up of more than 70 informal learning organizations, Hive NYC’s members have a range of missions, specialties, and resources. They include major cultural institutions such as Carnegie Hall and the American Museum of Natural History, the city’s library systems and parks department, grassroots community-based organizations such as Dreamyard and the Brooklyn College Community Partnership, and other youth-serving nonprofits that focus on particular pedagogical approaches and specialties like the Institute of Play, Global Action Project, the LAMP, Beam Center, and Iridescent. Member organizations develop learning initiatives around web and game design, film and music production, informal science, “maker” education, journalism, youth organizing, media and digital literacies, coding and electronics, and other emerging digital technologies. At the same time, they share a common interest in promoting youth pathways with technology and exploring new pedagogies enabled by technology. Broadly, members aim to promote interest-driven learning approaches that center on creativity and production and are accomplished collaboratively with mentors and peers, aligning with ideas of Connected Learning (Ito et al., 2013) and constructionism (Papert, 1980).

AuQ35

AuQ36

Hive NYC is stewarded by the Mozilla Foundation, whose open-source philosophy has informed the design and facilitation of community activity. Mozilla is most well known for designing the open-source Firefox web browser, and in 2010, it launched an education effort focused on digital equity and web literacy, goals it sees as critical for maintaining the internet

as an open public resource. Hive Learning Networks, within this larger effort, represent contexts for developing new approaches to mobilize educators around these goals. Later in the chapter, I describe the activities that Mozilla stewards provide as a means of supporting the work and learning of educators in the Hive.

### **“Working in the Open” as a Set of Collaborative Learning Practices**

In my fieldwork studying Hive NYC from 2012 to 2015, notions of “Working in the Open” were regularly discussed by Mozilla staffers as a way of addressing consequential problems through design processes rooted in values of transparency, collaboration, and flexibility. If, for example, a group of educators saw an emerging need for young people to understand that the internet is a designed context and thus “remixable” (as I will explore later in the example of Hackasaurus), the way of going about developing a technology, curriculum, or program model addressing this need would happen in public contexts, would aim to involve an ever-increasing set of contributors from a community of educators, and would be deeply documented “in the open” so others could learn from and participate in the process.

While it was rooted in the way that Mozilla developed the Firefox web browser through mass online collaboration, “Working Open” was seen as a general set of practices that could be applied across many domains. In Hive NYC, Working Open was promoted by Mozilla as a way of tackling issues within education by organizing the activities of the network in a way that might act as a “force multiplier” of efforts across many institutions, leveraging the expertise of many educators and acting as a mechanism for promoting learning and agency across the many actors involved. As Jason, one Mozilla staffer, shared with me in talking about Mozilla’s work in education,

You’re trying to build a thing, you encounter a problem you don’t have the answer to so you seek out knowledge through informal learning or research or through mentorship. [. . .] [We’re] trying to help other existing smart people and organizations rather than trying to bring them, sometimes we don’t need to bring them into our tent, we need to go out to where they are and empower them with what they’re already doing.

*(Interview, August 2014)*

In the next section, I detail the specific practices that advocates within Mozilla and the Hive NYC staff talked about within Working Open practices.

### ***Central Practices of “Working in the Open”***

As I spoke with those familiar with these practices and looked across various projects that were positioned as embodying them, five interconnected practices emerged as central to Working Open:

1. Public storytelling and context setting
2. Rapid prototyping “in the wild”
3. Enabling community contribution
4. Public reflection and documentation
5. Creating remixable work products

#### ***Public Storytelling and Context Setting***

Creating broader context and an ongoing shared narrative around a problem and project was often offered as fundamental to Working in the Open. Such activities were the mechanism that could inspire many actors beyond a given organization to join in, contribute to, and advance a larger vision. As Mozilla employee Jason put it, central to Working Open is

Trying to address a larger or shared social problem, trying to serve a mission as opposed to simply a bottom line and to think big, because ultimately that mission and that story that inspires is basically what sparks the force multiplier of open which is the passion of other people to want to contribute and build that thing with you.

*(Interview, August 2014)*

This practice emphasizes the central place of having a clear goal—a problem that a much larger community would be interested in working on together and putting time into. Ongoing narration and context setting also provides a mechanism whereby interested parties can follow the unfolding of a project so they can contribute in a productive way.

#### ***Rapid Prototyping “in the Wild”***

This practice of publicly piloting early-stage ideas embodied two key values of open work—those of “agility, speed, flexibility,” as Jason put it, and the importance of “starting small” and involving others early on in the process. Before an idea “went big,” it should be exposed to and advanced in real-world contexts. This could look like gathering some coworkers over lunch to look at some mock-ups, engage in a small activity, or play with a prototype. Or it could be more robust, like a more well-documented “user test” that invited educators



from multiple organizations to participate in a new curricular sequence before it was used more broadly. In this practice, testing and prototypes aimed to embody the “big idea” but in a small way. The core value here is to allow for rapid feedback that allows for course correction early in a project before substantive resources go into it.

### *Enabling Community Contribution*

Practices that allow a broader collective to get involved in an initiative exemplify the core value of open participation central to Working Open. Many of the other practices actively support this process. For example, public storytelling creates context that allows someone to become interested in a larger problem, and creation of remixable work products (which I will discuss shortly) lowers the barriers to contribution. Mozilla actors often spoke about supporting community contribution in terms of creating “avenues for participation” or “on-ramping,” and they emphasized the importance of having those initial experiences of contribution feel positive. Contributions could range in terms of their depth, from simply providing feedback on an early prototype or concept or providing space for a larger project to test out a lesson to more robust forms of participation that involved actively developing key parts of a project, like an educator becoming involved by contributing curricular approaches that built on their specific expertise. Developing projects in a way that actively enables participation by a broad community often involves rethinking the design process—questions of when, how, in what ways, and on what aspects of a project broader publics might engage with become key questions for project leaders to consider.

### *Public Reflection and Documentation*

Interwoven with practices of public storytelling are those that involve creating publicly available trails of documentation that include reflections on how projects are unfolding. Again, these practices help support “opening up” the process of creating new designs for learning. Publicly documenting the steps (and missteps) a project has gone through, creating visibility into why certain developments occurred and broadly creating a collective history allows others to both learn from a project and better contribute through understanding the challenges faced by a project. More practically, this process of reflective documentation often occurs in places like online forums and blog posts but also in in-person, “semi-public” contexts like meet-ups, conferences, or small roundtables. This practice supports both those already deeply involved as well as those that are more peripheral to use documentation in order to understand and contribute to ongoing projects.



### *Creating Remixable Work Products*

The final practice centered on creating “open” work products, be they curricula, software, or program models that others could easily and legally modify or reuse for their own purposes. Doing so in conjunction with the other practices meant that both the process and product were “open” for others to engage with and contribute to. This is perhaps where the technopolitical stance of open-source software is most evident within Working Open practices. In F/OSS, source code is both legally and practically accessible, and in Working Open, this value was expressed in a desire for all the products of educational projects to be similarly remixable. This could mean using “copyleft” licensing such as Creative Commons, Open Publication License, and GNU General Public License in order to create the legal conditions for remix, but beyond this legal standpoint, it could also mean considering how educators can create resources that are more easily adapted by others by privileging modularity and extensibility.

### *Working Open and the Development of Social Capital*

In emerging from a set of cultural practices coming from open source, ones that had their home in the networked environment of the online world, it shouldn't be surprising that actively valuing the development of social capital is both a key input and outcome of Working Open. The ways that Mozillians discussed these practices assumed leveraging social capital—engaging broader social networks as mechanisms for accessing resources, expertise, support, and unexpected opportunities (Lin, 1999)—would allow a project to flourish. At the same time, the orientation toward fostering networks of educators in contexts like Hive NYC that are characterized by strong relations and trust evidences a goal of building collective social capital not just for the sake of a given individual or project but as a collective asset (Coleman, 1990; Putnum, 1995). Working Open, by design, focuses on continually broadening the circle of actors involved, developing new and activating existing relationships within communities, and, in doing so, leveraging resources to deepen impact but also developing strong collectives that are better able to pursue goals together.

In particular, *public storytelling and context setting*, *enabling community contribution*, and *creating remixable work products* all have explicit orientations toward extending who is involved in the development and design of new forms of activity. Public storytelling and context setting creates conditions through which actors not yet involved can come to understand what a project is about and determine whether they care about the core problem it's addressing. Practices of enabling community contribution then provide the practical steps that those actors can take to become involved and contribute. Finally, creating remixable work products creates particular kinds of new possibilities for involvement through reducing practical,

technological, and legal barriers to contributing to solution development, or even the possibility of changing the goals of a project through the process of new actors finding new problems that a given openly licensed technology or innovation can be applied to.

One notable aspect of the priority of social capital development in open work is how it was sometimes framed vis-à-vis the purposes of doing so. Jason emphasized the pragmatic nature of this focus in terms of “building shared ownership”:

You’re trying to build the sense of a shared sense of ownership. Many projects in the world fail because they’re just three dudes in a room and then from that point on it’s just about, “Okay, how do we give flesh to our will?” We have this idea and now our job is just drive it out into the world. A lot of those projects fail, real top-down projects fail. Even though this still in many ways is the dominant model of development and production and trying to get things done because other people don’t have a stake. There’s no shared ownership around trying to make that goal a reality.

*(Interview, August 2014)*

By involving broader sets of actors in a project, you “build [. . .] a shared sense of ownership,” something he links to the pragmatic goal of preventing a project from failing due to people not caring about it, and, mentioned earlier, assessing the quality of a project’s core idea—“if the idea is genuinely worthwhile [. . .] other people have that same idea as well.”

Broadening the “who” of a project is viewed simultaneously as an expression of more philosophical and political values around participation and power, as well as practical ones related to more effectively organizing work. At one point, Jason framed the principle of transparency, something at the heart of Working Open, “as a way to be idealistic and pragmatic.” He shared,

Transparency is the way both to live and work your values but also, I think this is crucial, as a way to get more done. I think one of the central insights of open source is that radical transparency reduces collaboration costs. Collaborating with humans is complex and difficult. The way that we traditionally solve that problem is through the firm by organizing people into payrolls and little boxes in org charts. One of the central insights of a source is that by ripping the doors off the project and embracing transparency, you actually can reduce a lot of admin and chatter and noise and dumb obstacles to collaboration and make it easier for people to get things done.

*(Interview, August 2014)*

Here, Jason emphasizes that transparency and getting others involved in a project is a “way to [. . .] live and work your values” while also being “a way to get more done.” He frames the kinds of social capital development supported by working in an open and transparent way as an explicit contrast to traditional modes of production and divisions of labor found in scientific management and Taylorism, stating that “we traditionally solve that problem [of collaboration] [. . .] through the firm by organizing people into payrolls and little boxes in org charts,” something he doesn’t see as necessarily the best way to collaborate, linking those modes of production with “a lot of admin” and “dumb obstacles.” In his mind, open work, by “ripping the doors off the project and embracing transparency,” bypasses these problems. Again, the principle of transparency here is framed as being about broader political values around power and voice, but also about pragmatic approaches to organizing large number of actors to accomplish ambitious goals.

### **Hackasaurus: Enculturating Working Open Among Hive NYC Educators**

One of the first efforts that Mozilla engaged in within Hive NYC after it became the network’s steward in 2011 was a project called Hackasaurus, an online tool and associated curriculum promoting web literacy (Belshaw, n.d.). How its development unfolded, a highly collaborative effort among a distributed set of educators and educational organizations within Hive NYC, represents a case of Mozilla providing an opportunity for educators to become familiar with the culturally distinct mode of production Working Open represents. Within the context of broader efforts to support Working Open in Hive NYC, the development of Hackasaurus is best characterized as a way that Hive members were *enculturated* into open practices by engaging with a specific project driven by Mozilla. I’ll share about the project here from this particular vantage point—the opportunities it provided for Hive NYC members to engage in open practices.

Hackasaurus, later known as the “X-Ray Goggles,” was a browser-based learning tool that allowed its users to reveal and then remix particular HTML elements on a web page. In what follows, I share screen captures of the interface for remixing a web page (Figure 7.1) and a page after it has been remixed with the tool (Figure 7.2). By pressing a “remix” button while hovering the cursor over a particular element, such as a picture, a user could change the associated HTML code and preview changes in real time before “committing” to them. All changes were local to the user’s computer and not visible to anyone else visiting the same website from a different computer. These “hacks” could be shared via screenshots such as those I share here and eventually through other online platforms created by Mozilla.

AuQ37

Proof



FIGURE 7.1 The Hackasaurus “X-Ray Goggles Remixer” Activated on *The New York Times* Website

Taylor & Francis



FIGURE 7.2 *The New York Times* Home Page “Remixed” Using Hackasaurus  
 Elements changed include paper masthead, front page focal image, three article descriptions, and two focal images.

Proof

### ***Enabling Hive NYC Community Contribution to Hackasaurus***

Throughout the project, Mozilla acted as a project manager and aimed to create ways for Hive NYC members to participate. With a broader network already in place, various network gatherings, events, and communication channels served as contexts in which educators were invited to participate. At one point in the project's development, Rachel, the lead designer from Mozilla, shared with me that she was "building out tools and systems so that community members can be more involved." Eventually, the team working on Hackasaurus set up a range of structures that enabled contribution to the initiative by educators that were interested. These included an open listserv, "community calls" in which project updates and discussions could take place and that were documented in openly accessible collaborative documents called etherpads, and an open online wiki where anyone could add to and access an ongoing thread of project developments.

In addition to those digital contexts, there were many face-to-face and semi-public contexts that enabled community contribution. Central among these within the Hive NYC context was the development of "pop-up" events, described next, at which members could help test out new curricular approaches and technology features. Over the course of Hackasaurus's development, educators at the New York Public Library, Institute of Play, Mouse, Eyebeam, and the New York Hall of Science all played some role in project development, from developing curriculum, running youth leadership "squads," and hosting playtest events to generally giving feedback.

### ***Rapid Prototyping Hackasaurus Through "Pop-Ups" With Hive NYC Member Organizations***

One of the ways that Mozilla staffers enabled participation in development of Hackasaurus by Hive members was through partnering with member organizations in order to rapidly prototype and iterate on the technology and pedagogy associated with the project, a central practice of Working Open. Often, the forums for doing so, alternatively called Hack Jams or Pop-Ups, were enacted collaboratively among many Hive educators and organizations with Mozilla staffers.

Pop-Ups were full- or part-day events hosted by member organizations but usually organized by Mozilla staff wherein different organizations participated by hosting stations with different learning activities that focused on media production. Participants, which included not only youth but also families as well as other Hive NYC educators, would freely roam from station to station based on interest in the activities offered. Within these contexts, activities utilizing Hackasaurus were often offered as a means to test youth responses to the tool

in terms of how interested youth were in what it could do, the usability of its interface, and overall experience, and how well it supported certain kinds of learning outcomes.

In the course of these events, youth and staff of Hive member organizations simultaneously had the opportunity to engage with the learning practices the project promoted as well as engage in a collective effort around the iteration of the technology and pedagogy central to it, giving feedback and making suggestions that contributed to its development.

### ***Public Storytelling and Context Setting—Blogs as a Context-Setting Tool***

Throughout the development of the project, Mozilla staffer Rachel actively documented the Hackasaurus work through her blog, a key space of public storytelling for the initiative. In more than a dozen blog posts written in 2011 and 2012, Rachel provided narratives of where the project was in its development, recent activities, ways different educators had contributed, and, critically, different ways to get involved. Posts included everything from accounts of Hackasaurus workshops held at conferences and how educators responded to reflections from Pop-Ups at which the tool and curricula were tested to a variety of resources, such as learning objectives and toolkits associated with the project.

The process of public storytelling and context setting here was intimately linked to enabling community participation. In the process of these narratives, Rachel often implicitly and explicitly signaled that such participation was a norm of the project. In various posts, Rachel directly invited participation from anyone reading, whether it was as small as leaving comments about a prototype or as large as inviting educators to host Pop-Ups at which Hackasaurus could be tested.

### ***Public Reflection During Project Development***

Just as context setting and storytelling were public processes within the Hackasaurus project, so was reflection on how the initiative was unfolding. This sort of reflection occurred both in the blog posts mentioned and in semipublic contexts of community calls and after Pop-Up events where Hackasaurus was prototyped.

Blog posts from Rachel ranged from specific reflections on how, for example, a given prototyping session played out to more general “views from 10,000 feet” of her current thoughts on where the project was heading. An example of the former was a post she wrote about a prototyping session she held at the Mozilla Festival in 2011 wherein a group of participants came together to brainstorm, develop prototypes of, and test a variety of learning activities. She reflected on how a number of the prototypes “filled voids” in the project, such as “giving



users a playful introduction” to the tool and “providing a social, community space for users to collaborate and communicate.” In more general reflection later, she shared about the initiative’s thinking at that time about what the right learning objectives were, also sharing a difficult aspect of this process—determining what learning objects the project would *not* address:

In the end, the learning identity we’re interested in supporting is that of a web maker, someone who thinks about the web as a place for designing, crafting, challenging and coding. Coming to that allowed us to remove some of the other areas that are tangentially associated with the work we do, but are not our direct focus.

Sharing on her blog about the ways the project was coming to better understand what problems it was and was not aiming to solve is a direct example of this open practice of public reflection.

### ***Creation of Remixable Work Products—Code and Curriculum***

The work developed through the Hackasaurus initiative was shared as open educational resources by project leaders, inviting others to remix, build off of, and adapt both the technology and curricula resources of the project. The project’s leaders shared all of its content on GitHub, a public repository of open-source projects in which any interested party “can discover, use, and contribute to over 30 million projects” (*GitHub.com/about*, retrieved December 2015). As GitHub allows users to “fork,” or duplicate, modify, and publish modifications to a given project, there was no single project page for Hackasaurus, but rather 16 distinct projects on the site associated with it. Some of these were different aspects of the project shared by project leaders—such as the code for the project website and the “hacktivity kit” that could be used to run prototyping sessions—but others were created by community members that had remixed parts of the project, for example, translating the tool into other languages. The core code for the technology was “forked” 57 times as of this writing, indicating that a range of actors repurposed the fundamental technology on which the project was built.

The Hackasaurus project is one that played an important role in the development of Hive NYC as a context that valued Working Open practices. The project created direct opportunities for Hive educators to engage in these practices, and even for those that did not participate, it publicly modeled this mode of development by the steward of the network—a means of communicating the importance of these practices within the community. In the next section, I explore a second key mechanism that Mozilla utilized in order to support Working Open in the Hive—the provision of the “Hive Platform”—a series of interconnected community structures that members could utilize to develop their own projects in the open.



### **“Hive as a Platform for Building Solutions”: Community Structures to Support Working Open**

If participation in projects like Hackasaurus was one way that Working Open practices were brought to Hive NYC, a second, more ongoing mechanism, was the Hive Platform—a series of participation structures that together supported Working Open by Hive educators. In a blog post titled “Hive as a Platform for Building Solutions,” one Hive leader, Carl, characterized Hive as a context meant to “incubate solutions,” bringing people together, since “complex problems demand collaboration.” He linked the notion of “Hive as a Platform” to open-source culture:

This idea of a responsive organization operating as a platform on which others build should resonate with anyone who uses the web’s many collaboration tools—openly shareable docs, maps, and calendars. Many of the most recognizable companies building the internet today have done more than provide a set of products for customers to passively consume, but have created a platform on which others are invited to collaboratively build upon and make their own. Mozilla has long created open platforms on which global communities build, and it continues to do the same through Hive events, Communities, and Networks globally.

*(Blog post, July 2014)*

In public blog posts by other Mozilla employees involved in Hive stewardship, the linkage of Hive networks to open source and open practices was a regular characterization—it’s spoken of by these Hive staffers as “an open source community” (blog post by Kara, December 2015), “actively support[ing] an open source approach” (blog post by John, July 2014).

Toward these ends of supporting Hive members to work openly and actively take on design practices in public contexts, stewards created the Hive Platform—community structures where members could work openly to advance their organization’s projects. Throughout my time studying the network, I saw staffers at Mozilla facilitate a range of activities—community calls and meet-ups, posts about community activities on a Hive NYC blog, an online portfolio in which members could share resources around their projects, an online email listserv in which members could ask questions, post information and solicit collaborators, and others. Table 7.1 outlines these participation structures.

These structures, taken together, formed a professional ecosystem promoting open work—there were regular structures in which members could test ideas, get feedback on them, solicit participation in projects, share progress along the way, and draw new ideas from others that could inspire new projects.

One of the powerful aspects of the Hive Platform that I came to see through my fieldwork is that it created an infrastructure through which exploration of

**TABLE 7.1** Participation Structures That Made Up the Hive NYC platform Supporting Working Open

<i>Participation Structure</i>	<i>Description</i>	<i>Frequency &amp; Mode of Engagement</i>
Community Meet-Ups	Regular community gatherings where educators shared out projects, gave feedback to each other, engaged in discussion and debate around common issues, socialized, and networked.	Face to face, monthly, most often Hive stewards facilitating, occasionally network members facilitating
Pop-Up Learning Events	Youth oriented half-, full-, or multiday events with a range of organizations running “stations” where youth could engage in production -centered learning activities.	Face to face, irregular frequency
Coordinated Conference Participation	Utilizing larger conferences and events, most often organized by other actors but sometimes organized by Mozilla, as a means to expose member organizations to new ideas or highlight their work by supporting travel and coordinating panels and other sharing opportunities for members.	2–3 times per year
Specialized Professional Development	Curated talks or trainings around common areas of interest, such as engaging with a new learning technology or discussing issues around partnerships, spread, and scale, etc.	Face to face, irregular frequency
Specialized Partnership Opportunities	Cases in which Mozilla stewards acted as an intermediary with a larger organization, such as the NYC Department of Education, to organize opportunities for Hive members to reach youth or to leverage member organizations’ expertise to inform border initiatives.	Irregular frequency, sometimes would imply an ongoing opportunity for a large period of time
Community Happy Hours	Informal community gatherings explicitly oriented towards socializing, celebrating, and hanging out.	Face to face, twice a year
Community Calls	Regular conference calls, mediated by collaborative etherpads, where members and Hive HQ often gave updates about projects and opportunities and broader discussions about issues were held.	Monthly, voice-based, multimodal synchronous engagement (presentations, etherpad)
Learning Lab Calls	Regular group conference calls explicitly oriented toward members sharing about collaborative projects funded by the Hive Digital Media and Learning Fund with aims toward surfacing ongoing best practices and soliciting feedback.	Every 6 weeks, call based, multimodal synchronous engagement (presentations, etherpads)
Online Project Portfolio	Documentation space on the Hive NYC web site where members created entries describing their youth-facing projects, which included a range of documentation including curricula, reports, photos, videos, and blogs.	Online, with members creating entries for their projects

AuQ38

(Continued)

TABLE 7.1 (Continued)

<i>Participation Structure</i>	<i>Description</i>	<i>Frequency &amp; Mode of Engagement</i>
Network Blog	Curated by Mozilla Hive HQ, with regular guest posts by network members and stakeholders discussing topics of interest, sharing about projects, documenting participation in various events, etc.	Online, asynchronous writing/reading of posts
Community Listserv	Email-based community listserv in which Mozilla Hive HQ and members posted a range of information, responded to queries, sent notifications about upcoming opportunities, solicited project collaborators, etc.	Online, asynchronous via email
Member Directory	Online database with information about each organization and associated individuals that are members of the Hive NYC network, including contact as well as professional specializations.	Online, asynchronous, each member updates their own information

Adapted from Santo et al. (2016).

a wide ranging but still fairly coherent set of ideas was possible. Digital literacies, youth development, project-centered and constructionist pedagogies, youth leadership, “maker” education, computing education, and others served as a collective problem space in which educators could openly advance solutions and engage in collaborative learning. There were often dozens of ongoing, parallel projects taking place within the community that connected to these different threads of knowledge and exploration at any given time. The “connective tissue” among them was educator participation in different parts of the Hive Platform. Through Working Open in the Hive, they not only circulated new knowledge that was emerging from their work with students but also created the conditions for new educators to get involved with these projects or remix elements from them to form the basis of new initiatives.

## Discussion and Implications

In an education landscape in which teacher deprofessionalization is ongoing, creativity and collaboration among educators takes a back seat to accountability, and professional learning is too often just as didactic as the “stand and deliver” pedagogies that progressive education aims to challenge, practices of Working in the Open and infrastructures supporting them provide a needed contrast. While certainly no panacea, the approach I’ve described here assumes that development and activation of an educator’s social capital are central to professional learning. It assumes that this will not only have benefits for individual educators, but will also form the basis for collective advancement of educator communities. In focusing on relationship-driven activities among educators occurring in public

contexts, it offers both a rich form of individual learning and one that naturally feeds into the development of robust and professionalized educator ecologies.

While the Hive NYC Learning Network may seem like a fairly distinct context—a distributed network with many organizations engaged in overlapping but still separate efforts—it shares these qualities with other contexts in formal education such as districts and large-scale teacher professional development networks. And while Working Open might on its face seem culturally foreign from formal education, it shares familial resemblances to established practices of teacher-led professional learning such as lesson study (Lewis & Hurd, 2011; Lewis, 2015) and other forms of teacher inquiry that focus on having teachers working in concert to create and test new pedagogical approaches. What the open approach emphasizes that's distinctive is a core value around making such processes and the products of them accessible to wider circles of actors. In doing so, it supports educators to more easily find others interested in the same things that they are, creates strong communities, and also emphasizes and validates practices of remixing the work of others, something educators are well versed in.

If logics of scientific management were, at least in part, warranted with the argument that they were necessary in order to scale effective learning designs across massive educational systems, Working Open provides an alternate approach to thinking about issues of spread and scale that align more with movement building and collective action. In contrast to the hierarchical and centralized approach of Taylorism, which focuses on first creating an approach to supporting learning and then broadly promoting adoption of that approach, it offers a vision of what it might look like to interlace processes of creativity and design with those of spreading and developing a robust community around sets of powerful ideas that educators have agency around. In effect, what Working Open aims to scale is educators' collective agency rather than any particular pedagogical design.

## References

- Anderson, D. P., Cobb, J., Korpela, E., Lebofsky, M., & Werthimer, D. (2002). SETI@home: An experiment in public-resource computing. *Communications of the ACM*, 45(11), 56–61.
- Atkins, D. E., Brown, J. S., & Hammond, A. L. (2007). *A review of the Open Educational Resources (OER) movement: Achievements, challenges, and new opportunities* (pp. 1–84). Mountain View, CA: Creative Common.
- Au, W. (2007). High-stakes testing and curricular control: A qualitative metasynthesis. *Educational Researcher*, 36(5), 258–267.
- Au, W. (2011). Teaching under the new Taylorism: High-stakes testing and the standardization of the 21st century curriculum. *Journal of Curriculum Studies*, 43(1), 25–45. doi:10.1080/00220272.2010.521261
- Benkler, Y. (2002). Coase's penguin, or, Linux and the nature of the firm. *Yale Law Journal*, 369–446.

AuQ39

AuQ40

- Benkler, Y. (2006). *The wealth of networks*. New Haven, CT: Yale University Press.
- Bobbitt, J. F. (1913). *The supervision of city schools: The twelfth yearbook of the national society for the study of education*. Bloomington, IL: Public School Pub.
- Callahan, R. (1964). *Education and the cult of efficiency: A study of the social forces that have shaped the administration of the public schools*. Chicago, IL: University of Chicago Press.
- Chesbrough, H. W. (2006). *Open innovation: The new imperative for creating and profiting from technology*. Cambridge, MA: Harvard Business Press.
- Coleman, J. (1990). *Foundations of social theory*. Cambridge, MA: Belknap Press of Harvard University Press.
- Eiben, C. B., Siegel, J. B., Bale, J. B., Cooper, S., Khatib, F., Shen, B. W., & Baker, D. (2012). Increased Diels-Alderase activity through backbone remodeling guided by Foldit players. *Nature Biotechnology*, *30*(2), 190–192.
- Forte, A., & Lampe, C. (2013). Defining, understanding, and supporting open collaboration lessons from the literature. *American Behavioral Scientist*, *57*(5), 535–547.
- Gillmor D. (2004). *We the media: Grassroots journalism, by the people, for the people*. Retrieved from [www.authorama.com/we-the-media-1.html](http://www.authorama.com/we-the-media-1.html)
- Hannemyr, G. (1999). Technology and pleasure: Considering hacking constructive. *First Monday*, *4*(2).
- Hylén, J. (2006). Open educational resources: Opportunities and challenges. *Proceedings of Open Education*, 49–63.
- Kliebard, H. M. (1975). Bureaucracy and curriculum theory. In W. F. Pinar (Ed.), *Curriculum theorizing: The reconceptualists* (pp. 51–69). Berkeley, CA: McCutchan Publishing.
- Kliebard, H. M. (2004). *The struggle for the American curriculum, 1893–1958*. New York, NY: Routledge Falmer.
- Labaree, D. (2010). How Dewey lost: The victory of David Snedden and social efficiency in the reform of American education. In D. Tröhler et al. (Eds.), *Pragmatism and Modernities*. Boston: Sense Publishers.
- Lewis, C. (2015). What is improvement science? Do we need it in education? *Educational Researcher*, *44*(1), 54–61.
- Lewis, C., & Hurd, J. (2011). *Lesson study step by step: How teacher learning communities improve instruction*. Portsmouth, NH: Heinemann.
- Lin, N. (1999). Building a network theory of social capital. *Connections*, *22*(1), 28–51.
- Nielsen, M. (2012). *Reinventing discovery: The new era of networked science*. Princeton, NJ: Princeton University Press.
- Noble, D. F. (1977). *America by design: Science, technology, and the rise of corporate capitalism*. New York: Alfred A. Knopf.
- OECD. (2007). *Giving knowledge for free: The emergence of open educational resources*. Paris: OECD. Retrieved May 25, 2007, from <http://213.253.134.43/oecd/pdfs/browseit/9607041E.pdf>
- Putnam, R. D. (1995). Bowling alone, revisited. *Responsive Community*, *5*(2), 18–33.
- Roberts-Mahoney, H., Means, A. J., & Garrison, M. J. (2016). Netflixing human capital development: Personalized learning technology and the corporatization of K-12 education. *Journal of Education Policy*, *31*(4), 405–420.
- Santo, R. (2017). *Working open in the Hive: How informal education organizations learn, collaborate and innovate in networks*. Doctoral dissertation. Indiana University, Bloomington, IN.
- Santo, R., Ching, D., Hoadley, C. M., & Pepler, K. A. (2014). *What does it mean to "Work Open" in Hive NYC? A vision for collective organizational learning*. New York, NY: Hive Research Lab. Retrieved from <https://hiveresearchlab.files.wordpress.com/2014/12/what-does-it-mean-to-work-open-in-hive-nyc-hive-research-lab-october-2014.pdf>

- Santo, R., Ching, D., Hoadley, C. M., & Pepler, K. A. (2016). Working in the open: Lessons from open source on building innovation networks in education. *On the Horizon*, 24(3), 280–295.
- Taylor, F. W. (1914). *The principles of scientific management*. New York, NY: Harper.
- Taylor, F. W. (2004). *Scientific management*. New York, NY: Harper.
- Tyack, D., & Tobin, W. (1994). The “grammar” of schooling: Why has it been so hard to change? *American Educational Research Journal*, 31(3), 453–479.
- Von Hippel, E. (2001). Innovation by user communities: Learning from open-source software. *MIT Sloan Management Review*, 42(4), 82.
- Von Hippel, E., & Krogh, G. V. (2003). Open source software and the “private-collective” innovation model: Issues for organization science. *Organization Science*, 14(2), 209–223.

Taylor & Francis  
Not for distribution