

THE CONNECTED LEARNING RESEARCH NETWORK

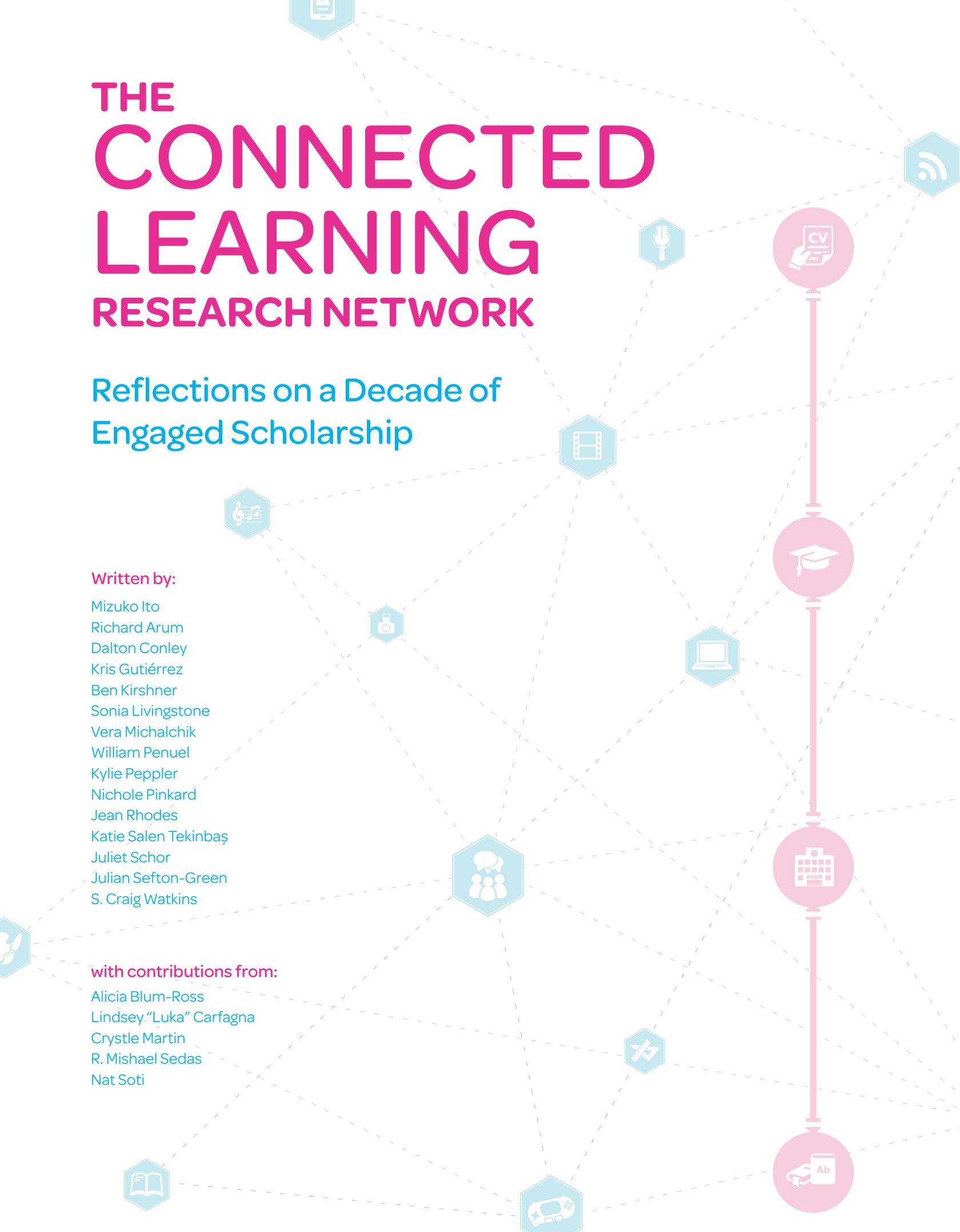
Reflections on a Decade of Engaged Scholarship

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SUMMARY

Today's digital and online media demand an approach to learning keyed to a networked and interconnected world. The growth of online communities, social and online media, open educational resources, ubiquitous computing, big data, and digital production tools means young people are coming of age with a growing abundance of access to knowledge, information, and social connection. These shifts are tied to a host of new opportunities for interest-driven learning, creative expression, and diverse forms of contribution to civic, political, and economic life. Even learning of traditional academic subjects is increasingly supported in self-directed ways and in settings outside of the teacher-guided context of the classroom. At the same time, these changes raise new concerns such as challenges to the credibility of information, threats to privacy, changing literacy needs, and new demands for managing attention and connection. Most important, the changing media and technology landscape intersects with and threatens to exacerbate broader problems in civic and economic participation and to contribute to growing social inequalities.

This report presents a vision for understanding and revitalizing the ways in which we support learning during these changing times. Responding to the interests and needs of young people, researchers, educational practitioners, and policy and technology makers, this report synthesizes a varied set of content and perspectives: empirical research on the changing landscape of new media and learning, design principles, evaluation approaches, learner and case studies oriented to identifying and spreading positive innovations. The authors were part of the Connected Learning Research Network (CLRN), an interdisciplinary group of scholars, designers, and educational practitioners, who collaborated between 2011 and 2019 to study and develop new modes of learning with digital media with the support of the MacArthur Foundation. Our guiding framework is the connected learning approach, first described in a report authored by the CLRN in 2013 (Ito et al. 2013). This report expands and revises key elements of this initial framework and report.¹

In a nutshell, connected learning is learning that connects personal interests, supportive relationships, and academic, civic, and career opportunity (see Figure 1).² Although connected learning does not require technology, the emerging landscape of social and digital media can potentially make connected learning more accessible to young people with diverse interests and backgrounds. New digital tools support new forms of literacy and self-expression, and online affinity networks enable young people to connect to a wider range of specialized communities of interest. For example, Brady, a 17-year-old in the United States, makes model airplanes, cars, and ships with his grandfather. These experiences helped cultivate skills and dispositions that he applied in a bike repair business, after learning through YouTube videos together with his peers (see [Learner Story 4](#)). Maria, a high school student in the Philippines, writes fanfiction and develops literacy skills with fellow fans of professional wrestling in an online affinity group (see [Learner Story 1](#)). While many young people are able to connect to communities of interest through their families, schools, and local communities, online connections have expanded possibilities for many others.

¹ Portions of this report were originally published in Ito et al. 2013.

² In our original report (Ito et al. 2013), we described the three spheres as Interests, Peer Culture, and Academic. We have revised our framework for a more expansive conceptualization of the three spheres, as elaborated in section 3 of this report.

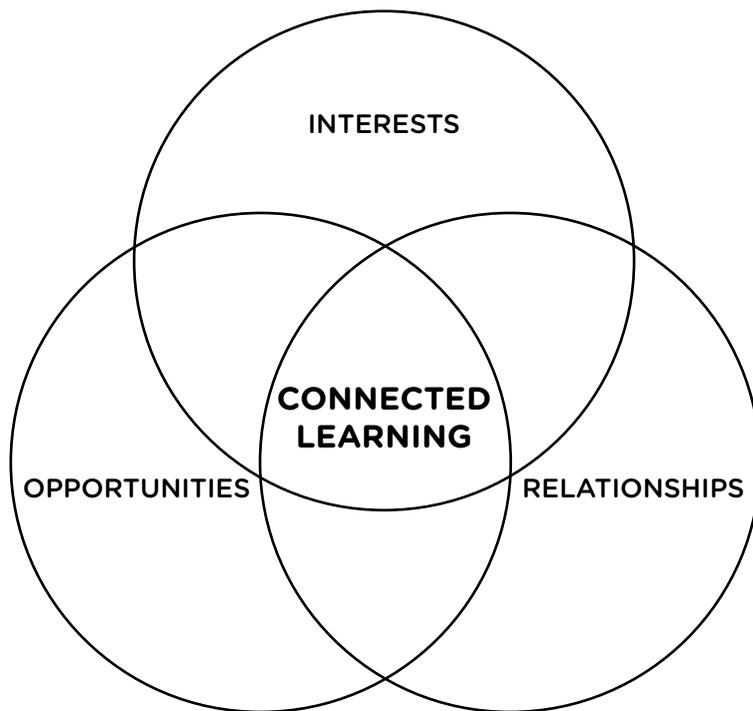


Figure 1
Three spheres of learning
that are integrated in
connected learning.

Connected learning is not confined to explicitly educational and teacher-guided experiences intentionally designed to support learning, nor is it limited to traditional academic subjects. It differs from these more individualized and formal approaches to learning and education in emphasizing the collective contexts, shared culture, relationships, and expansive networks that support young people’s learning, development, and success. Young people can take diverse pathways into connected learning. Schools, affinity groups, homes, afterschool clubs, online networks, religious institutions, community centers, and the parents, teachers, friends, mentors, and coaches whom young people find at these diverse locales, all potentially have a role to play in guiding young people to connected learning. Connected learning takes root when:

- organizations **sponsor** and legitimize the interests and identities of diverse youth,
- learners are engaged in **shared practices** such as creative production, research, or friendly competition,
- these practices are guided by **shared purpose** such as contributions to communities, social change, or solving real problems
- and learning is **connected across settings** through brokering, coordination, and openly networked platforms.

Learning environments that embody these elements of connected learning include athletics programs tied to in-school recognition, many arts and civic learning programs, and interest-driven STEM programs such as math, chess, or robotics competitions. They also include youth-driven affinity networks that connect to academic, civic, or work-relevant opportunities, such as communities around fanfiction, media making, and esports. These connected learning environments must embody values of equity, social belonging, and participation in order to expand opportunity for diverse youth.

Connected learning is grounded in theories of learning that recognize that learning and development are embedded within social relationships and cultural contexts. It is a model that both describes a form of learning and can guide design and policy to expand access to this form of learning (Penuel et al. 2016). The theory of intervention and design grows out of research about the risks and opportunities inherent in today's changing social, political, economic, technological, and cultural landscape. The model also draws from a growing body of research that indicates that learning is most enduring and meaningful when supported by peers and mentors, rooted in the interests and culture of the learner, and connected across settings. Essential to the approach is an equity agenda that recognizes the cultural identities of diverse young people, building capacity and points of connection to opportunities in academic, career, and civic life. Rather than suggesting a specific "technique" for improving individual educational outcomes, connected learning pursues outcomes through a systemic approach to building communities' and collective capacity for learning and opportunity. It also provides a framework for analyzing equity of learning opportunities across settings. Without this focus on equity and collective outcomes, any educational model or technology risks becoming yet another way to reinforce the advantage that privileged individuals already have (Rafalow forthcoming; Reich and Ito 2017).

Over the past decade, the CLRN investigated connected learning through a set of interlocked empirical and design-based research studies guided by different questions, methodologies, and orientations. These studies investigated the wide range of settings that support learning, including schools, community-based organizations, home, and online networks and communities. Some studies focused on more typical types of settings and experiences, while others focused on unusually innovative and connected cases. They also spanned a range of qualitative, quantitative, and design-based research methods, enabling us to both triangulate and challenge findings and disciplinary biases. Some studies investigated common experiences that revealed problems as well as opportunities, while other studies sought out promising practices that could inform design and interventions. Other studies were conducted in partnership with designers and educators putting connected learning into practice. This effort to incorporate both sobering empirical cases and forward-looking case studies to inform innovation and improvement reflects our broader commitment to engaged, interdisciplinary scholarship that integrates both critical and hopeful viewpoints.

After describing the common research questions and commitments of the CLRN, this report ranges across critical-empirical and solution-centered research. The section “An Unequal Economic, Educational, and Media Ecology” outlines the broader disconnects and divides that characterize young people’s learning and opportunity. The report then turns to a section that describes the experiences, key elements, and outcomes of connected learning. The final section outlines a design framework to help guide educators, technology makers, program designers, parents, and policy makers who are seeking to bring connected learning into their programs, communities, and families. Learner stories, which offer concrete examples of connected learning experiences, are interspersed throughout the report.

LEARNER STORY 1

MARIA

By Crystle Martin

Maria is a 17-year-old from the Philippines and in her first year of college. She has been a professional wrestling fan for about four years, starting to watch just before her first year of high school. Her very first encounter with wrestling was by chance:

There was a tie-in between a local resto here and WWE that they give this collectible cards after purchasing something. My dad brought home those cards, and then I was fascinated because I got the Trish Stratus one. I saw the showtimes and then I decided to go check it out.

Her local community was not supportive of her interest. Wrestling was looked down upon and she was called a “tomboy” for being interested in World Wrestling Entertainment (WWE). She did not have a local community to talk to about wrestling, except her little brother, who began watching with her. Maria wanted a larger community and went online to find one. After trying different communities, she settled on the *Wrestling Boards*.

The *Wrestling Boards* offered Maria a community of people who were supportive of her interest and interested in her opinion and help. She also found fulfillment in participating in *Over the Ropes*, the forum’s fantasy wrestling federation. It was a place where she felt safe talking about WWE without fear of damaging her reputation or experiencing other negative social repercussions. She felt that being able to talk and participate with people who shared her interest in an online setting gave her freedom to completely express herself. It also offered her the chance to explore an interest in creative writing by writing and editing for the fantasy wrestling group that was a part of this online community. Maria had dabbled with creative writing in the past, but this was the first time she was writing for an audience and with a specific purpose. Every week she received feedback from the community about the quality of her work in terms of both content and form. Maria confided in her writing teacher about her enjoyment

and participation in this fan community; he was the only teacher she told about her interest in professional wrestling. He encouraged her to join the school newspaper, which she did, and she wrote for it until graduation. She decided when applying to colleges that she would not go directly for a degree in creative writing; instead, she decided that it was more practical for her to choose a degree as a medical technician, in which field she could use her strong writing and grammar skills for technical writing and then pursue her creative writing on the side.

Maria pursued her interest in both writing and professional wrestling through her participation in *Over the Ropes*. She was able to develop skills through feedback from community members. Maria received feedback on the content and form of her writing from people with expertise in her area of interest, creating a space for her to pursue her interest in a strategic and skill-developing way. Through exploring creative writing in this interest-powered, peer-supported structure, she improved her skill and realized her enjoyment of it, which led her to think of creative writing outside of *Over the Ropes*. Her writing teacher was able to help her connect her enjoyment of creative writing to a more technical form of writing (journalism) by encouraging her to join the school newspaper. Through her work on the school newspaper, she discovered the variety of applications possible for her well-developed writing skills. She explored different avenues of writing until she found and settled on her current path. At present she is enrolled in a medical technician program, which uses her technical writing, and she is pursuing creative writing as a second major.

1. THE CONNECTED LEARNING RESEARCH NETWORK



This report grows out of nine years of research conducted by the CLRN, supported by the MacArthur Foundation's Digital Media and Learning (DML) Initiative. The purpose of the DML Initiative was to investigate how young people's learning has been changing in tandem with an expanding new media ecology, and how practitioners, policy makers, and technology developers might respond to these changes in order to further progressive and equitable approaches to learning and education. CLRN members included researchers from varied disciplines (sociology, economics, education, anthropology, learning sciences, media studies, design, communications, psychology), as well as technology designers and educational practitioners. A list of projects and project principal investigators can be found in the appendix. This report draws from a wide range of research efforts related to connected learning, and those that were part of the CLRN are explicitly named as CLRN projects throughout this report.

We followed in the footsteps of other interdisciplinary MacArthur Foundation networks that developed new paradigms and approaches to social change, tied to changing social, cultural, and technological conditions (Rose 2000). Among MacArthur research networks, the CLRN has been unique, however, in being part of a larger foundation initiative that has included major efforts to develop new educational innovations and organizations such as schools, educator networks, and youth development programs. Holding together this diverse scholarship are a set of research questions, topics, and commitments that center on understanding challenges and opportunities for connected learning, through engaged, impact-oriented scholarship.

1.1 Questions and Focus

Our collective research was guided by a set of overarching research questions to investigate the challenges and opportunities of connected learning and its efficacy. They included:

Barriers and Challenges: What are the barriers to broadening access to deeper and connected learning? What produces disconnects between spheres of learning? Given its often voluntary and noninstitutionalized nature, what are the unique risks to equity for connected learning?

Supports and Access: How can we support, design for, and expand access to connected learning? What kinds of practices, policies, incentives, and standards can support routine and regular connected learning experiences for diverse learners?

Outcomes: What are the benefits and risks of connected learning? How can we document and assess connected learning outcomes?

These questions were situated within a set of historically specific contexts and trends that have accompanied growing youth engagement with digital and networked media, as well as the background and expertise of the researchers involved. In addition to these defining questions, our investigations were bounded by topic and regional foci. We were looking

specifically at: (1) the pivotal teen years, (2) our research settings centered on the United States and Great Britain, and (3) issues of equity and inclusion.

Young People

Our studies center on teens and young adults, an age group that has been at the vanguard of changes in how people are engaging with information, social communication, and learning. Throughout this report we refer to this age group as “young people.” We are heartened by a complementary and growing body of research that examines the earlier years, particularly as tablets and digital toys have spread to toddlers, preschool, and elementary-aged children (e.g., Gee, Takeuchi, and Wartella 2017; Guernsey and Levine 2015, 2017; Mascheroni, Ponte, and Jorge 2018; Sefton-Green et al. 2016). Although connected learning can apply to any age group, we focus on adolescents and, secondarily, on young adults. The period from around 12 to 18 years old is a critical time when individuals form interests and social identities that are key to the connected learning model. We also see adolescence and early adulthood as periods when young people establish an orientation to schooling and learning that can carry into adulthood as well as begin to make decisions that will lead them to certain job and career opportunities.

Focus on the Global North

As a model of learning, connected learning could potentially be applied across ages, and it is agnostic as to national context and institutions, but we have focused our investigation on young people in the Global North. We discuss our approaches to learning and media engagement in general terms, but because our research centers on the United States and Great Britain, our frameworks will likely be most relevant in places that share similar social, cultural, and economic conditions with these two countries. To focus the discussion and to capitalize on the expertise of this report’s authors, we center our discussion on the United States. We acknowledge that these conditions vary considerably in different parts of the world (Sefton-Green and Erstad 2018), although much of what we discuss applies across the Global North, and perhaps more widely. Countries that have not fully embraced digital and networked media confront different challenges in addressing questions of social equity and educational reform.

Attention to Equity

The final defining feature of our research is that we focus on issues of equity and inclusion. We seek to understand the varied and often inequitable ways in which technology is deployed and new learning opportunities are accessed. In addressing issues of equity, we look across what Gutiérrez and Jurow have described as “multiple scales” and sites, “from institutions and the practices that sustain inequity to transformation in individuals’ agency and the kinds of knowledge that are valued and leveraged across spaces” (2016:5). Research indicates that more economically privileged young people access technology-enhanced

connected learning environments at higher rates (Carfagna 2014; Rafalow forthcoming; Reich and Ito 2017). Differences in out-of-school learning opportunities can contribute to inequity (Covay and Carbonaro 2010; Duncan and Murnane 2011; Putnam 2015), and we fear connected learning programs and new learning technologies could amplify these tendencies. Connected learning is not equitably distributed among young people from all walks of life; at the heart of our research and design approach is a commitment to equitable and expanded access to educational, civic, and career opportunity. For this reason, much of our research has investigated diversity in uptake and conditions that produce inequitable access to new learning opportunities. Our design principles have a strong skew toward approaches that give advantage to less resourced youth and families.

In describing differences we use specific social, economic, and demographic terms as appropriate to the specific youth and families we are describing. We use the term “minoritized” to describe processes of marginalization from positions of institutional power and authority. In line with our original report, we use the term “nondominant” to describe groups in ways that signal power relations rather than positioning based on traits of individuals (see Gutiérrez, Morales, and Martinez 2009).

1.2 Our Platform: Engaged and Interdisciplinary Scholarship

The connected learning approach is part of a growing movement in educational research to integrate research, design, and practice in order to advance scholarship as well as transform educational practice and policy to be more equitable and just. We draw in particular from models of research-practice partnerships (RPP), design-based implementation research, and social design-based experimentation in which researchers and educators work collaboratively to address pressing problems in practice, tap community-based assets, and transform educational ecosystems to promote equity (Fishman et al. 2013; Gutiérrez 2016; Gutiérrez and Jurow 2016; Gutiérrez and Vossoughi 2010; Penuel and Gallagher 2017). This movement is motivated by the need to expand educational opportunities as well as by critical self-reflection on how educational research has historically operated and often continues to operate. When educational research prioritizes the interests of the academy and of researchers to build their scholarly reputations, it can be conducted with a form of “independence” in which results do not necessarily serve marginalized communities and those implementing programs and institutions. An engaged-scholarship approach means bringing a commitment to rigorous empirical research to the service of social impact, justice, and the improvement of educational practice.

This stance differs from work done for our disciplines and communities of scholarly practices, and it has challenged us to thread the needle between empirical research and impact- and action-oriented approaches, balancing critical humanities, social science, design, and educational practice. In the nine years that we have worked together as a network, convening four times a year in cities around the United States and in London, we

have continued to challenge each other from across divides of varied disciplines, fields, and communities of practice. We had the rare luxury of engaging diverse approaches through productive cross-talk during nearly a decade of collaboration. The rapidly changing face of digital media, as well as our commitments to equity, have lent urgency to our efforts and propelled engagement and action. Our challenge has been to maintain a critical and evidence-driven perspective while also seeking to inform and inspire an agenda for justice and social change.

This aspect of our collective work deserves special emphasis, because we believe it is a unique aspect of our collaboration, and it is one that is often misunderstood. Often proponents of promising new digitally powered changes and solutions are at odds with critical research that takes a sober and evidence-driven look at the limits of new innovations and the enthusiasm of changemakers. Rather than engage in a polarized debate between boosters and critics, however, our network has pursued a critical and aspirational agenda in tandem. Embarking on an ambitious effort to remake learning requires *both* inspiration that fuels new efforts and coalitions, as well as careful critical research that keeps us honest and in touch with limits and failures. Critical research has often been relegated to the sidelines of social change and technology-development efforts because of its focus on critique and lack of a positive vision for design and action. Conversely, technology-fueled efforts at educational reform have often suffered from an overly optimistic view of the power of technology and innovation to drive positive social change. These perspectives have been a source of constant debate and productive tension in our network, and the mix has been essential to developing a forward-looking agenda informed and tempered by evidence and scholarly criticism.

Unlike a typical research-practice partnership that centers on a specific program, organization, or school system, our collaboration has centered on developing, challenging, and improving the connected learning model writ large. As a research network, we provided anchors of evidence and critical analysis to the broader DML Initiative. The connected learning framework has been informed and enriched by the experiences of innovators and reformers in the initiative, as well as by research in settings unrelated to MacArthur's programmatic investments. Instead of being an "application" of research and theory to practice, the framework has been co-developed by researchers, designers, and practitioners from the start. Our original report represented our first effort to synthesize our prior research and co-develop this framework (Ito et al. 2013). This report draws from a longer history of collaboration, as well as from research studies that were specifically designed to address questions and problems related to connected learning.

2. AN UNEQUAL ECONOMIC, EDUCATIONAL, AND MEDIA LANDSCAPE



Before diving into the experiences, elements, outcomes, and design principles of connected learning, we situate our endeavor within broader trends and challenges in the economic, educational, and media landscape. In this section of the report, we describe this context and introduce CLRN studies that investigated inequalities and disconnects in realizing connected learning, sharing stories of how some learners we met navigated this shifting terrain.

2.1 Economy: Uncertain Pathways to Opportunity

Much of today's conventional wisdom about the relationship between educational and economic opportunity was established in the so-called "golden age of capitalism" (Marglin and Schor 1992) of the 1950s and 1960s, when preparations for entering the job market were reasonably straightforward. Jobs were plentiful and the fraction of "good" or "better" jobs among the total was rising. The middle class was expanding, the economic "return" to education was high, and inequality was falling (Wilkinson and Pickett 2010). High school, college, and professional degrees provided solid stepping-stones toward high-quality jobs and careers. Based on this history, the message to young people and their families has been that they should seek college educations and professional certifications as reliable economic investments. However, in recent years, pathways to good jobs have become narrower, fragile, and uncertain. The labor market for stable working- and middle-class jobs has been gutted, and schooling is no longer a reliable guarantee of economic returns. At the same time, trends such as automation and the creative and gig economies create new challenges in connecting learning to opportunity.

Changes in class dynamics and labor market trends are contentious subjects, but scholars generally agree that income inequality has grown in the United States, and the proportion of high-quality jobs is stagnant at best. Wealth is increasingly concentrated in the top 20 percent (particularly the top 1 percent), working- and middle-class jobs have been eroding, and social mobility has declined (Bowles, Gintis, and Groves 2008; Mishel et al. 2012; Putnam 2015; Reeves 2017; Stiglitz 2015). Although employment rates in the United States have bounced back since the 2007 Great Recession, inequalities in earnings and employment rates persist across region, race, and gender (Bureau of Labor Statistics 2018a, 2018b; United States Department of Agriculture 2018). Technology trends also threaten to exacerbate labor market equity gaps and disconnections. While predictions vary widely on which jobs robots and artificial intelligence (AI) will take over, most agree that our rapidly evolving digital economy will demand new kinds of skills and abilities that include solving uncharted problems and mastering complex forms of communication. We should also expect that low-wage workers and minoritized communities are at higher risk of automation (e.g., Manyika et al. 2017; Muro, Maxim, and Whiton 2019).

In this environment, educational credentials alone can no longer expand opportunity since they confer a relative, rather than an absolute, benefit. A college degree is a requirement for most good jobs, but it is no longer a guarantee. Wages for both men and women entry-

level college graduates (i.e., workers aged 23–29) fell between 2000 and 2011 (Mishel 2012) as college attendance rates grew nationally. Less privileged youth are more severely impacted by these trends. College completion rates are increasing for all income groups, but the gap between wealthy and poor has steadily increased from the 1980s to the 2000s, from 31 percent to 45 percent (Dynarski 2014). Even when young African Americans earn a college degree they are more likely than their white counterparts to be unemployed or underemployed (Jones and Schmitt 2014). On the other side of the ledger, the real cost of higher education has risen more than two and a half times since the 1980s (Ma et al. 2019). Brown, Lauder, and Ashton (2011:5) argue that many Americans are mistakenly “schooled in the belief that ‘learning equals earning.’” They argue that in today’s “global auction for cut-priced brainpower” the “neoliberal opportunity bargain, which offered families a path to individual and national prosperity through education, has been torn up.”

2.1.1 Uncertain Pathways to Creative and High Tech Work

Educational reformers have moved in different directions in responding to these trends. Some have focused on specific skills gaps in areas such as computer science and manufacturing. Seeking to align demand and supply, Code.org and CS4All have mobilized to offer coding and computer science in schools. Others have argued that children and young people need to develop broader “21st century skills” such as systems thinking, problem solving, critical thinking, adaptability, self-direction, and perseverance (e.g., Araya and Peters 2010; National Research Council 2012; Thomas and Brown 2011; Wagner 2012; Warschauer 2008). The argument behind these workplace- and school-led efforts is that these high tech and higher order skills will enable young people to adapt to a rapidly changing and unpredictable employment landscape. However, preparing children for creative and high tech jobs does not guarantee that those jobs will materialize just because workers are standing by. Based on his surveys of employers in manufacturing, Andrew Weaver (2017) has argued against “blaming workers and schools.” He argues that “instead of fretting about a skills gap, we should be focused on the real challenge of knitting together the supply and demand sides of the labor market” (para. 16). He suggests that an emphasis on mechanisms such as apprenticeship, employer-provided training, and employment agencies is at least as important as skills-focused educational interventions.

The CLRN³ Last Mile project, led by Ben Kirshner, Julian Sefton-Green, and Craig Watkins, investigated this shifting terrain from a youth-centered perspective, focusing on the transition to high tech and creative work (Sefton-Green, Watkins, and Kirshner 2019; Watkins 2019). They focused on the experiences of minoritized youth getting involved in creative and high-tech work, through a series of case studies in the United States and the United Kingdom. These youth see their efforts to seek self-employment, work placements, internships, and apprenticeships not in terms of simply “getting a job” but more in terms of monetizing their participation in a series of fields. In turn, successful participation was intimately tied to social and cultural identity and was not simply about developing skills and

³ Throughout this report, we add “CLRN” before the project name to indicate projects that were part of and funded by the MacArthur Foundation Connected Learning Research Network.

earning credentials. For example, youth in the UK reflected on how being black and working class in Britain hindered possibilities for employment. At the same time, they were able to tap their networks for niche work opportunities. The story of Jermaine (see [Learner Story 3](#)) is a case in point. He used digital music and video skills cultivated in a prominent London digital arts program into collaborative music video–production skills in the context of a thriving local rap scene. He achieved a strong reputation in the scene and ran a studio that gained millions of viewers online, but this did not translate to an economically viable career path. He was working at a uniform supply shop at the time of the interview.

Jermaine’s story, and others like his, are situated within neighborhood or community as youth recount making do at particular moments—filming rap contests over a summer, the serendipity of an interpersonal contact that led to a job opportunity. A case study of the AMX hip-hop collective in Austin, Texas, found similar dynamics among young artists forging early music careers in a context of precarious conditions of labor and a music industry in transition. Starting from the seed of a weekly open mic, the AMX collective and community grew rapidly, attracting young talent, particularly young men from diverse races, social classes, and origins, and offering access to opportunity. These experiences of finding opportunity within local networks and communities contrast with youth experiences in organized afterschool settings, which are characterized by an emphasis on developing skills within a “positive youth development” framework. Even programs that aim to develop a “creative cohort” are poorly equipped to support transitions to sustainable livelihoods, and they often fall back on traditional models of career progressions that center on high-stakes, high-status institutional validation rather than the more informal experiential learning preferred by the creative industries.

2.1.2 The Gig Economy and Peer-to-Peer (P2P) Markets

The precarity and peer-to-peer dynamics of the creative economy in some ways foreshadowed the rapid growth of the gig economy⁴ (Guile 2006). A 2016 national survey by the Pew organization found that 8 percent of all Americans had earned money during the last year in the gig economy, doing tasks such as online labor, ride hailing, shopping or delivery, or other household tasks (Smith 2016). Youth (aged 18–29) were twice as likely (16 percent) as all adults to have participated, and black (14 percent) and Latinx (11 percent) respondents had higher rates of participation. Indeed, young people who were less satisfied with their financial situation were more likely than those who were dissatisfied to take up gig labor (Rideout and Robb 2018; Watkins 2019). The growth of gig work has been controversial, with critics noting the lack of employment protections because gig workers are independent contractors rather than employees (Dubal 2017), as well as inadequate wages and lack of control over an algorithmically determined work process (Rosenblat and Stark 2016).

The CLRN Connected Consumption project, led by Juliet Schor, investigated gig platforms such as TaskRabbit and Airbnb and platforms for peer-to-peer learning and exchanges such

⁴ We define “gig labor” as independent contractor work for platforms for either consumer or business customers. Furthermore, there are two main types of platforms—those that organize what is called “digital labor,” such as online work including image tagging, survey taking, and other higher-skilled online tasks on platforms such as Amazon’s Mechanical Turk or Upwork (Gray and Suri 2019; Irani 2015), or platforms and apps that specialize in offline work, such as driving, hosting, house cleaning and maintenance, pet care, and so on.

as massive open online courses (MOOCs) and makerspaces (Carfagna 2017; Carfagna et al. 2014; Dubois, Schor, and Carfagna 2014; Schor forthcoming; Schor and Attwood-Charles 2017; Schor et al. 2018). These case studies investigated whether these platforms had the potential to offer new pathways to learning and opportunity. Most of these platforms and programs were founded with missions that emphasized access, democracy, “the community,” and even equality among people. At most of them, we found widespread evidence of many types of learning and new opportunities for economic and knowledge exchange. Open learners such as Mei (see [Learner Story 2](#)) were teaching themselves everything from coding to history to business planning. They were bootstrapping new businesses, creating new careers for themselves, filling in gaps in traditional education. At the same time, researchers found that people acted in ways that were socially exclusionary. The more lucrative the platform, the whiter it tended to be. Nonwhite hosts on Airbnb tended to charge less (Cansoy and Schor 2019). In the food swap, a monthly gathering of people who prepared food to trade with others, a core group performed “foodie” snobbery and many newcomers came away unable to trade what they had brought (Fitzmaurice and Schor 2018). The makerspace similarly evolved into a place with an exclusionary culture in which a small group of people gained status and position (Attwood-Charles and Schor 2019). And yet people were generally not conscious of the ways in which their behaviors, the cultures of the sites, or the makeup of people who were there were socially exclusionary. They tended to embrace the inclusive ideals of the sites and thought they were involved in an enterprise that was accessible and open (Fitzmaurice et al. 2018). The fact that these new communities of learning and economic activity are not free of the biases and inequalities of the larger society is not surprising. Indeed, the idea that they would be was perhaps naïve. Understanding the ways in which these sites and gig opportunities are exclusionary is the first step to considering how these new platforms might address equity gaps in connected learning.

2.2 Education: Growing Inequities in Learning

In addition to rising inequality in the labor market, access to educational and learning opportunity continues to be tied in troubling ways to economic, racial, and ethnic background. Scholars have documented how class-based inequality in education has been rising over the past few decades in tandem with the growth of economic inequality writ large (Putnam 2015; Reardon 2011; Reardon and Owens 2014; Reeves 2017). Today U.S. schools are more segregated by income than ever, and this trend has only accelerated in recent years (Owens, Reardon, and Jencks 2016). Racial disparities persist at all levels of education, from the primary years of school to postsecondary outcomes, even when controlling for income (McFarland et al. 2019).

Scholars have also argued for the importance of out-of-school factors such as poverty, community conditions, systemic inequities, family background, and parenting approaches as drivers of educational inequity (Coleman 1966; Heckman 2006; Heckman and Masterov 2007; Lareau 2003; Weininger, Lareau, and Conley 2015). Robert Putnam has suggested

that schools in the aggregate do not have a strong influence in either direction when it comes to addressing inequity, but home factors such as access to extracurricular activities and mentors does (Putnam 2015).

Enrichment Expenditures On Children, 1972-2006

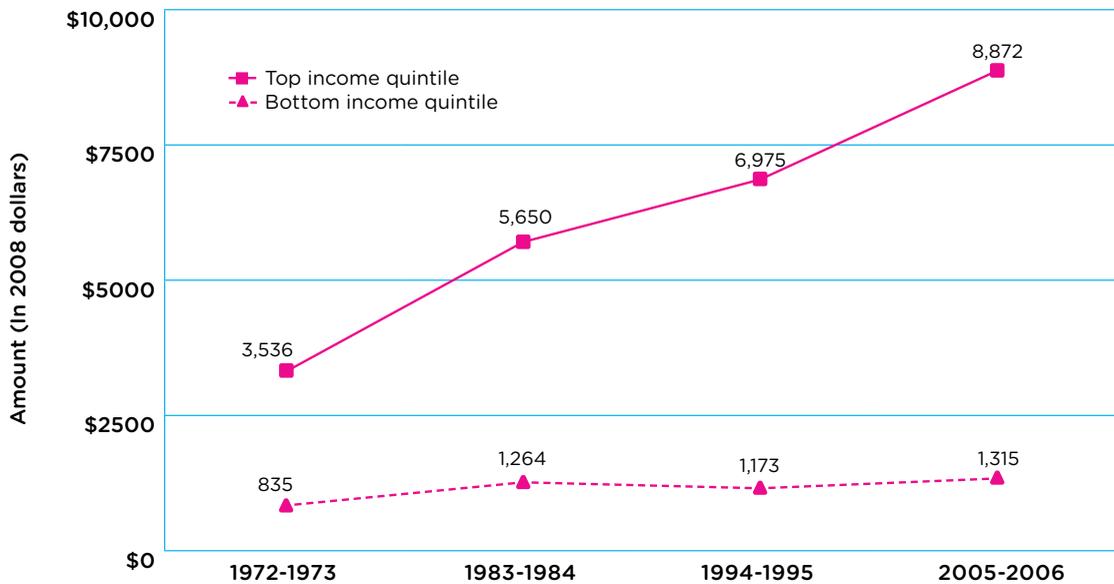


Figure 2

Comparison of highest- and lowest-income quintile of U.S. families' enrichment expenditures on children.

Source: Duncan, Greg J. and Richard Murnane. "Figure 1.6, "Enrichment Expenditures on Children, 1972 to 2006." In *Whither Opportunity?: Rising Inequality, Schools, and Children's Life Chances*. © 2011 Russell Sage Foundation, 112 East 64th Street, New York, NY 10065. Reprinted with Permission. <https://www.russellsage.org/publications/whitheropportunity>

The growing levels of investment that upper-income households make in out-of-school enrichment activities is one important dimension of widening gaps in learning opportunity. Analysis of consumer expenditure data indicates that upper-income households' expenditures on enrichment activities have nearly tripled in the years between 1972 and 2006 (see Figure 2) (Duncan and Murnane 2011) and continues to grow (Silva, Snellman, and Frederick 2014). Research also indicates that access to school-based extracurricular programs declined for lower-income families between the mid-1990s to 2010 (Putnam 2015). Covay and Carbonaro's analysis of extracurricular activities (2010) confirms that participation varies by factors such as race, ethnicity, and socioeconomic status (SES), and upper-income families participate at higher rates. Some have raised important concerns about "overscheduled" childhoods (Gutiérrez, Izquierdo and Kremer-Sadlik 2010; Levine 2006; Luthar and Latendresse 2005; Pope 2001; Rosenfeld and Wise 2001), but for the vast majority of young people, extracurricular involvement is associated with a wide range of positive benefits (Fredericks and Eccles 2008; Mahoney, Harris, and Eccles 2006; Mahoney and Vest 2012). These include important cognitive and noncognitive skills that are correlated with positive outcomes in the educational system and in the labor market beyond (Bodovski and Farkas 2008; Covay and Carbonaro 2010; Lareau 2003). Further, extracurricular activities have an ameliorative impact on psychosocial development (Linver, Roth, and Brooks-Gunn 2009).⁵

5 Yet other scholars have claimed that structured extracurricular activities serve a gatekeeping role in acting as a selection factor in the recruitment of students to selective colleges (Kaufman and Gabler 2004; Stevens 2007) and in the screening of job candidates for certain elite professions (Rivera 2011).

LEARNER STORY 2

MEI

By Lindsey “Luka” Carfagna

In a warehouse turned premium office space in a trendy part of a major Northeastern city, a mix of young people in their 20s and early 30s sipped complimentary beers and munched on pretzels while Regan, a successful entrepreneur in her mid-30s, taught a project-based class on gamification. It was 7 p.m. on a weeknight and a group of about 15 people were gathered around the projector screen where Regan presented a 40-minute introduction to the topic. Everyone in the class had come voluntarily and had paid \$0–15 for access to the 1.5-hour course. After her presentation was over, Regan asked people to break up into groups of 4–5 for an activity. It was here that I met Mei, a 30-year-old Chinese American woman, who was attending the class with a few coworkers after work.

Mei worked for a startup-style tech company as a user experience (UX) designer, a field she said she loved because it married her interests in math and science with art and literature. Mei recalled feeling that she had to choose between her interests growing up and did not feel welcome with other students: “The science kids were like, ‘You’re too flaky,’ the art students were like, ‘You’re too neurotic. We don’t want you either.’” This feeling of disconnection and exclusion carried with Mei well into her college years and it was not until she started learning on her own, at places such as the gamification class, that Mei really fell in love with learning. While pursuing a graduate degree in library information science, she started attending conferences and free lectures, and she regularly followed bloggers in her field. Postgraduation, she retained this habit of seeking out external learning opportunities and found several online and offline spaces to continue her learning.

To Mei, this kind of learning felt different from the kind she was exposed to growing up, and she attributed much of that

difference to her upbringing as a child of two academics. She expressed sincere disdain for the highbrow, status-seeking culture of academia that she was raised within, calling her parents and their peers “immature” because they “make up words that no one understands.” Mei was smart enough, she remembered, but she tried hard in school only because she wanted to get away from her hometown and her immigrant parents, who had values that were very different from those that she was cultivating. Now, as an adult, Mei was finding learning environments that fit her vision of a “good” education, which stood counter to traditional measures of academic achievement.

The new kind of learning she was doing felt more connected and allowed her to learn just as much from conversations as she did from the content. It required her to solve problems and share her successes and failures with others. She stated that her favorite teachers in her graduate program were the adjuncts, because they worked full time outside of academia and could bring their “hands-on experience” into the classroom. Now, in what she called “informal learning environments,” she found a similar attraction to speakers such as Regan, who teach voluntarily and “generally care about sharing.” Mei was grateful for these flexible spaces, where teacher certification was not required of instructors, and she believed that these connected, informal learning environments open “everyone up to being a student and teacher,” which created more richness and deeper relationships in Mei’s experience.

Though Mei beautifully portrayed the positive sides of her new learning, she also gave subtle hints as to the “why” of her learning. For example, she talked about not being able to daydream at work, because she was expected to work so hard, and that the expectation to learn new things for her

job was for her to figure it out on her own. While an evening class with coworkers over beers could pass for leisure, it could also be evidence of work creeping into her nonwork hours. In Mei's technological field, change is constant; therefore, individuals who are not constantly learning new techniques or technologies will be left behind. While Mei's learning fulfilled social and emotional roles for her, as indicated by her focus on connection and sharing, and was in theory voluntary, it also carried a level of de facto economic compulsion. In other words, if Mei wanted to keep succeeding as a UX designer, she would have to keep learning.

At the time of our first interview, Mei did not seem to mind the constant grind of laboring to learn while learning to labor (Carfagna 2017). However, when we followed up two years later, I met a sleep-deprived new mother who was working from home while raising her baby. At this interval, she critiqued the workaholic culture that compelled her before, and she feared that even in her very flexible workplace she might be left behind because she was no longer learning as vigorously on the side. It felt unfair to her that she would have to choose between raising her daughter and succeeding in her career, especially because she had already proven that she was a capable professional and learner. Herein lies a concerning feature of connected learning for adults such as Mei: without sustainable institutional supports, it can scaffold only on the will, desire, and structural privileges of learners.

We lack data sets that can speak to the general distribution of connected learning experiences that cut across in- and out-of-school settings. The evidence for inequity in both school and extracurricular settings strongly suggests that connected learning experiences are stratified in similar ways. Progressive and learner-centered educational innovations have historically been largely limited to privileged or unconventional communities, and connected learning is no exception. Studies conducted by the CLRN have delved into key dimensions of gaps and inequities in young people's access to connected learning experiences, specifically limits in home-school connections and inequitable access to mentoring relationships.

2.2.1 Limited Home-School Connections

The disconnect between classroom learning and the everyday lives and interests of many young people is not new. Buckingham (2007:96) sees this divide between in-school and out-of-school use "as symptomatic of a much broader phenomenon—a widening gap between children's everyday 'life worlds' outside of school and the emphases of many educational systems." Similarly, Collins and Halverson (2009) identify a culture gap between educational systems designed in the industrial age and the emerging learning practices of the knowledge age. They describe how young people are finding opportunities for more customized and opportunistic learning out of school, but many schools are confronting narrowing curricula and a push toward accountability in the form of standardized testing. In his study of three technology-rich high schools in Southern California catering to students from different class backgrounds, Matthew Rafalow (forthcoming) found that only the school serving elite students tapped digital technologies to support creative and connected forms of learning. While some schools are mobilizing today's technology to connect young people's digital learning to formal education, most young people are not growing up in environments with robust home-school connections, much less digitally networked ones.

Sonia Livingstone and Julian Sefton-Green's (2016) CLRN project, *The Class*, set in London, explored the relationships between learning at home, school, nonformal learning settings, peer group interactions, and the online context. They found pervasive disconnects between sites of learning, as interests at home were unsupported by school, as school learning went unrecognized at home, as peer-based and online sites were seen as irrelevant to education even when potential connections existed. Young people can be actively invested in these disconnections. For example, Max (a white middle-class child of divorced parents) had formed an extraordinary friendship with a young woman of East African origin, Jenna, and another white girl because of their common interest in Harry Potter. In terms of social class, gender, and ethnicity their common interest transcended the conventional structures of friendship. Yet this bond was kept out of sight to avoid teacher, peer, and parental surveillance. On other occasions, the school excluded forms of learning that did not conform to the content and outcomes it tracked and valued. Sedat, a rather attention-seeking and disruptive student at school, turned out to be an avid and disciplined player of the saz at

home—and was heavily involved in performances in his native Alevi culture. The school’s promotion of classical music and the structure of music education on offer made it difficult for him to convert both his commitment and discipline as well as his musical knowledge and experience into forms of performance that were valued by the school.

2.2.2 Gaps in Relational Supports

The disconnects that Livingstone and Sefton-Green uncovered in their ethnographic research are windows into wider gaps and inequities in young people’s access to informal supports for learning and access to educational opportunity. Minoritized youth not only experience cultural gaps in home-school connection, but also gaps in informal social supports and connections. Scholars have increasingly focused attention on the importance of social capital (Freeland-Fisher 2018) and on how privileged families leverage social connections to maintain access to valuable resources, including coveted forms of educational opportunities. These forms of “opportunity hoarding” (Tilly 1999) include practices such as legacy admissions and internship referrals (Reeves 2017). By contrast, nondominant youth are less likely to have access to social connections that support educational and economic opportunity of this kind (e.g., Berardi 2012; Museus 2010; Terenzini et al. 1994; Tinto 1993). “Institutional agents” such as teachers in schools are less likely to connect with, sponsor, and broker opportunities for minoritized students (Stanton-Salazar 2010).

The CLRN Affinity Project, led by Jean Rhodes, focused on the role of mentors in supporting connected learning experiences. Through a wide range of studies and analyses, Rhodes and her collaborators have documented the importance of mentorship and social relationships centered on shared interests and affinities. In particular, the project emphasized the value of “natural” mentors whom youth connect with outside of formal and “assigned” mentoring programs. Their research on formal mentoring programs indicates that these programs tend to be less successful for marginalized and vulnerable youth (Raposa, Rhodes, and Herrera 2016), and outcomes vary widely depending on how mentors are trained and matched (Raposa et al. 2018a). By contrast, they found that informal mentorship initiated by youth, or occurring more organically in the context of shared interests and family ties, has more reliably positive outcomes (Schwartz et al. 2016; Schwartz and Rhodes 2016; Schwartz et al. 2017). They also emphasize that access to these kinds of supportive mentoring relationships is highly inequitable. Their analysis of ADD-Health data revealed that low-income youth are less likely to have access to informal mentors (Raposa et al. 2018b). These inequities in supportive and opportunity-enhancing mentorship offer a window into how social capital reinforces existing forms of educational advantage.

2.3 New Media, New Divides

Young people's landscape of learning and opportunity is complicated by a rapidly changing media and technology environment creating new kinds of social divisions, especially between generations. Worldwide, young people access the internet at higher rates than other age groups. As of 2017, in the developed world, 94 percent of young people aged 15–24 are online (International Telecommunication Union 2017). In the United States, a 2019 survey by Common Sense Media found that tweens average 5:54 hours and teens 9:49 hours with entertainment media per day, excluding digital media use at school or for homework (Rideout and Robb 2019). These rates of media engagement are similar among parents (Lauricella et al. 2016). Although traditional activities of watching television and listening to music remain young people's preferred media activities, the underlying media infrastructure has changed dramatically with the shift to digital media. Today's media environment is a convergence of what were once distinct media types such as books, comics, television, and cinema. It is also more pervasive, as it includes social-communication and mobile platforms. This pervasiveness means that the commercial and data-driven aspects of corporate-run media are also more ubiquitous in everyday life. This changing media environment has fed parental and educator concerns about how new technology is eroding social norms, literacy, and mental wellness among young people (Baron 2008; Bauerlein 2008; Carr 2010; Greenfield 2009; Pea et al. 2012; Turkle 2011; Twenge 2017). Others have raised concerns about commercial media and technology platforms' influence over young people's entertainment and communication, and related privacy concerns (Barassi 2018; Livingstone and Third 2017; Lupton and Williamson 2017; Macenaite 2017; Stoilova, Nandagiri, and Livingstone 2019). In contrast to these cautionary views of young people's digital media use, proponents of "digital natives" (Prensky 2010) and the "digital generation" (Tapscott 2008) have argued for the highly activated, engaged, and resourceful kinds of learning and literacy young people are gaining with games and online activity.

We attend to both risks and opportunities in digital media engagement. Rather than frame our inquiry by risk or benefit for youth as a whole, however, we argue for a focus on critical *differences* as they are structured by factors such as socioeconomic status, ability, race, interests, parenting approach, and learning institution. The growing diversity and fragmentation of engagement with media and communication means that blanket claims about new media influences on young people are by definition overstated. If we reduce our inquiry to the question of whether new media are generically good or bad for young people, we lose visibility on important questions about diversity, vulnerability, and equity. A recent meta-analysis of research on social media and teen wellness indicates that at an aggregate level, harms are negligible, and social media use accounts for only a small variance in wellness (Orben and Przybylski 2019). This suggests that we need to look beyond technology use to consider contexts of use and other vulnerabilities. In their review of literature on teen mental health and technology, Madeline George and Candice Odgers

(2015) found that online threats generally mirror offline threats, and that threats and benefits are unevenly distributed among different populations of youth. Related research by Common Sense Media suggests that black youth are most likely to encounter hate speech online, and socially and emotionally vulnerable youth are most likely to benefit from peer support via social media (Rideout and Robb 2018). Studies indicate that social media have opened up opportunities for LGBTQ youth to connect with one another and offer spaces of destigmatization and emotional support (Byron et al. 2019; Craig et al. 2015; McInroy 2019). Other research describes how children with autism can reap unique benefits from online social interaction (Ringland et al. 2015). Scholars are refocusing on the relationship between risk and harm, recognizing that a certain amount of risk is vital for building resilience and learning to cope (Livingstone 2013; Schoon 2006). CLRN researchers have delved into critical differences in parenting, family dynamics, and media engagement that structure risks and benefits for diverse young people.

2.3.1 Digital Parenting and Screen Time Tensions

Well-meaning concerns over risks of digital media can produce intergenerational tensions that can themselves cause new tensions in the family and result in missed opportunities for connected learning. Parental anxiety over “screen time” has grown as even young children are engaged with smartphones and tablets. One 2018 survey indicates that it is the number one parenting concern in the United States (Israelsen-Hartley 2018). These concerns have led to efforts to “manage” a generic notion of “screen time” almost irrespective of the nature of children and young people’s digital media activities or outcomes. The highly influential American Academy of Pediatrics (AAP) focuses almost exclusively on risks and for many years advocated for time-based screen time rules that did not take into account different forms of content and engagement. Although the AAP softened its stance in some respects in 2017, the overall ethos remains risk focused even though based on a surprisingly limited and unsatisfactory evidence base (AAP Council on Communications and Media 2016; Blum-Ross and Livingstone 2016). Research has documented how concerns over media and screens intersect with class background. Middle-class and elite families tend to believe that limiting access to commercial media and related toys is a marker of good parenting (Clark 2013; Hoover, Clark, and Alters 2004; Pugh 2009; Seiter 1995). Attitudes toward managing media and technology may be shifting in recent years, as digital media offer more learning opportunities. Research indicates that in the past decade, educated households have begun to engage more heavily with “popular” media (Rideout, Foehr, and Roberts 2010), while lower-income immigrant families exhibit the most engaged and sometimes restrictive approaches to digital media management (Clark 2013; Rideout and Robb 2018).

The CLRN Parenting for a Digital Future project, led by Livingstone and Blum-Ross, delved into these dynamics by studying how diverse families engaged with media and technology in their everyday lives. They found that parents are highly engaged in their children’s interests and digital lives in varied and sometimes contradictory ways. For example, parents with

children with special educational needs experienced digital media as a source of conflict, as well as a pathway toward valued social skills or future employment. For one child with autism, Kyle (see [Learner Story 5](#)), digital media supported his creative expression in and out of school, but his family did not see these engagements as opening a pathway to work opportunities. Some parents fretted over screen time, while others embraced digital activities and play, such as gaming with *Minecraft*, as a source of shared enjoyment and learning. They found that parents struggled to apply abstract guidelines to their real-life contexts because the guidelines are insensitive to how outcomes differ depending on children's interests in and ways of using particular screen media in their lives. Not only were these rules and restrictions almost impossible for parents to apply in today's media-rich ecology, but they fit poorly with parents' (and society's) desires to prepare children for a digitally networked society. Despite these myriad ways in which parents actively engaged their children's digital interests, educators and policymakers tend to underestimate the positive role that parents could play, and the potential for parents to connect the digital learning young people are engaged in at home to academic success is largely unrealized (Blum-Ross and Livingstone 2016; Livingstone and Blum-Ross forthcoming).

2.3.2 Media Polarization and Inequity in Learning Technology

The growing diversity and fragmentation of today's media ecology means that young people have a greater range and choices in media and communications, and these choices are structured by familiar forms of difference and stratification. In our original report, we raised concerns about cultural balkanization and political polarization that accompanies this growth in media choice (Drotner, Jensen, and Schröder 2008; Prior 2007). Earlier hopes that the internet would promote cross-cultural understanding and a public sphere welcoming to diverse voices has clearly not come to pass (Pariser 2011; Zuckerman 2014). The equalizing effects of mass media and limited choice in the TV-dominant era no longer operate within an individualized social media ecology. Related dynamics are at play in learning and literacy. Although in principle, we might expect young people to do anything online, as fits their interests, the EU Kids Online project shows that in practice, most youth do not progress very far up this ladder of opportunities (Livingstone et al. 2019). Only a relatively skilled, privileged, and motivated minority create, upload, and post content and join participatory communities (Jenkins, Ito, and boyd 2015; Lenhart and Madden 2005; Livingstone, Haddon, and Gorzig 2012). Most young people need more support to translate and connect their new media engagements with more academic, civic, and production-oriented activities. When young people have an abundance of choice in media and are constantly connected, it becomes more difficult to focus their attention on topics less tailored to their interests. Howard Rheingold (2012) has argued that we must actively cultivate skills such as mindfulness and "crap detection" that are keyed to these new realities of the digital and networked world (see also Hobbs 2017; Madden, Lenhart, and Fontaine 2017). Just as

schools are struggling to equalize access to educational opportunity, “the media” no longer perform the same level-setting function that they once did.

These dynamics are at play with educational technology and online learning as well. Rather than mitigating the class-based achievement gap, digital learning opportunities may, in many circumstances, be exacerbating it (Reich and Ito 2017). For example, proponents of free online learning platforms such as MOOCs and open educational resources hoped they would help close equity gaps. Studies have indicated that it is overwhelmingly highly educated learners who are taking advantage of these opportunities (Despujol et al. 2014). In a study of HarvardX and MITx open online courses, researchers found that the median income and educational attainment of MOOC learners was much higher than in the general population (Hansen and Reich 2015). The tendency for more highly educated learners to access open educational resources has also been documented in the CLRN Connected Consumption study, which found that confident and economically secure learners tended to thrive most in the open learning scene (Carfagna 2014). Learning-technology use within schools also mirrors these broader inequities (Boser 2013). Progressive schools serving privileged learners are using new technology in learner-centered ways that knit together formal and informal technology engagement, while schools serving less privileged learners are using the same technology in more traditional, less empowering ways (Rafalow forthcoming).

The CLRN Digital Edge project (Watkins et al. 2018) involved an ethnographic study of the institutions, practices, and social relations that make up the daily and mediated lives of black, Latinx, and lower-income youth in the United States. The study found many instances of “social hacking” by minoritized youth, who “worked around social and economic barriers to pursue their relative investments in digital media” (Watkins et al. 2018:19). Whether through early adoption of the mobile internet or finding ways to appropriate school technology resources for games such as *Minecraft*, teens at the school that the researchers studied found ways to tap the power of digital media for self-expression and play. Researchers also found a profound disconnect between the active and creative learning young people were engaged in with online video out of school, as YouTube was blocked at their school. Even in classes centered on digital technology and literacy, they found the courses were technology rich but curriculum poor (Margolis et al. 2010). As a result of their fieldwork, the Digital Edge team recommended that schools focus as much on critical- and design-thinking literacy as they do on instrumental training on technology and tools. Whereas the latter focuses on lower-order literacy skills such as learning how to search or preparing documents and presentations, the former focuses on higher-order literacies such as asking novel questions, design, and complex communication. While digital media opens up the possibility of expanding access to connected learning experiences, resilient forms of stratification, inequity, and institutionalized practices means that we face an uphill battle in realizing this potential.

3. CONNECTED LEARNING



The connected learning agenda responds to the challenges and possibilities in a changing landscape of opportunity, learning, and technology. The underlying values and learning approach reflect long-standing traditions in progressive education, but they emphasize new opportunities afforded by changes in how we communicate, connect socially, and access information. While we consider explicitly educational institutions such as schools, we recognize that most learning happens in settings that are not explicitly “educational”—whether at home, in varied communities, online, or in contexts of play. We define “connected learning” as learning that is socially embedded, interest-driven, and oriented toward expanding educational, economic, or political opportunity. It is realized when a young person is able to pursue a personal interest or passion with the support of friends and caring adults and is in turn able to link this learning and interest to academic achievement, career success, or civic engagement. Social, digital, and interactive media, peer-to-peer marketplaces, and educational technologies have the potential to exacerbate equity gaps, as well as broaden access to connected learning. The focus of our research and design agenda is to understand under what conditions new media can expand the reach of connected learning experiences and environments and advance educational and social equity.

We draw from approaches to learning—often called sociocultural, cultural historical, social constructivist, or situated approaches—that stress how learning and development are embedded within social relationships and cultural contexts. This body of work is grounded in an understanding of people’s everyday activities rather than focusing exclusively on formal educational contexts and academic subjects. The emphasis is on how learning is supported by practical activities that are mediated by culture and are part of longer histories (Cole 1998; Vygotsky 1978). This orientation contrasts with approaches to learning, most notably behaviorism, that focus on external and often standardized inputs, rewards, and assessments. It also contrasts with some forms of constructivism, which focus on individual development and locate the primary driver of learning as internal to the developing child, rather than in the social, cultural (and technological) environment. While internal psychological and individual processes are clearly critically important to learning, we emphasize the dynamic relationship between learners and their social and cultural environment.

A growing consensus in the learning sciences recognizes that learning is most robust when grounded in a learner’s cultural identity, part of meaningful inquiry, supported by caring relationships, and reinforced across settings. These general claims are largely uncontroversial among learning scientists and are described in the National Academies’ consensus report on “deeper learning” (National Academies of Sciences, Engineering, and Medicine [NASEM] 2018). While researchers have increasingly converged in identifying characteristics of deeper and meaningful learning, how to support and document these forms of learning is much less settled. Despite the consensus of learning scientists, educational institutions and practices are still strongly rooted in the learning theories of a prior era and in infrastructures that predate digital media. Even “disruptive” new educational technology platforms such as

MOOCs often reproduce these same outdated theories of learning (Davidson 2017; Losh 2014). Efforts to deploy new educational technologies and reform education have floundered in the face of institutionalized forms of educational practice and entrenched social divides (Russakoff 2015). Expanding access to deeper and connected learning demands a systemic approach that looks at formal and informal learning environments, assessment and accountability, the role of media and technology, as well as broader political and institutional structures and relations.

Among approaches supporting deeper learning, connected learning is unique in considering an expansive network and underlying infrastructure of supports and institutional relations (Penuel, Clark, and Bevan 2016). Rather than focus exclusively on improving a particular institution (such as colleges, schools, or libraries), connected learning starts with the interests of the learner and is agnostic as to the settings in which learning happens. We use the metaphor of an “ecology” to stress these broader contexts and their interconnection. The notion of ecology refers to the complex character of the spaces in which children develop. It also positions the child in meanings, practices, structures, and institutions contextualized by family, neighborhood, culture, and global contexts (Barron 2006; Bronfenbrenner 1979; Horst, Herr-Stephenson, and Robinson 2010). It is important to note that the concept of ecology goes beyond a unidirectional model of context influencing an individual. It captures the interdependence and co-constituted nature of actor, diverse kinds of collectives, and varied institutional and infrastructural conditions. The ecological metaphor is tied to our approach to young people, which recognizes how they are embedded in what Weisner (2002) has described as an “ecological-cultural” context and everyday routines organized by the interrelated contexts of peer relations, family, and school. Our view also aligns with work in the sociology of childhood that examines how young people shape and are shaped within broader social and cultural dynamics (Corsaro 1997; Fass 2006; James, Jenks, and Prout 1998). This body of work emphasizes children and young people’s agency but recognizes how it is constrained by structures of family, school, community, religion, and commerce. This more expansive and learner-centered approach involves a fundamental paradigm shift from the mainstream of educational research, which has centered on schools, academic subjects, and individualized measures of learning. Here we describe connected learning in terms of experience, elements that support the experience, and outcomes before turning to issues of design.

3.1 The Experience of Connected Learning

The experience of connected learning is defined as the integration of personal interests, supportive relationships, and opportunities to be recognized by communities and institutions. We believe all young people deserve to experience connected learning, but we do not believe that all learning needs to be connected learning all the time. Time spent with relationships that are not tied to connected learning are also important; young people need space to pursue interests and social life with peers in ways that might not be tied to

3. CONNECTED LEARNING

passionate interests or to opportunities. Conversely, young people at times must also engage in activities and learning that they may not be deeply interested in, but that are important for societal and familial contributions or economic success. Young people can also have varied entry points into connected learning, which includes personal interests, peer and family influence, and via educators. We believe, however, that connected learning experiences are qualitatively different and impactful because they are tied to learners' deeply felt affinities and meaningful relationships. These kinds of experiences are the most likely to guide young people toward developing interests, purpose, and self-determination.

In our original report, we conceptualized connected learning as an integration of three spheres of learning—interests, peer culture, and academic topics. While we still see the integration of these three spheres as defining the experience of connected learning, we have expanded our conceptualization of two of the three spheres of learning to encompass a broader set of relationships and opportunities (see Figure 3).

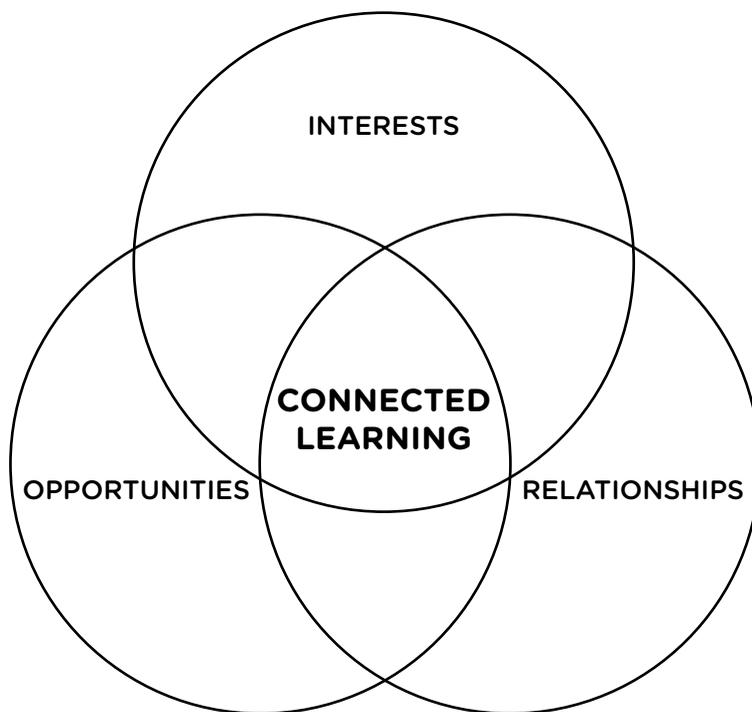


Figure 3
Three spheres of learning that are integrated in connected learning.

Relationships

Our original model of connected learning stressed the importance of peer culture in engaging young people in shared practices and identities. We drew from research on peer learning that indicated that when peer culture is centered on shared interests, learning is highly motivating and efficacious. Our current understanding of connected learning builds on and expands on these initial insights by including a wider range of supportive relationships. In many of our studies we found that mentors, caregivers, and educators were joint participants in peer learning environments. In particular, we have noted the important role of both near-peer and adult affinity-based mentorship in legitimizing interests and brokering connections to opportunities across settings. Vivian Chávez and Lissa Soep (2005) have described mentoring relationships that rest on mutual respect as a form of “collegial pedagogy.” For these reasons we have renamed the “peer culture” sphere of learning to “relationships” in order to be inclusive of these mentoring relationships.

Interests

This sphere has retained the same label as in our original conception. In our earlier report, we noted that interests can span hobbies, sports, academics, and artistic areas, and that they “are not innate, but rather discovered and cultivated within particular social and cultural contexts” (Ito et al. 2013:64). Interest development is an interaction between individual preference and what Azevedo (2013) has described as “lines of practice” that sustain engagement in shared interest-driven activities through time. As we have progressed in our work in collaboration with the MacArthur Youth and Participatory Politics Research Network, we have expanded our notion of interest to include political and civic forms of engagement. “Interest” can refer to having a personal stake in social and political affairs as well.

Opportunity

Our original conception of connected learning focused on connections to and from schooling, emphasizing academic subjects as the central focus for young people to engage in the adult-facing world of opportunity. We used the term “academic” to describe this sphere “given that for most young people, their most immediate future-directed goals are primarily success in school” (Ito et al. 2013:65). As we progressed in our work, however, we realized that it was too narrow and limiting to assume that scholarly activity and formal education were the only or primary pathway to opportunity. When a young person is pursuing an interest, it may intersect with a subject or class at school but also be tied to varied out-of-school and online settings. In addition, we found young people engaging in civic and political action, or in economic and workplace opportunities that were not mediated by school or academic pursuits. In our revised conception of connected learning, we expand this sphere to include opportunity that may not rest on academic and school success. We renamed this sphere “opportunity” to encompass connections and practices that help young people find their way to success in the wider world, which includes academic, career, civic, and political opportunities.

LEARNER STORY 3

JERMAINE

By Julian Sefton-Green

The CLRN Last Mile project investigated how young creators in London moved from intense, sustained interest-driven engagement into economic activity. I interviewed Jermaine, a young black man and filmmaker, when he was in his 30s. He recounted how he had fallen out of the education system for “just hanging around with the wrong kind of people.” He ended up at WAC Arts (Sefton-Green 2017)—an informal learning center. WAC Arts introduced him to a range of job roles and brokered some initial connections, facilitating work with a studio that created music for *The Matrix*. He had flourished in terms of his personal confidence and production expertise but nevertheless had achieved no credentials nor indeed used the course as a way of getting a job.

In some ways, Jermaine seemed uninterested in turning his training into formal outcomes and saw his learning much more as a means to extend his interests in music making and to enable his participation in cultural events with his peers. These courses were taking place around 2007 and 2008 when YouTube had not yet achieved dominance. Jermaine built a home studio and had access to technologies quite scarce at the time. He started a YouTube-based media channel for up-and-coming artists, uploading their tracks, recording in his studio, and creating music videos.

Despite investing these resources and the emerging possibility of commercializing his online content, Jermaine initially seemed content simply to participate in the scene: “I wouldn’t say finance was my main drive because, at that time ... we couldn’t really see ... how are we going to the money, but it was an outlet for the passion and for the message that we were all kind of trying to promote at the time.” Eventually he began seeking a full-time role in his scene, so “I got active with my friend and we put together

our heads and equipment and built the online media thing ... UK Overstood.” He saw an opportunity to leverage his online content into long-term career or business opportunities in a genuinely entrepreneurial moment, as distribution was moving online and digital.

We were using the Canon with three different lenses that allowed us to shoot at night without external lighting ... you could just literally go with your camera, put the music on someone's phone and shoot wherever you are so that you can go on the train, a bus, Camden Town. You could literally go and film two or three music videos with one or three or four artists over a period of a day. Between me and him in our first year and a half, we put over 500 videos on our channel. No one had kind of done that ... with the artists that we were using that weren't very accessible to, you know, the people that really wanted to see them.

However, despite these market advantages, Jermaine was not able to fully tap the potential of the moment. He described a falling-out with a business partner and the difficulty of ensuring that capital that came his way came from legitimate sources, given the relationship of the music culture he was describing to communities resourced by the illegal sale of drugs. He understood how he could have derived income from making these videos. For example, he analyzed the value of the market traffic he had generated, drawing in viewers from Canada and even some Latino markets. What came across more strongly in our interview, however, was a sense of ethical imperatives of participation in the scene, which he portrayed as a noncommercial gift economy. He made this clear as he described the practices of lending cameras, the hours spent editing, ferrying people around, and uploading videos.

JERMAINE

When we met up with Jermaine, he told us that he was working for “Denny’s Uniforms, which supplies suiting to hotel chains and restaurant chains,” a far cry from “a creative field,” and that he was now on “autopilot.” The world of filmmaking was very much one of personal contacts and of being part of a neighborhood at a particular time. He could see connections with this scene to the larger marketplace of YouTube, and even more role-defined careers in these creative businesses. Yet, in some sense, participating in his scene, managing to earn a bit of cash, and keeping all that activity ongoing during a period of time had been the point of it all. Critics may suggest that this existential value is a post hoc rationalization for the barriers he had faced and a failure to progress, but this severely underestimates how playing his part in a cultural economy created purpose, value, and reward.

3.2 Elements of Connected Learning Environments

Like other forms of student-centered learning, connected learning is supported by tried-and-true pedagogical approaches such as project-based, inquiry-driven, constructionist, and experiential education. It can also be supported by a wide range of technologies and techniques such as flipped instruction, personalized, and mastery-based approaches. Connected learning environments are not, however, defined by a specific technology, technique, or pedagogical approach. Unlike instructional techniques, connected learning is fostered in *environments* that have particular social and cultural characteristics, and it can be supported through diverse technologies, techniques, and infrastructures. Fostering connected learning differs fundamentally from more instructor-centered approaches that involve “applying” or “implementing” a particular technique within existing learning institutions such as schools. Connected learning environments have emergent properties that develop through time, across a range of stakeholders who share power and authority. Here we offer an overview of four key “elements” present in all connected learning environments that we have observed across a wide range of studies and design efforts: sponsorship of youth interests, shared practices, shared purpose, and connections across settings.

These four elements represent an evolution of the three core properties and supports for connected learning identified in our original report—production-centered, shared purpose, and openly networked. Supporting and legitimizing diverse youth interests emerged as aspects of connected learning that were not adequately signaled in our initial conceptualization. We use the term “sponsorship” to describe this key element. The “production-centered” principle was expanded into a broader element of “shared practice,” in order to include shared activities such as competition and joint research, as well as creative production. Similarly, our original property of “openly networked” was expanded to “connections across settings” to include a broader range of ways to broker and connect that did not rely exclusively on open networks. We have also moved to describing these supports as “elements” in order to signal the alchemy required to foster connected learning environments and an openness to a diversity of settings and approaches. More detailed design principles for supporting these elements in practice are described in the final section of this report.

3.2.1 Sponsorship of Youth Interests

One essential element of connected learning environments that makes them different from purely youth-driven spaces is the presence of adults and adult institutions that confer legitimacy and resources. These “sponsors” value and highlight the importance, and academic and career relevance, of youth interests. For example, young people’s interest in gaming or music gains recognition and resources when it is sponsored by a faculty mentor and gets institutionalized as a school club. We draw from Deborah Brandt’s (1997) work on

“sponsors of literacy.” Sponsors, be they people, organizations, or even communities, “enable, support, teach, model, broker, mentor, and sponsor” (1997:166). They offer emotional support, as well as knowledge and access to resources, to propel youth forward. This might mean connecting youth to career opportunities, endorsing them publicly, helping them enrich their social networks, or providing mentorship and access to space, technology, and other resources. Successfully enlisting and supporting youth’s interests can lead to deeper and sustained learning, as well as motivate them to re-engage school material when the opportunity arises (e.g., Dewey 1916; Schiefele 1991). Sponsorship also means legitimizing nondominant youth interests, culture, and identities through culturally responsive and antiracist pedagogical approaches (see, e.g., Ashcraft, Eger, and Scott 2017; Gay 2010; Ladson-Billings 1994, 1995a, 1995b, 2006; Paris and Alim 2017; Pinkard et al. 2017; Scott and Garcia 2016).

The concept of sponsorship draws attention to the important role that parents, friends, caring adults, and learning and community institutions play in elevating particular affinity groups and fueling youth interests. While peer support for interest is critically important, sponsorship by adults and more established peers confers uniquely powerful resources, legitimacy, and access. Parents and other caregivers are perhaps the most important sponsors of youth interests and play a central role in providing access, resources, and emotional support for finding and developing interests. A range of studies have investigated parental supports for extracurricular activities and other forms of “concerted cultivation” (Barron 2006, 2010; Clark 2013; Lareau 2003; Lareau and Conley 2008). The CLRN Longitudinal Survey of Connected Learning study looked at young people’s participation in a wide range of youth programs, and researchers found that parents were often critical influences in guiding young people to opportunities that fostered and supported new interests. Once a young person is in a program, a parent can continue to sponsor that interest by engaging at home. One young woman in a museum “explainer” program described the support her mother provided. “I’ve got to study sometimes for our demonstrations and my mom would always kind of sit there and like listen to me practice. She would like do it with me. She’d quiz me on it, like if there was a test, which is nice” (Van Horne et al. 2016). Several CLRN studies looked more deeply at the parental role in connected learning, including the Parenting for a Digital Future (Livingstone and Blum-Ross forthcoming), and Connected Parenting (Brough 2016; Cho et al. 2019) projects. In their study of a diverse range of families, Livingstone and Blum-Ross found that parents variously sought to embrace, balance, or resist their children’s digital interests, often focusing on policing screen time rules rather than engaging deeply with their digital interests. Only a small number of “geekier” families saw digital interests as a space of shared enthusiasm.

The CLRN Connected Parenting study (Brough 2016; Cho et al. 2019) looked more selectively for lower-income black and Latinx families who were effectively supporting their children’s tech interests. This research found that even without a high degree of their own

tech expertise or resources for expensive tech camps and other forms of enrichment, parents were finding ways to sponsor their children's tech interests. Even light touchpoints at which a child sees a parent playing a game or taking digital photos can have a lasting influence. Sharing digital authority, when a child has more digital expertise than the parent, cultivated a climate of trust and youth empowerment that supported budding interests and expertise. Finally, the study identified "sandboxing" as a parental practice in which parents or other caring adults construct a space or provide an opportunity for children to learn playfully, guided by the child's interests and with low consequences for failure. For example, one young man's uncle gave him an old computer to tinker with freely. On another occasion, he took it upon himself to disassemble and repair the broken controller for his Nintendo 64. He recounted these experiences as a key turning point in the development of his interest in technology.

Several CLRN studies have investigated "affinity-based mentorship" by caring adults outside the family as another mode of sponsorship for connected learning. Mentors, such as athletic coaches, music teachers, and art instructors, can provide support, expertise, and resources to young people in specialized areas of interest. The CLRN Affinity Project, led by Jean Rhodes, studied both traditional one-on-one "assigned" mentorship approaches and the natural mentorships that youth forge with teachers, afterschool staff, and other caring adults. This included comprehensive meta-analyses of both formal youth mentoring program studies (Raposa et al. 2019) and natural mentoring studies (Van Dam et al. 2018). Interestingly, when relationship quality was taken into account, the effects of natural mentoring exceeded the effects of formal mentoring. Additionally, across both types of relationships, youth benefited more from mentors with a helping-profession background (e.g., teacher, guidance counselor, minister/priest/rabbi, religious leader, doctor/therapist). Given that natural mentoring relationships are far more common and require less infrastructure and investment than formal mentoring relationships, efforts to increase the "relational capacity" of the everyday settings of youth and foster opportunities for natural mentoring relationships are promising.

Qualitative research on connected learning environments such as the Digital Youth Network and YOUmedia Chicago also suggest the powerful role of affinity-based mentorship in informal learning environments centered on youth interests (Barron et al. 2014; Larson et al. 2013). Building on these findings, Rhodes and Schwartz developed connected approaches to youth mentoring that center on directly targeting young people's capacity to recruit mentors and sponsors. In the Youth-Initiated Mentoring (YIM) approach, youth nominate adults to serve as their mentors, selecting from among the adults who are already in their social networks. YIM program staff then provide relationship oversight, including screening, training, and supporting the nominated adults. YIM has been successfully deployed for more than a decade through the National Guard Youth ChalleNGe Program (NGYCP), an intensive program for adolescents who dropped out of high school. An evaluation of NGYCP

suggested the potential of YIM in improving academic and career outcomes and reducing delinquent outcomes (Schwartz et al. 2013; Spencer et al. 2016). Compared with traditional formal mentoring programs, the YIM approach resulted in longer-lasting relationships, and a three-year follow-up showed that enduring YIM relationships were associated with less erosion of program effects (Schwartz et al. 2013). In an extension of this approach typically used with high school and college students, the Connected Scholars Program actively supports and trains students in reaching out to and cultivating a network of supportive adults, rather than a single mentoring relationship (Schwartz et al. 2016). Results from a qualitative study of a program serving ethnic minority, low-income, and first-generation precollegiate students showed promising findings in its capacity to develop youth’s help-recruiting skills, as well as their motivation and efficacy in accessing social support (Schwartz et al. 2016; Schwartz et al. 2017). Young people benefit from both “stocking the pond” with caring adults with diverse backgrounds and interests, as well as from “teaching youth to fish” for sponsors and mentors (Rhodes 2017, para. 4).

3.2.2 Shared Practices

Shared activities form the backbone of connected learning. Hands-on projects, experiential learning, and engagement with real-world problems and politics fuel learning and engagement (Condliffe et al. 2017; Holm 2011; Resnick 2017). Whether youth are writing fanfiction, competing in a debate, organizing a protest, or streaming the play of their favorite gamer, their engagement resides in a set of practices embraced, valued, and made consequential by a community of practice. Interests and affinity-based relationships both grow out of and are sustained through varied forms of concrete and purposeful activities, which might be centered around creative production, friendly competition, civic engagement, or joint research. A young person’s extended participation in a drawing practice, for example, only partly develops through instructional activities related to drawing, such as workshops and courses. It further develops as the learner is able to advance an identity of creativity and competence in the hobby and to socialize around the interest (Azevedo 2011). Youth gain audiences and recognition as they publish work, share expertise, and make social connections. Once engaged, young people receive immediate feedback on progress, have access to tools for planning and reflection, and are given opportunities for mastery of specialist language and practices that are reflected across a set of shared contexts.

To be equitable, practices must grow out of the interests, cultures, and identities of nondominant youth and be accessible for families across the socioeconomic spectrum. Forms of *creation and making* from home cultures include practices that can span generations and connect home, community, and school (Gutiérrez et al. 2017; Gutiérrez et al. 2019; Gutiérrez and Jurow 2016). Kylie Peppler and Mishael Sedas conducted a survey of prior experience with making and crafting and interviewed a group of lower-income youth participating in a making workshop (see [Learner Story 4](#)). They found that the vast majority of youth engaged in some forms of crafting, and most had learned to craft from a

family member. One 13-year-old participant shared how he spent time with his grandfather working on model airplanes, model cars, and particularly on small ship models in bottles. The value his family placed on making (i.e., his father repaired cars and his grandmother did scrapbooking and sewing) informed his own desire to build cars like his father and turn it into an entrepreneurial venture. He started working with two of his friends to fix bicycles in their neighborhood and built a bike-repair venture (Peppler and Sedas 2019).

Engagement with popular culture is also a way of meeting youth where they are and connecting practices to learning and opportunity. Creative production around popular culture and entertainment was a common form of shared practice in the case studies of youth-centered online affinity networks conducted by the CLRN Leveling Up project, led by Mizuko Ito and Katie Salen Tekinbaş (Ito et al. 2018). The cases include networks focused on fanfiction, knitting, professional wrestling, anime video remixers, Bollywood dance, YouTube vloggers, and communities surrounding two games, *LittleBigPlanet 2* and *StarCraft II*. In these networks, young people mobilize digital networks and production tools to connect with one another through their passion for niche popular-culture interests. In most of these cases, some form of creative and often collaborative production provided the focus of the activity, whether it was designing game levels, knitting, dancing, or writing fanfiction. Another form of common shared activity was *competition*, which included esports tournaments or competitions around dance, design, or writing. These kinds of shared practices are also common in adult-led connected learning environments, whether it is sports, chess, or arts-related competitions and creative productions.

Joint inquiry is another type of shared practice that can provide a focus of activity for connected learning environments. Often this is in support of creative production or competition, such as when gamers solve problems to win at a game or investigate how to design a new feature in a game modification. At other times, research can itself be the primary focus. This can take the form of fans engaged in collectively developing theories or tracking down clues about a TV series (Jenkins 2006) or youth reporters investigating a story (Soep and Chávez 2011) or community issue. As part of the CLRN Longitudinal Survey of Connected Learning study, Ben Kirshner engaged youth to be part of the research team, employing methods of youth participatory action research (YPAR). Teens worked alongside adult researchers to study and identify elements of connected learning in out-of-school learning environments. YPAR approaches draw from a long history of justice-oriented efforts in what Soep and Chávez (2011) have described as “collegial pedagogy” and from efforts to engage young people in investigating problems of relevance to their community (Cammarota and Fine 2008; Kirshner, Pozzoboni, and Jones 2011).

3.2.3 Shared Purpose

The civic dimensions of YPAR highlight the importance of shared purpose as well as shared practice. Participants are engaged in activities not simply for the pleasure of pursuing an interest, but also to make a meaningful contribution to a community, perform or create work that is shared with others, or fulfill a collective purpose. In this it is more akin to everyday learning outside of school, which generally happens as a part of engaging in an activity or goal that is not explicitly educational, whether that is getting food on the table, playing a game, preparing a presentation, or communicating with friends and family. Learning and cognition “in the wild” also tends to happen in social and collaborative contexts where individuals work together, share knowledge, and engage in joint inquiry (Hutchins 1996). Unlike in classrooms, there is less need to assess and mark individual knowledge and expertise, and it is more important that collective goals are accomplished (Lemke et al. 2015). As such, connected learning environments draw together young people and adults in joint activities that are defined by a shared purpose and goals as well as common interests (Miell and Littleton 2004). Formal instruction, workshops, and training may happen in individual contexts and moments disconnected from these joint activities, but the shared purpose creates the collective frame and defines ways of collaborating and competing.

Educators in schools, makerspaces, and other learning settings have found that opportunities to share work to broader audiences provide a heightened sense of purpose. For example, at YR Media, young people research and produce stories that appear on National Public Radio and other major outlets (Soep and Chávez 2011). At the Quest to Learn middle school and high school, devoted to gamelike learning, students showcase their final projects for each unit to parents and other community members (Ito et al. 2013; Salen et al. 2010). At YOUmedia Chicago, gamers publish a game-review podcast, spoken-word artists perform in a weekly open mic session, and music makers have created their own record label (Larson et al. 2013). In the cases of youth-driven online affinity networks in the CLRN Leveling Up study, participation was motivated because young people were making a contribution to a shared community of interest. Audiences with shared passions read their stories, played their games, and watched their videos and dance performances, offering appreciation and meaningful feedback. Just as with traditional athletics, esports and streaming are fueled by appreciative audiences that view competitions and *Let's Play* videos (Ito et al. 2018). Anime fans painstakingly translate and subtitle hundreds of hours of television episodes so millions of English-language fans can have access to diverse forms of Japanese-language content (Ito 2012).

Offering practical resources, solutions, and support to family and community is also a source of shared purpose. In the Mouse Design League, teens design and develop technologies to serve their communities (Gleason 2016). Many online affinity networks are powered by youth community organizers (Ito et al. 2018). Youth can be called on to volunteer or mentor even younger people in areas of expertise and interest (Lombana-Bermudez 2017a). Taking

BRADY

By Kylie Pepler and R. Mishael Sedas

As part of a MacArthur-funded research project designed to support systems thinking in middle- to high school-aged youth, we hosted a summer workshop in a large Midwestern city where 52 youth of low socioeconomic status (27 girls and 25 boys) piloted a new media-production curriculum with teachers from the National Writing Project. In an interview with one of the workshop participants, a 13-year-old African American male named "Brady" shared that he spent time with his grandfather working on model airplanes, model cars, and particularly on small ship models in bottles. Though working on the ship models was "pretty difficult," Brady said that he was able to finish thanks to his grandfather, who sets goals and expectations for him as a way to support Brady in finishing building the model in spite of its difficulty. His grandfather also takes the instructions away from him, encouraging him to figure it out on his own without taking any "shortcuts." Brady mentioned that while making with his grandpa, he "learned how to ... be calm when everything, say, falls apart." Even when Brady wanted to say, "Oh, I quit," he asserted that "you have more options, you know, just keep going when you do that." Brady's case speaks to the often-overlooked importance of intergenerational learning between grandparents and children (e.g., Kenner et al. 2007; Strom and Strom 1995). Families connect their children with the needed resources such as tools, materials, workspace, and expertise from their own or from other family members, friends, or from the community.

It is important that youth can excel when they share a sense of shared purpose between themselves and their communities, including members of their families and in their learning institutions. In this case, Brady recognized the value his family placed on making (i.e., his father repaired cars and his grandmother did scrapbooking and sewing), and how it informed his own desire to build cars like his father and turn it into an entrepreneurial venture. During his interview, we learned that Brady was already working with

two of his friends to fix bicycles in their neighborhood. He started when he and his friends were "just sitting around, not doing nothing." However, when they happened upon some YouTube videos, "we saw people fixing bikes and we just followed them, the way they did it and we kind of taught ourselves from YouTube, how it easy it was." Brady explained how they took care of advertising, division of roles within their very small business, and pricing:

"We set up fliers in our neighborhood. Sometimes we go out to different neighborhoods and we'll set up because we have some friends that live in those neighborhoods; they want some money and they want to help so we'll set up in front of their garage and help out and then give everyone their cut."

While the bike-repair venture was informed by online research Brady and his peers performed, the initial interest was spawned by the informal lessons he had garnered within the home. For the most part, making in families provides a place of collaboration, a safe environment to take risks and fail, to work at one's own pace, to receive encouragement and emotional support because of the already existing relationship based on trust and familiarity.

Brady's case is an example of the existing intergenerational practices already taking place in nondominant families, and it demonstrates their potential in supporting learning across contexts in spite of stereotypical "labels." "[P]oor in cultural capital" is one such label, produced by "shallow cultural analyses" (González, Wyman, and O'Connor, 2011:483) that contribute to the failure of seeing and appreciating the "ingenuity in the everyday practices" (Gutiérrez et al. 2017:31) of these nondominant populations. However, these existing intergenerational relationships and practices constitute the "ample cultural and cognitive resources with great potential utility" (Moll et al. 1992:134) for the creation of culturally relevant and effective learning environments across contexts.

a cue from traditional summer camps, Salen Tekinbaş and Ito’s nonprofit, Connected Camps, empowers teens to become counselors in training to staff online summer camps and afterschool programs in *Minecraft* (Lombana-Bermudez 2017c). Earning money through these kinds of interest-driven activities is an added bonus for fueling purpose. Young makers can offer goods and services as does the young bike-repair entrepreneur in Peppler’s study (Peppler and Bender 2013) or work as “explainers” in science centers (Diamond et al. 1987; Penuel et al. 2016).

Other groups are motivated by social justice or what we have called “connected civics,” in which civic engagement is tied to a personal interest and identity (Ito et al. 2015). For example, the mission of the Nerdfighters is to “decrease world suck,” and Dreamers mobilize “any media necessary” to achieve immigration reform (Jenkins et al. 2016). The International Youth Organizing Study conducted research on youth organizing in Ireland, Northern Ireland, South Africa, and the United States (Watts et al. 2018). One group in the study, the South African organization Equal Education (EE), developed a youth-driven multiyear campaign to persuade the national government to adopt minimum norms and standards for schools, such as functional toilets, windows, and walls. Youth organizing is rooted in self- and collective interest to fix problems or injustices that directly harm a person or his or her community. In this political context, the word “interest” has a distinct meaning, more akin to a having a “stake” in social and political affairs (Kirshner, Strobel, and Fernández 2003).

3.2.4 Connections across Settings

A distinctive element of connected learning that distinguishes it from most other project-based and student-centered approaches is the emphasis on connections across settings, which include home, school, community, as well as online contexts (see Figure 4).

Connected learning considers the learner at the center of a wide range of influences on interest and identity through time rather than taking an institution-centered perspective. Research indicates that interest and identity development is highly contextual and deepens through socially supported “lines of practice” that span contexts and varied life activities (Azevedo 2011; Hidi and Renninger 2006; Järvelä and Renninger 2014). Taking a learner- and interest-centered approach means that no single setting or institution can fully support connected learning through time.

Our research has identified a wider range of supports that connected learners tap into in order to persist in their interests and connect them to opportunity. The formal pipeline is an important learning context for most connected learners, and it is the dominant metaphor that guides the thinking and planning of parents and educators. In our research on interest-driven learning, however, we found that young people also rely heavily on supports in home, community, peers, and other learning environments. The CLRN Digital Edge project found that even when young people developed digital-production skills in formal education, they often lacked the connections and social capital to parlay those skills into jobs (Watkins et al.

3. CONNECTED LEARNING

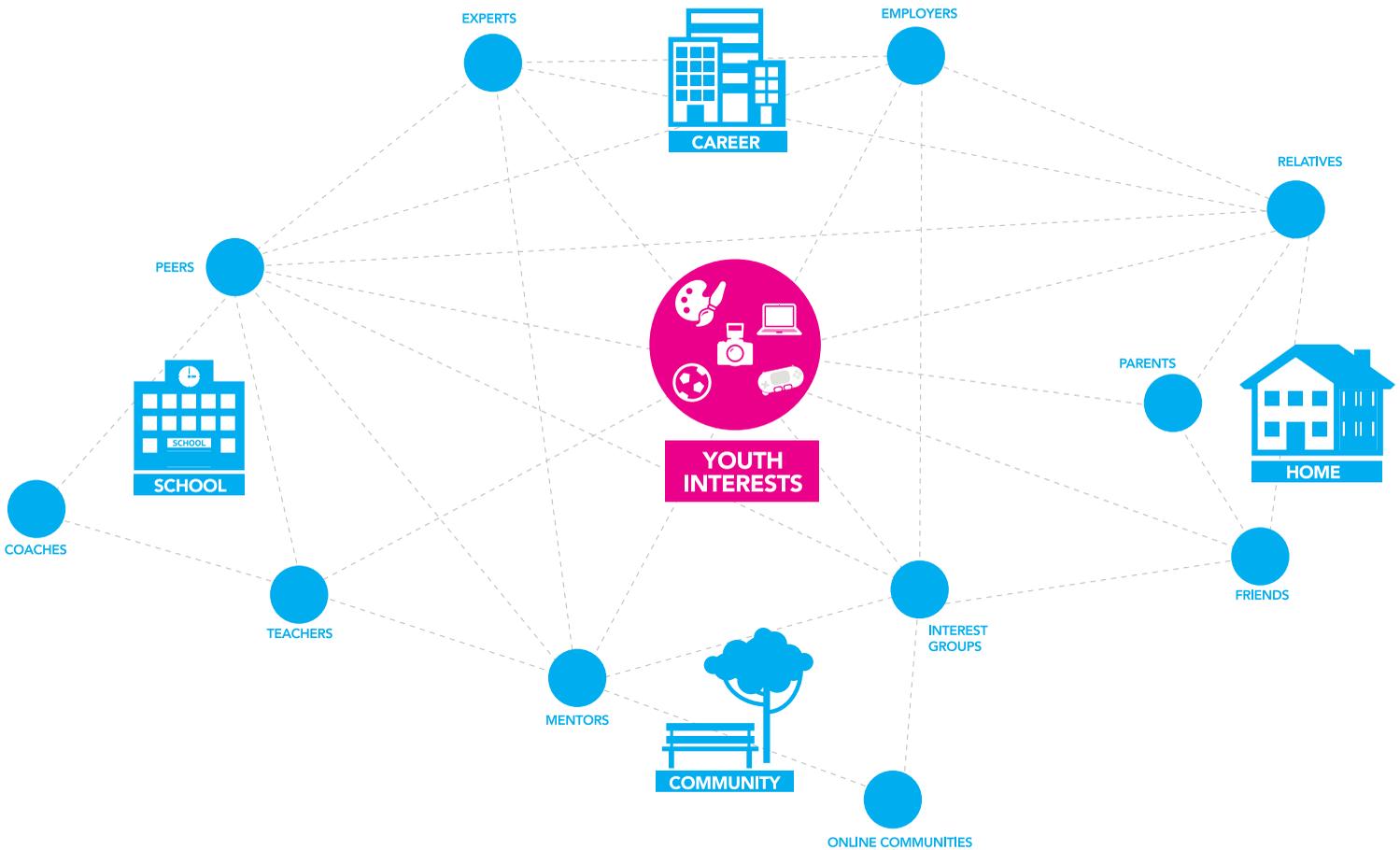


Figure 4

Connected learning supports interests through connections across settings.

Image Credit: Nat Soti

2018). In subsequent work, Sefton-Green, Watkins, and Kirshner (2019) have collaborated to investigate “the last mile” that connects education and careers, with an emphasis on creative careers and economies. They found that success hinges on building an extensive, interconnected, and diverse network of relationships to supportive peers, mentors, and organizations. In taking a more youth- and interest-centered approach to learning, we increasingly moved away from metaphors of “pathways” and “progressions” to metaphors of networks and capacity building (see Figure 5). This networked view of learning, and the importance of relationships and social capital, became a central and unifying thematic as our collective work proceeded.

Researchers have long sought to understand relationships between schooling and out-of-school influences. For example, research on “summer setback” suggests that SES (and gender

gaps) in academic skills grow when school is not in session and ebb during the course of the school year (Borman 2000; Downey, Broh, and von Hippel 2004; Entwisle, Alexander, and Olson 1997; Heyns 1978). This dynamic suggests that schools work to mitigate the effects of “unequal childhoods” (Lareau 2003) that are due to differences in access to enrichment activities at home. Other studies suggest that increased investments in school can improve educational attainment and earnings (Jackson, Johnson, and Persico 2015; Johnson and Jackson 2018) among low-income students, while other studies show that schools can

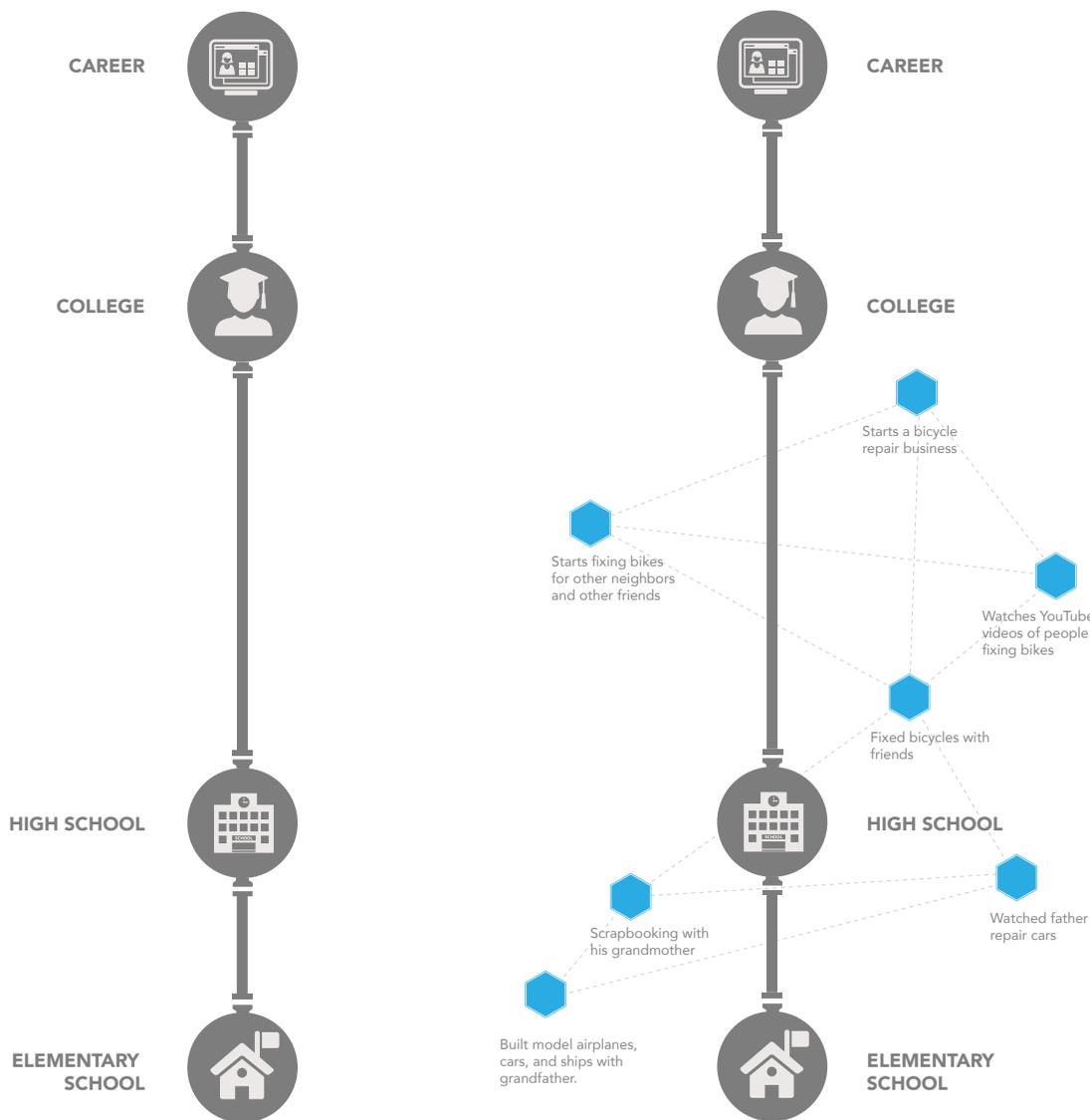


Figure 5
Learning and interest development as a pipeline versus network building, illustrated in the case of Brady in [Learner Story 4](#).
 Image Credit: Nat Soti

reduce inequality on some outcomes and exacerbate them on others (Putnam 2015). In our first report, we focused on the problem of schools being disconnected from out-of-school learning. Since then, we have shifted to a more learner-centered emphasis on a wider network

of connections to individuals and organizations that young people build as they find their way in the world. Our research suggests a complex interplay between the learning supports that young people are connected to in home, school, community-based organizations, and online. Rather than approach this as a question of the effectiveness of schools, we focus on the *connections between* school and other sites of learning. It is not sufficient to investigate the “impact” of the formal pipeline of education on life outcomes or the “transfer” of learning across settings. We argue that schools and learners are embedded within a broader web of culture and social relationships; only when the connections between school, home, peers, and community are effectively knitted together are young people’s learning and development fully supported.

How we conceptualize the relationship between school, community, peers, and home culture has important implications for equity. The CLRN Leveraging Horizontal Expertise project, led by Kris Gutiérrez, investigated how individuals’ and families’ repertoires of practice take shape, ultimately accounting for a richer set of tools and practices that constitute their repertoires. The researchers argue for the importance of multisited ethnographies to document “learning as movement”: that is, how “tools and practices traveled, got taken up, or were reorganized and reinvented in that movement across people’s ecologies” (Gutiérrez et al. 2017:4). Rather than assume that the goal of connected learning is access to and alignment with a dominant culture of schooling, this work urges us to fully recognize and leverage the assets and capacities of nondominant youth and their families. Their research found several examples of ingenuity in family practices, including “playfulness, resourcefulness, making, tinkering, fixing, and new forms of boundary crossing” (Gutiérrez et al. 2017:45). For example, one mother displayed ingenuity when she reconfigured a long daily drive with her children as an opportunity to support her children’s schoolwork (Gutiérrez et al. 2017). Gutiérrez (2014) and Gutiérrez and Jurow (2016) suggest that educators can intentionally engage in “syncretic” approaches to learning that pair valued everyday cultural forms with academic genres. In the process, both are transformed into new forms of consequential learning. For example, the Migrant Student Leadership Institute supported the creation of syncretic texts that integrated the tradition of testimonial narrative, *testimonio*, with academic genres to produce written and multimodal artifacts that were valued in the academy, community, and among peers.

Educators can also foster social capital, cultivate community cultural wealth (Yosso 2005), and forge connections across settings by focusing on *brokering* and relationship building as a core dimension of the work they do. Most educators, whether in formal or informal settings, have a focus on fostering knowledge and skills and many sponsor youth interests through culturally responsive approaches within their programs. Connected educators are increasingly emphasizing the importance of brokering connections *outside* of their programs and building relationships that transcend a specific program. Researchers from the Hive Research Lab, in partnership with the New York Hive Learning Network, have identified

brokering practices that informal educators can employ to foster networks of learning across the city. These strategies can vary from organizing field trips to keeping in touch with alumni (Ching et al. 2015). The Brokering Youth Pathways toolkit developed by this team offers a rich set of tools and techniques for brokering (see <https://brokering.hiveresearchlab.org/>). This attention to brokering means that educators must foster collaborations with local organizations, connect to online resources and communities, and build social capital in areas of learner interests.

Brokering and connections across settings can also be fueled by online tools and openly networked infrastructures that enable learners to showcase their work and stay connected with affinity networks even when they lose access or do not have access to local programs. While online affinity networks often lack the rich connections to local communities, they are accessible across time and space in ways that are often difficult for place-based programs to maintain. In *Affinity Online* (Ito et al. 2018), the authors conclude that while these youth-driven networks offer powerful forms of peer-to-peer and interest-driven learning, more often than not they are disconnected from adult-led settings such as school, workplaces, and family life because of lack of awareness by adults and the stigmatization of many youth interests such as gaming and fandom.

When educators and parents *do* recognize and tap into these online networks, the results can be powerful. Open online resources varying from gaming communities to YouTube videos are rich sources of specialized knowledge and social capital. In the Twist Fate challenge, educators from the Young Adult Library Services Association and the National Writing Project helped design and sponsor a youth writing and art challenge on DeviantArt and Wattpad (clalliance.org/twist-fate). The project connected the institutions of libraries and schools to the fan production that thrived in these online affinity networks. Educators can also support young people in developing reputations and portfolios online that will serve as a lasting showcase for their work, as well as providing a way to build social capital that transcends a specific program or project. For example, the Hive fashion program used Tumblr as a platform to showcase the participants' work, creating connections with youth-driven fashion affinity networks (Rafalow and Larson 2014). The Digital Youth Network has developed iRemix, a platform that enables young people to stay connected with their peers and mentors from their digital media-production programs from home, beyond the life of a specific program (Erete et al. 2015). At YOUmedia Chicago, gamers publish a game-review podcast online for fellow game aficionados (Larson et al. 2013). Open online portfolios can be designed to showcase an evolving portfolio for young makers (Keune and Peppler 2017). These are all examples of how today's networked technologies can help build support for learning and social capital that knits together varied sites of learning through time.

3.4 Outcomes of Connected Learning

We began a decade of research together knowing that developing an understanding of the outcomes of connected learning was going to be a challenge, given the model's divergence from prior assumptions about educational evaluation and assessment. Today's educational assessment traditions grew out of a model of classroom instruction and competitive individualism that compares individuals based on standardized measures. By contrast, roles and experiences are highly variable in connected learning environments, and individual growth is tied to collective goals and community development (Lemke et al. 2015). Few studies examine learning that takes place across multiple settings, and methods for studying learning outcomes in this way are still evolving. A focus on learning across settings shifts the object of research from learning in a single setting to the person learning within a broader learning ecology, that is, within a network of people, tools, and practices spread across the settings of home, school, and community (Barron 2006, 2010). This focus also demands we turn attention to the movement of young people across these settings as a key aspect of learning (Gutiérrez and Vossoughi 2010). Youths' movement is shaped in part by the ways that participation in particular settings is structured for them and also in part by the supports and freedom they have to move across different settings to engage in interest-related pursuits (Bell et al. 2012). To accommodate its ecological conception of learning, we employ a "multi-sited ethnographic sensibility" (Vossoughi and Gutiérrez 2014), seeking insights from investigations of multiple settings that are related through a common framework (Erstad 2013; Erstad and Sefton-Green 2013; Erstad, Sefton-Green, and Arnseth 2016; Sefton-Green and Erstad 2018). This also means looking at learning, or "improvement," or development at a collective and systemic level, as well as at the level of individual learners (Bryk et al. 2015; Fishman et al. 2013; Penuel and Gallagher 2017).

How we document elements of connected learning developed substantially through the course of our work together, and our approach is still evolving. Our efforts to evaluate the outcomes of connected learning proceeded in tandem with seeking to better understand and refine the model. The process was not a linear one of developing a technique or program and then testing and evaluating outcomes. Rather, it was an iterative cycle of co-development across research and practice, blending evidence, practice, theory, and design. Many studies in our network looked at environments that embody connected learning principles and sought to understand outcomes that are both collective and individual in nature. These include qualitative case studies in the CLRN Leveraging Horizontal Expertise, Connected Consumption, Leveling Up, and Connected Parenting projects that studied environments that researchers thought would embody elements of connected learning. The CLRN Longitudinal Survey of Connected Learning team also sought out programs that exemplified connected learning, and it employed a mixed-methods approach with the aim of developing ways of measuring features and outcomes of connected learning. The CLRN Connecting Youth project, led by Richard Arum, investigated programs that grew out of the

DML Initiative and that were explicitly designed to embody elements of connected learning. In addition, Dalton Conley’s CLRN Children’s Non-School Activities and Cognitive Outcomes project was a series of investigations of how existing large-scale data sets could elucidate the relationships between various features and outcomes of connected learning. Together, these projects made progress toward new methods for considering outcomes of connected learning as well as some evidence of individual and collective outcomes.

3.4.1 Collective Outcomes

Schwartz and Arena (2013:3) have argued: “Educational assessment is a normative endeavor. The ideal assessment both reflects and reinforces educational goals that society deems valuable.” Like other progressive approaches to education, connected learning is defined by values of excellence, democratic participation, and equity. We identified three related collective outcomes of connected learning in our original report: (1) high standards for knowledge and creative production, (2) civically oriented and politically activated collectives, and (3) diverse and equitable pathways for recognition and contribution. Being explicit about these values and outcomes is an effort to mitigate the risk of individual excellence and outcomes being pursued at the expense of broader social and cultural benefits. These collective values and desired outcomes framed how the connected learning model was defined and evaluated at the level of programs and environments. They also guided the selection of connected learning environments, networks, and programs we investigated, as well as our design work.

Many of the case studies we have pursued documented how connected learning environments can achieve these outcomes, and when they fall short. Before delving into individual learner outcomes, we needed to refine our characterization of connected learning experiences and elements. We have seen examples of environments that strive for these collective outcomes, including programs such as YR Media (Soep and Chávez 2011), YOUmedia Chicago (Larson et al. 2013), Family Creative Learning (Roque 2016), and varied youth organizing initiatives (Kirshner, Strobel, and Fernández 2003). We have also seen these outcomes in some online affinity networks around fandom and gaming (Ito et al. 2018) and in youth collectives mobilized for causes such as immigration reform (Jenkins et al. 2016). The experiences and elements of connected learning, described earlier in this report, are a result of this work of identifying elements in relation to desired collective outcomes.

In addition to positive outcomes of connected learning, we have also documented risks and failures to achieve the collective outcomes of connected learning. Some of these risks are described in the earlier section “An Unequal Social, Economic, and Media Landscape.” The CLRN Digital Edge and Last Mile projects found instances when well-meaning educators fostered digital interests and skill development for nondominant youth but were not able to support pathways to careers and economic opportunity (Sefton-Green,

Watkins, and Kirshner 2019; Watkins et al. 2018). Because connected learning requires a broader ecosystem of opportunity, it can be challenging for individual programs to achieve the desired collective outcomes on their own. Conversely, the CLRN The Class project identified many instances when families and youth wanted “positive disconnections” to protect spaces of play and interests from the logic of schooling and achievement (Livingstone and Sefton-Green 2016). In addition, learning environments centered on niche and culturally specific interests have the side effect of excluding those who do not share those identities (Ito et al. 2018; Schor et al. 2016). Put differently, choices to connect to particular networks and affiliations often necessitate disconnecting and excluding others. These costs are particularly high when we consider openly networked forms of educational content and communities, as described by the Connected Consumption project researchers in many of their case studies (Carfagna 2014; Dubois, Schor, and Carfagna 2014).

The CLRN Longitudinal Survey of Connected Learning team worked alongside the qualitative case study teams to sharpen our understandings and develop quantitative and qualitative instruments to better understand connected learning outcomes, as well as to serve connected learning programs. Employing a construct-modeling methodology (Wilson 2005), the team co-developed measures with practitioners that would help identify the presence of connected learning elements and experiences in their programs. The team also conducted research on experiences and outcomes of connected learning for youth pursuing diverse interests in a range of different programs. Although much of the focus was on individual outcomes, the team suggests that research on connected learning programs should also focus on research-practice partnership and formative research that helps programs reflect on and improve their support for connected learning. These instruments continue to be refined and shared among a community of connected learning researchers, practitioners, and evaluators at <https://connectedlearning.uci.edu/research-tools/>. Penuel, Michalchik, and Ito are collaborating on an effort to develop practical measures of connected learning for library and museum settings. The project involves working with library partners to co-develop ways of assessing connected learning experiences. One example is the use of “talkback boards,” which are posters where librarians can quickly post questions to participants, who “answer” by putting stickers to show their agreement. These kinds of assessments do not track individual learning outcomes, but they enable educators to quickly determine, at a collective level, whether they are supporting the desired experiences of connected learning (Widman et al. 2019).

3.4.2 Individual Outcomes

Individual outcomes of connected learning experiences are highly varied, because they center on specific interests, and young people have wide latitude in choosing roles and areas to dive into. Specific programs will look to measures that track growth in their field or discipline, but these will not be measures unique to connected learning. In our original report, we referenced the 21st century competencies in the National Research Council’s report for deeper learning

(2012), such as intellectual openness and teamwork. These general competencies are likely outcomes of connected learning experiences that span fields and disciplines. Rather than dive deeply into these kinds of competencies cultivated through time, however, our research network focused more on the three proximal outcomes specific to connected learning that we posited in our initial report: (1) greater depth and breadth of interest, (2) peer, adult, and institutional learning supports, and (3) greater academic orientation.

Among the projects in our network, the CLRN Connecting Youth project (Arum and Larson forthcoming) took the most direct approach toward measuring the relationship between connected learning environments and these individual outcomes. The project centered on efforts that were part of the DML Initiative and were explicitly intended to exemplify aspects of the connected learning approach. These efforts included two schools designed largely around connected learning principles and two connected learning networks based in local geographies. The study examined the degree to which these particular programs provided learners with connected learning experiences. The data set for their longitudinal analyses included pre-post surveys from 347 school students and pre-post surveys from 460 local program participants. The research team investigated the relationship between an index of connected learning that they developed and several outcomes. Most notably, they found a positive correlation between connected learning and educational engagement, and between connected learning and academic persistence and grit. Surprisingly, connected learning experiences did not vary notably by sociodemographic background for learners at the four sites. Experimental studies would be needed to better evaluate whether designed connected learning experiences caused these outcomes, but these results suggest that connected learning environments can support positive outcomes in an equity-enhancing way.

In parallel with the CLRN Connecting Youth project, the CLRN Longitudinal Survey of Connected Learning team co-developed, with other researchers and practitioners, measures of learning experiences, elements, and outcomes that could be used across a wide range of programs. Unlike the CLRN Connecting Youth project, which focused on the outcomes of specific programs, the CLRN Longitudinal Survey team centered its inquiry and measures on youth pursuits as they spanned settings. Pursuits denote the things that people do in and across different places and with different groups of people that support the development of their expertise, interests, and identities (Bell et al. 2012). Unlike more traditional ways of measuring learning, this approach does not start with a particular field or program. Instead, the survey or interview starts by asking the respondent to identify a pursuit—what activity does he or she both enjoy and seek to get better at? The rest of the questions centered on understanding the learning experiences and supports the respondent has for this pursuit. The Longitudinal Survey team took this approach with a sample of 479 teens in 29 out-of-school programs and followed up with two additional waves of surveys and interviews.

3. CONNECTED LEARNING

At the program level, the Longitudinal Survey project found that connected learning experiences and elements were associated with positive individual outcomes such as growth in interests and growth in supportive social capital. For example, members of the team conducted an evaluation of FUSE Studios, a set of STEAM learning challenges for youth offered in schools and community settings. The degree to which participants report experiencing FUSE as peer-supported using the team's measure of connected learning is positively associated with growth in their interest in STEAM-related careers (DiGiacomo et al. 2016). Researchers also studied ARTLAB+, a career-oriented digital media–arts program at the Smithsonian's Hirshhorn Museum. They found that the peer-supported aspect of connected learning contributed to young people's persistence. Further, the more they felt the skills they were developing at the program were transferable, the more likely they were to develop networks of similarly interested or capable peers and mentors. In these ways, youth enhanced the connectedness of their connected learning opportunities at ARTLAB+ (Podkul, Sauerteig, and Homma 2016).

While various studies have demonstrated positive outcomes of connected learning–inspired programs, the effort to document the outcomes of pursuits as they are supported across settings is a work in progress. It will take more investigations across diverse sites to develop practical ways of measuring how a network of supports around a particular pursuit can lead to individual learning outcomes. CLRN members are continuing to collaborate on projects that extend the methodological innovations developed during the course of the CLRN. Nichole Pinkard has been leading an effort to develop an online platform that enables researchers and educators to examine the distribution of opportunities for young people to engage in different kinds of pursuits within and across different neighborhoods of Chicago. The Digital Divas project is exploring how to present data on youths' initial interests to educators, so that they can make connections between Digital Diva activities and those interests (Pinkard et al. 2017). We need to do much more work to understand the effectiveness of different ways of supporting connected learning and of comparing connected and more traditional approaches. This effort will require conversation and coordination across ongoing efforts across a wide range of settings and populations.

4. DESIGNING FOR CONNECTED LEARNING



Designers and developers of connected learning environments need to acknowledge the complex and interconnected character of the spaces in which children develop and conceive of their work at the systems level. Donella Meadows has defined a system as a set of related components that work together in a particular environment to perform whatever functions are required to achieve the system's objective (Meadows 2008). Figuring out how the various related components “work together” is key to the design of connected learning environments. This approach differs fundamentally from more traditional approaches in instructional design and individualized testing that create separation and boundaries between explicitly educational settings and settings where learning is happening as part of other activities. Supporting learners in their pursuit of an interest across time, settings, opportunities, and relationships means that designers must pay attention to the tissue that connects experiences, as well as to the individual experiences themselves. This connective tissue could include a mentor who brokers an introduction, open networks that enable the sharing of artifacts, credentialing systems or competitions that make progress visible across settings, and schedules that bridge school and afterschool opportunities. Partnerships offer another form of connective tissue, as they are one way of coordinating contributions among key stakeholders. All partners must know not only where they fit in (are they offering mentorship, access to professional opportunities, academic credit, or space?), but also how they might help knit together their contribution with the contributions of others. Notably, such work is time intensive, iterative, and focused on the changing needs and interests of the young people being served.

4.1 Design-Based Research

The evolution of connected learning has been powered by partnerships between design, practice, and research. Efforts to identify, build, support, and study connected learning environments have been fueled by teams of designers, educators, youth, parents, and researchers working together in a spirit of experimentation and iteration. One aspiration of the connected learning design framework is to enable developers, funders, educators, youth, and others to work together to address some of the emerging participation gaps fueled by the social, economic, and media landscape. In addition to creating meaningful and often transformative experiences for youth, the empirical and design-based research of our network has contributed to a refinement of connected learning's initial design framework. We now better understand the kinds of features, supports, and infrastructure necessary to support connected learning, as elaborated in the prior two sections of this report.

The design-based research practices of members of our network build on the strong history of design-based research (Bell, Hoadley, and Linn 2004; Cobb et al. 2003; Collins, Joseph, and Bielaczyc 2004; Hickey and Zuiker 2012). This includes projects such as Quest to Learn, YOUmedia, North American Scholastic Esports Federation, Connected Camps, the HIVE Research Lab, among others. Design-based research is a methodology in which researchers and practitioners collaborate to iteratively analyze, design, develop, and implement learning

LEARNER STORY 5

KYLE

By Alicia Blum-Ross
and Sonia Livingstone

We met Kyle, 13, at London Youth Arts (LYA)—a cross-arts organization running a digital media club (“LYA Interactive”) for kids with special educational needs (SEN). Lanky, with fiery red hair and pale skin, Kyle is passionate about art and design and has moderate to severe autism. In addition to observing Kyle in his class, we visited him at home, where he sat with us to show us his designs. Given that Kyle is mostly nonverbal, our understanding of the challenges and opportunities he faced in pursuing connected learning were supplemented by interviews with his parents (who are white, middle income) and with the facilitators at his class, where he was part of a group developing a music player app.

From a young age Kyle has loved to draw, creating intricate logos and playing with words and fonts, which he has recently translated to computer art. Although he has no idea where Kyle found it, Kyle’s father Ryan recounted that Kyle had “downloaded, miraculously, professional architectural software.” When we visited we saw that Kyle had downloaded the software SketchUp, a 3D-design program, and had begun to pursue a new interest—designing shopping malls. Ryan and Kyle’s mother, Amy, have tried to support this interest by taking Kyle on local outings, taking digital pictures to bring home, and helping Kyle with his designs. Ryan has taken printouts of some of Kyle’s designs to the teachers at his special school but has been frustrated by their lack of follow-through on incorporating Kyle’s digital interests into their planning for him.

Ryan described Kyle’s “understanding of computers [as] very innate” and so when another parent at Kyle’s specialist

school for children with autism mentioned the evening class, Ryan and Amy jumped at the opportunity. Although he already has the “ability and the skills,” Ryan and Amy wanted to enroll Kyle in the digital apps club because of the “socializing aspect of it” as much as for the content, building on “something that he enjoys” to help him work on his ability to be with other young people. Ryan also wanted to “encourage him with his creative endeavors on digital media because ... [of] the satisfaction that can come from creating things rather than just wandering the internet.”

According to Gus and Mia, the lead facilitators from LYA, “communication” and “friendship” are the main rationales for the course. Some of the young people use assistive technology apps and Gus says that in his experience, “nonverbal young people ... are the most adept users of technology I’ve encountered.” When asked what she hopes Kyle will gain from the class, Mia says, “It would be great to see if he could really build upon his communication and listening skills. ... I would like him to be able to be part of the group ... and be more engaged in it. ... That would be a massive achievement for him.” Ryan shared the facilitators’ hopes about communication, worrying on Kyle’s behalf that “those who don’t speak ... [people think] they don’t exist.”

The staff at LYA who run the SEN activities have more responsibility than others for liaising with the parents, and they do lengthy intake interviews and reach out to parents to let them know how the class is going. Mia, for example, knew about Kyle’s use of SketchUp and had considered running a session with it at LYA but worried that Kyle would just replicate what he had already been doing.

Instead, Mia and Gus designed a session using an app called PhonoPaper (which produces sound-enabled “tags” like audio QR codes), where they could explore the built environment around the school inspired by Kyle’s interest in shopping malls—although ironically Kyle was absent that day. When we asked Gus about whether LYA made an effort to link to what the young people did at home, he wondered whether the participants might want to keep what they did at LYA “entirely separate from all that [the other parts of their lives]. ... I think they come to LYA and they associate it with certain things and experiences and feelings that they don’t have anywhere else.” In a sense, then, he wondered if the experiences at LYA were too connected, they might lose their value.

During the class the facilitators worked to connect technology with physical experiences. For example, they combined drama and drawing, and one week they brought in an Arduino to hook up to the music app the participants had been building (using software called Max, a visual programming language used by musicians). Connecting fruit and vegetables to the leads, the facilitators had the participants create a percussive song by completing the circuits and triggering the app they had created. Although it took him some time to settle into the activity, and the physical dexterity of connecting the wires was difficult, Kyle tapped the banana rhythmically when asked.

Looking into Kyle’s future is fraught. The support that LYA receives finishes when the participants hit 18—what Mia calls the “cliff edge.” Although his parents believe that Kyle has talent, when asked whether they thought graphic design

might be something he could pursue after finishing his time at LYA, Ryan and Amy were not optimistic. Although Kyle might have the ability to work at the level required by art school, they thought it would be “totally inappropriate for him because he just loses interest.” So although they have hopes about how digital media helps him express himself, at the end of the day it is about his “motivation” and that digital and artistic skills are still “of no use if you can’t work with people,” and that to work as a designer “you’ve got to [be able to] listen to your client,” something they can not envision Kyle as being able to do.

Kyle and his family, and educators, show both the possibilities and limitations of connected learning. When everyone is working together, Kyle’s interests at home translate into activities at his afterschool learning site, although there are missed connections that are both intentional—as disconnections are sometimes by design—and default. LYA is nimble enough to be able to respond, whereas often Kyle’s school is not, but even when the facilitators at LYA attempt to support him Kyle cannot always engage. The facilitators at LYA are well intentioned, but they do not have autism-specific training unlike the teachers at his school, so the activities they design sometimes miss the mark. Even with all these supports, Kyle’s version of connected learning will probably not translate into future employment or a traditional notion of academic success, but the hope is that it will help him communicate, create, and participate in his own way in his community of peers in the present.

experiences in real-world settings (Wang and Hannafin 2005). While design-based research is primarily concerned with finding an effective solution to a localized design problem, to build on this work, design-based researchers also focus on two additional outcomes. First is the emergence of design principles to guide future educational implementations. Second is the formulation of new contributions to our theoretical understandings to guide research and practice, such as the present and prior (Ito et al. 2013) theoretical advancements outlined by connected learning.

In traditional educational research, existing theories are usually tested through experimental treatments in controlled contexts. People engaged in these experimental approaches hope to be able to design instruction based on the principles that the theory and associated experimental results support (Edelson 2002). In design-based research, however, the goal is not simply to validate whether an existing theory works (van den Akker 1999). Designs seek to embody theories of learning, and through iterative testing, both the designs and theories are refined, elaborated, and sometimes challenged. Ideally, design-based research contributes to substantial change in educational practice through the identification of practical principles and theories for designing learning experiences (van den Akker 1999). The “social design-based experiment” (SDBE) framework as articulated by Gutiérrez (2008, 2016) and Gutiérrez and Jurow (2016) takes this one step further. Gutiérrez argues that “because DBR is still primarily carried out from a ‘top-down,’ researcher-driven perspective, it carries with it the possibility of reifying normative and deficit-oriented conceptualizations of nondominant community practices and ways of being, as co-participation and co-design are not part of its conceptualization” (Gutiérrez et al. 2017:38). SDBE emphasizes the importance of the design process being guided by goals of social transformation, justice, and equity. This means shifting the focus from improving programs and institutions to “a significant reorganization of systems of activity in which participants become designers of their own futures” (Gutiérrez and Jurow 2016:566). This also means deep partnership with participants from communities who are often the objects rather than the authors of educational interventions. We see these equity-oriented approaches as essential to achieving the collective goals of connected learning, but we also recognize that many programs are just beginning to explore and embrace these kinds of design processes.

4.2 Design Principles for Fostering Connected Learning

Connected learning does not rely on a single technology or technique. Rather, it is fostered over time through a combination of elements that support developing interests, relationships, skills, and a sense of purpose. Each of the four elements of connected learning is aligned to a set of design principles through which an element can be realized in practice (see Table 1). While not comprehensive, the design principles we list are some of the most frequent emerging from current research and represent those that designers and educators have found valuable in fostering connected learning.

Table 1

Elements of Connected Learning Environments and Supporting Design Principles

Sponsorship of Youth Interests	
Organizations and adults must meet youth where they are in order to foster connected learning. They do this by being sponsors of what youth are genuinely interested in—recognizing diverse interests and providing mentorship, space, equipment, and other resources.	
Design principles	Examples
Legitimization of youth interests, values, and practices	<ul style="list-style-type: none"> • Teachers referencing particular forms of pop culture in their classrooms • Educators taking initiative to learn about and support diverse student interests • Supporting projects that grow from diverse student interests, culture, and identity
Affinity-based mentorship	<ul style="list-style-type: none"> • An online writing platform that allows users to create and form groups, enabling peer-to-peer mentorship among group members • High school students with an interest in coding earn service-learning credit mentoring younger students in an afterschool coding class • College esports players serve as online coaches and mentors for aspiring high school esports enthusiasts
Explicit and substantive links to systems of opportunity	<ul style="list-style-type: none"> • A local business sponsors student travel to a national spoken-word competition • An afterschool provider creates a badging system tied to community college credentialing • A game company uses its game-creation platform as a way to nurture, celebrate, and hire future talent
Providing resources	<ul style="list-style-type: none"> • A makerspace provides youth with access to equipment, space, and materials with which to produce projects • A community-based organization provides youth with free bus passes to attend afterschool STEM workshops at a local university • Parents offer the use of their garage as a practice space for their teenage daughter and her band

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Shared Practices	
<p>Ongoing shared activities are the backbone of connected learning. Through collaborative production, friendly competition, civic action, and joint research, youth and adults make things, have fun, learn, and make a difference together.</p>	
Design principles	Examples
Collaborative production	<ul style="list-style-type: none"> • Small-group work in a program or classroom • Online collaboration in which youth are sharing code, art, music, or writing • Remixing and curation of community work
Friendly competition	<ul style="list-style-type: none"> • Competitions where youth have a chance to revise and resubmit their projects based on peer feedback • Game jams in which youth work in teams to create games around a shared theme with the support of industry mentors • A mock debate in a classroom
Civic participation	<ul style="list-style-type: none"> • Youth engaged in digital activism through online communities • Community organizing • Volunteering, national service, and service-learning
Joint research	<ul style="list-style-type: none"> • Citizen science initiatives • Participatory action research projects • Research-practice partnerships
Shared Purpose	
<p>Learners need to feel a sense of belonging and be able to make meaningful contributions to a community in order to experience connected learning. Groups that foster connected learning have a shared culture and values, are welcoming to newcomers, and encourage sharing, feedback and learning among all participants.</p>	
Design principles	Examples
Shared values and norms recognized as culturally relevant	<ul style="list-style-type: none"> • Youth engaging in projects with collective goals • Communities developing, maintaining and revising norms and expectations • Youth leading the development of new programming for an afterschool program
Clear pathways and roles for participation	<ul style="list-style-type: none"> • Community guidelines that cover how to be friendly, constructive, and welcoming • Support for different degrees of interest and levels of expertise • Authority and expertise that are shared across the community
Meaningful contributions made to real communities	<ul style="list-style-type: none"> • Supportive recognition: accolades, certificates, letters of recommendation • Experts and stakeholders connecting with youth around real-world projects • Youth voice is made visible through publishing, showcases, or celebrations

Responsive to changes in community norms and values	<ul style="list-style-type: none"> • Youth work together to create community agreements that they revisit through time in response to changing interests and membership • Norms for student participation in a dedicated chat channel vary across clubs within an afterschool network • Librarians engage in a participatory design process that engages community members in designing programming for the upcoming year
Connections Across Settings As connected learners develop, they access varied programs, communities, and opportunities. In order to support diverse learner pathways, educators can form partnerships, broker connections across settings, and share work and opportunities on openly networked platforms and portfolios.	
Design principles	Examples
Coordination across settings	<ul style="list-style-type: none"> • Youth receiving credit for self-directed learning in school or a workplace • Learners accessing open educational resources at home and school • A community organization offers free drop-in hours during school breaks, enabling youth basketball players the chance to practice when schools are closed
Brokering across settings	<ul style="list-style-type: none"> • A parent curating potential learning opportunities for his or her child; a mentor making connections between those opportunities for the learner • A teen being introduced to a citywide poetry slam by their English teacher • Undergraduate research opportunities that allow students to work as researchers in a research faculty's lab on campus
Openly networked infrastructure	<ul style="list-style-type: none"> • A game includes a feature to allow anyone to spin up his or her own game server • A school allowing students and teachers to use an online chat platform as a tool for messaging and coordination across both in-school and afterschool spaces • Youth in a drama program stream their performances as a way to gain audiences and exposure
Progress or achievement is visible across settings	<ul style="list-style-type: none"> • Youth receiving credit for self-directed learning in school or a workplace • An open portfolio containing work created across time and settings, which is controlled by the young person who owns it • A citywide arts festival providing showcase opportunities for youth of all ages

The following is a discussion of each design principle, organized according to the elements of connected learning.

4.2.1 Sponsorship of Youth Interests

Organizations and adults must meet youth where they are in order to foster connected learning. They do this by being sponsors of what youth are genuinely interested in—recognizing diverse interests and providing mentorship, space, equipment, and other resources.

Legitimization of youth interests, values, and practices

Connected learning begins by meeting youth where they are as a starting point for building new connections—interest-driven learning is central to the model. The design of any connected learning environment should take into account the role sponsors can play in pointing out, labeling, and identifying the rich interests, values, and practices youth bring to learning environments. Legitimization has an outsized impact for minoritized and stigmatized interests and identities. It can include helping youth launch a school gaming or making club, serving as a role model for neighborhood youth interested in learning to code by running weekend hack-a-thons, recognizing the accomplishments of youth publicly, or supporting youth in raising funds for an event they want to host. Through their participation, sponsors signal to others the value of the youth endeavor. Doing so opens up opportunity for youth as their goals and passions are recognized and supported by caring adults and others with a shared interest.

Affinity-based mentorship

Affinity networks open unique avenues for young people to find their people—peers and mentors who share an identity or interest. These networks are tailored to bonding around a specific interest. When fostered online, they can be more accessible across time and space than networks they might develop through school, families, or enrichment programs. Learning is transformative and resilient as youth connect with mentors in the context of shared activities and meaningful projects. Supportive relationships and peers and mentors are particularly important in programs serving youth who do not have strong supports for their interests at home, and who are pursuing rapidly changing fields in areas such as digital media and technology.

Explicit and substantive links to systems of opportunity

Sponsors lend their credibility and resources to youth, smoothing the way into expanded networks of opportunity. Developers of connected learning environments should consider ways of helping youth link to systems of opportunity, such as internships, professional networks, and competitions. These might take the form of a letter of recommendation, inclusion in a professional networking event as a way of helping youth to enrich their social networks, or through funding that enables travel to a competition or conference. Or it might include professional development for program staff or mentors, community-building activities that raise awareness about broader opportunities and the goals and interests

of participating youth, or access to youth credentialing systems, such as open portfolios, résumés, or badges.

Providing resources

An often overlooked feature of connected learning environments is the important role sponsorship plays in providing youth access to resources: space, networks, mentors, tools, and technologies. Simply offering opportunity is not enough if a young person does not have resources to gain access and fully engage. A young person engaged in learning to code requires more than activities and projects; he or she also needs the right kinds of tools, spaces, and technologies to support this learning. Providing access to a computer lab or professional-level software or hardware, for example, can expand learning opportunities for many youth who might not have access to either. Travel to programs can be an issue for many youth—sponsoring access to transportation can be a critical way to contribute to the success of a young person.

4.2.2 Shared Practices

Ongoing shared activities are the backbone of connected learning. Through collaborative production, friendly competition, civic action, and joint research, youth and adults make things, have fun, learn, and make a difference together. Design principles supporting shared practices within connected learning environments include:

Collaborative production

Project-based learning can provide opportunities for self-expression and contribution, as well as a chance to collaborate, cooperate, and remix (Barron and Darling-Hammond 2008; Blumenfeld et al. 1991; Greeno 2006). Collaborative production can take the form of small-group work in a program or classroom, or an online collaboration in which youth are sharing code, art, music, or writing. Youth might spend time observing others, messing around with tools and technologies in a low-stakes environment before engaging in project-based activities, so it is important to keep barriers to collaborative production low. It is also important to ensure that youth have access to relevant production tools and are supported in developing the skills to use them. Since no single project will be meaningful to all youth, ensuring a diversity of offerings (in both content and level of expertise required) can engage youth from different backgrounds, experience levels, and interests. Offering varied structures of participation allows youth to contribute in many different ways as they explore different roles or identities.

Friendly competition

When youth team up to compete with others in a video game such as *Fortnite*, join a debate or swim team, or enter a coding or spoken-word competition, they are engaged in friendly

competition. Through competitive structures such as hack-a-thons, matches, game jams, contests, and tournaments, youth have a chance to show off their skills and learn from others. Well-structured, consciously designed competitions can also foster collaboration and teamwork, as youth work together to accomplish a goal. Competitions put a value on the idea of improving and can support a growth mindset (Dweck 2006; Niemivirta 2002). Developing clear benchmarks for progress, providing ways for youth to give and receive feedback, and offering mentorship in the form of coaching can support competitive practice among youth.

Civic participation

The creation of and participation in communities is a form of civil society. Online affinity networks can offer accessible ways for young people to contribute to communities and exercise leadership. Designing structures to enable such forms of participation requires organizations and educators to consider how they will sustain young people's participation by addressing physical, social, and intellectual access (Powers and Allaman 2012). Careful attention should be paid to features such as recruitment, space, meeting times, communication, privacy and security, transportation, stipends, and flexibility in attendance requirements. Critically, involving a diverse group of young people and keeping them involved is an important part of effective participation in the social world.

Joint research

Connected learning is at its most effective when youth let initial inspirations provide them the courage to explore solutions, seek out new resources, and entrench themselves in communities with which to share ideas that matter to them personally. Engaging in joint research with other peers and adults is one way youth can pursue an interest (Kirshner 2010; Kornbluh et al. 2015). Youth might get involved in a citizen science project to measure the air quality in their neighborhood or to learn more about a health issue affecting their community through a participatory action project led by university researchers (Baum, MacDougall, and Smith 2006; McIntyre 2007). They might engage in joint research with other members of an online community to better understand how their data are being used or collaborate with developers of a game to create more effective systems for addressing toxic behavior on a game server (Maher 2016). It is important to consider how research partnerships are established and monitored, the role youth play in the partnerships, and the mechanisms by which youth might be able to take action through the dissemination of their findings to policymakers or other key stakeholders.

4.2.3 Shared Purpose

Learners need to feel a sense of belonging and be able to make meaningful contributions to a community in order to experience connected learning. Groups that foster connected learning have a shared culture and values, are welcoming to newcomers, and encourage

sharing, feedback, and learning among all participants. Design principles supporting shared purpose within connected learning environments include:

Shared values and norms recognized as culturally relevant

Connected learning environments are shaped by a set of values and norms shared across the community. The combination of values, norms, and practices make the culture of each environment unique, since they draw on the cultural knowledge, experience, frames of reference, and performance styles of its participants (Gutiérrez and Johnson 2017). The values of a community can often be seen in the community guidelines, which dictate expectations for participation, rules for engaging with others, processes for reporting infractions, and general tips on how to be a good community member. Organizations, educators, technologists, and designers should ground any design intervention in existing community practices and values to increase the chance of its being embraced, sustained, and leveraged. Building in effective ways for participants to take ownership of community values and model them for others is critical to ensure that the values and norms remain culturally relevant and resilient. This approach uses a co-design process that is shaped by the learning styles of the participants, which might differ significantly from environment to environment.

Clear pathways and roles for participation

Connected learning environments provide clear and accessible invitations and pathways for new participants with shared interests and affinities. As they get more involved, participants can contribute in varied ways, and the community supports diversity in levels and types of expertise. Environments should have defined, community-driven processes for giving and getting feedback and for learning and mastery to be recognized. This can involve publishing work online, beta testing, being a community organizer, curating or remixing the work of others, or providing mentorship. Connected learning environments, particularly those with an online component, can provide a space where relationships between young people and adults are fluid and equitable, and authority and expertise are distributed across the community. This often results in a strong sense of affiliation and social bonding (Ito et al. 2018). Inclusive environments are characterized by strong systems of social support, including mentors and community guidelines modeling how to be friendly, constructive, and welcoming.

Meaningful contributions made to real communities

When young people are making genuine contributions to and are recognized by communities and audiences they care about, learning becomes relevant and strongly motivated (Azevedo 2011; Barron 2006; Ito et al. 2018). As youth engage with others around a shared interest, they are able to see the importance of their contributions to the community, which adds meaning and further motivates their participation. This dynamic can be reinforced when contributions, work, and skills are made visible and consequential within a community or broader publics. Designers, organizers, and educators can create

opportunities for discussion and feedback, publishing work online, recognition through celebrations, showcases, and other markers of status in the community, and by connecting youth to projects with real-world impact.

Responsive to changes in community norms and values

Connected learning environments are dynamic by nature. Youths' identity and cultural practices are plural and fluid; the ways in which they participate shift and change and are transformed through time (Gutiérrez and Rogoff 2003). As identities and practices change, so too do the norms and values of the community. These shifts can take place over the life course and through generations, and they are interwoven with historical change in a community's organization and relationships with other communities (Cole 1998; Lave 1996; Rogoff 2003; Rogoff and Angelillo 2002). This dynamism should be sustained and supported through participatory design processes or other methods to help a community maintain, reevaluate, and develop norms and values. In addition, digital tools such as Slack, Discord, and TeamSpeak and others offer an easy way for communities to discuss, share, and debate.

4.2.4 Connections across Settings

As connected learners develop, they access varied programs, communities, and opportunities. In order to support diverse learner pathways, educators can form partnerships, broker connections across settings, and share work and opportunities on openly networked platforms and portfolios. Design principles supporting connections across settings within connected learning environments include:

Coordination across settings

The richness of connected learning comes in part from the active work educators and other caring adults do to connect young people to opportunities outside of their setting. This might include giving youth the ability to use space in libraries or to take a class in a community college that meets a high school requirement. It might mean developing an agreement or shared protocol that enables one organization to accept the credential of another. Shared agreements and protocols work to sustain and support youth learning through shared infrastructure, communications, credentialing, and community building. This coordination work focuses on the needs and interests of youth, creating transitions between settings, offering access to opportunity, and reinforcing relationships.

Brokering across settings

Connected learning environments include resourceful individuals (peers, educators, or other caring adults) who create meaningful cross-site connections for youth, supporting youth learning and interest development. Barron refers to such individuals as *learning brokers*—those who find and curate potential learning opportunities and make connections

between those opportunities and young learners in their community (Barron 2006). These opportunities might include events, programs, internships, individuals, and institutions. Internship programs, public showcases, competitions, or campaigns can cultivate a sense of belonging and help youth develop a new social imagination in which they see their interests as a resource in the present and a tool for future action (Ching et al. 2015; Gutiérrez and Jurow 2016; <https://brokering.hiveresearchlab.org/>). Creating roles, supports, and recognition for teachers, mentors, and outside experts to act as translators and bridge builders for learners across domains and contexts is essential in helping students access opportunity and enrich their social networks. Programs can also create opportunities for parental involvement that recognize their role as learning brokers.

Openly networked infrastructure

Infrastructure that encourages young people to share their work, skills, and knowledge with others across networks, groups, and communities boost social connection and can support engagement and a sense of relevance. Blogging, sharing videos, publishing work, or streaming offer young people platforms with which to gain audiences and recognition. Online communities and affinity networks enable young people to connect to specialized communities of interest and tools and sites such as Twitter, Scratch, *Minecraft*, and DeviantArt offer shared learning spaces spanning home, afterschool, and home settings.

Progress or achievement that is visible across settings

Connected learners access a network of opportunities that span time, spaces, and contexts. Systems such as open portfolios and badges are tools for youth to track progress across settings, showcasing representative work to a range of audiences in peer, academic, and career contexts. Events such as competitions, leagues, game jams, and festivals provide ways for young people to signal interests and growing expertise while also providing connection to broader kinds of affinity networks. Designers should ensure youth control access to their data, stories, and identities as progress is shared.

4.3 Using the Framework

The principles that make up the connected learning design framework are a guide for the design of connected learning environments in educational and commercial contexts. Developers of new technologies can play a substantial role in supporting large numbers of youth in online, in-person, and hybrid connected learning experiences. The resulting environments can serve to help translate youths' nascent interests into passion areas, encourage dialogue between like-minded peers and mentors, and connect youth to future employers and learning opportunities in impactful and reliable ways. Prior investigations into high-quality connected learning environments, including the Scratch online learning community (scratch.mit.edu; Hill and Monroy-Hernández 2013; Martin 2017a; Martin 2017b; Roque, Rusk, and Blanton 2013), Ravelry (ravelry.com; Pfister 2014), and others,

reveal this critical role that developers play in the fostering of connected learning experiences at scale (c.f., Brennan, Monroy-Hernández, and Resnick 2010; Lombana-Bermudez 2017b; Rafalow 2016). The design framework can be used to guide design decisions, help practitioners evaluate their programs, and provide teams with a way to iteratively improve upon design decisions as they seek to maximize a range of learning outcomes.

Connected learning environments and interventions come in all different shapes and sizes. Table 2 offers some guiding questions for consideration across settings of varied scales and complexity. Despite a variety of forms and approaches, all connected learning environments share a commitment to supporting youth in making connections across the spheres of interest, relationships, and opportunity. One change we made from the framework presented in our original report was to acknowledge that any framework needed to take into account more varied settings of application. Features of an existing environment or program, such as its established social practices, the configuration of space (physical and virtual), available tools and technologies, and human capital, including mentors, adult support roles, and peers, all play a role in defining how any particular design principle might be instantiated. Sponsoring access to resources in a school-based program might look very different from access in an online environment such as Scratch. There is no one right or best way to apply the design principles of connected learning. Rather, they should serve as loose guidelines and points of reflection gleaned from both research and practice.

Table 2

Connected Learning Environments: Elements, Design Principles, Guiding Reflections, and Examples

Design Principles	Guiding Reflections
<p>Sponsorship of youth interests</p> <ul style="list-style-type: none"> • Legitimization of youth interests, values, and practices • Affinity-based mentorship • Explicit and substantive links to systems of opportunity • Providing resources 	<ul style="list-style-type: none"> • Are youth interests being supported, publicized, and celebrated? • Do adults celebrate youth participation as academically meaningful and relevant? • Do formal/academic settings provide space/opportunity for engagement with interest?
<p>Shared practices</p> <ul style="list-style-type: none"> • Collaborative production • Friendly competition • Civic participation • Joint research 	<ul style="list-style-type: none"> • Do practices grow out of the interests, cultures, and identities of diverse youth? • Can young people form groups to explore a facet of an interest? • Do young people have access to mentors who are modeling best practices within the domain? • Are there opportunities for young people to team up and compete, either at individual or group levels?

<p>Shared purpose</p> <ul style="list-style-type: none"> • Shared values and norms are culturally relevant • Clear pathways and roles for participation • Meaningful contributions made to real communities • Responsive to changes in community norms and values 	<ul style="list-style-type: none"> • Are norms and expectations collectively maintained? • Does the experience build in opportunities for authority and expertise to be shared and made reciprocal among learners/mentors/teachers? • Are there ways for young people to “lurk” as they discover new interests? • Are young people allowed to remix and build on the work of others to meet a shared goal?
<p>Connections across settings</p> <ul style="list-style-type: none"> • Coordination across settings • Brokering across settings • Openly networked infrastructure • Progress or achievement visible across settings 	<ul style="list-style-type: none"> • Have you considered the pros and cons of afterschool, school-based, and summer settings for different groups of youth? • Are adults helping young people to make connections across contexts and communities? • Are groups and partners loosely networked? • Are there easy ways for individuals and organizations to connect and coordinate action or activity? • Are tools that signal quality or mastery visible, shareable, and easy to access? • Are the opportunities offered by the space public and publicized in ways that are attractive and accessible to diverse youth, parents, educators, and partners? • Is there a way for young people to share their work, skill, and knowledge with others across networks, groups, and communities? • Is work visible/discoverable to others within the environment? Outside of the core site? Are artifacts easily exportable?

5. CHALLENGES AND OPPORTUNITIES ON THE HORIZON



We have taken stock of a decade of collaborative work and made our best effort at capturing and synthesizing our current state of understanding of the challenges and opportunities for connected learning. Our framework has been refined and expanded by studying a broad range of influence on connected learning, and through the articulation of specific *experiences, elements, outcomes, and design principles* of connected learning. Many of us are still analyzing and publishing from our studies of the CLRN. As this research, as well as research by many others engaged in studying connected learning, is produced, we expect the model to continue to evolve. Throughout we emphasize the following distinctive dimensions of our scholarship and the connected learning framework:

- We focus on how to support the interests and development of diverse learners rather than center our work on organizational goals, considering how learning and pursuits span settings such as home, school, community, and online. The focus is not on reforming a particular institution, such as schools or libraries, but on situating these institutions within a broader set of supports for youth pursuits.
- We conceptualize learning and development as a process of network building, in which building social capital, contributing to collective goals, and belonging to communities is essential. This view is in contrast to approaches to learning that center on individual knowledge and skill acquisition and see education as a linear pipeline and progression.
- Designing for connected learning takes an ecological and systemic approach, which emphasizes partnerships across sites of learning. It is not about implementing a particular technology or technique.
- Rather than see research standing apart, we believe in community-engaged scholarship. The stakeholders we study and seek to benefit have essential knowledge and perspectives that must be at the table in research and design that aim for equity and positive learning outcomes.

The engaged and systems-oriented approach that underlies connected learning means that the model is challenging to realize, and it is difficult to document its successes. In our case studies, we were able to identify the kinds of social and relational supports that fuel connected learning. In particular, we were impressed with the power of affinity-based mentorship, brokering across settings, and asset-based approaches that tapped everyday knowledge and youth culture and identity. At the same time, it was clear that access to connected learning is still quite limited. Significant structural disconnects separate home, schools, and community based institutions, and stakeholders are often quite invested in maintaining boundaries. This means that the wide array of supports that connected learning requires are rarely institutionalized or routinized. Most of the stories of connected learners grew from an exceptional degree of personal commitment, initiative, and passion on the part of learners, parents, and educators. And while our studies have clearly documented positive outcomes of connected learning experiences, the difficulties of consistent

assessment are endemic to the model. In order to offer connected learning to a more expansive group of youth, we see our future challenges in the areas of partnership, citywide and regional coordination, professional development, and assessment.

- Developing connected learning environments requires purposeful and engaged collaborations that respect and welcome diverse identities, democratize knowledge, and leverage diverse institutional relationships (Bevan et al. 2015; Coburn and Penuel 2016; Gutiérrez and Rogoff 2003; Lee 2007; Nasir and Hand 2008). These collaborations integrate research, design, and practice into an ongoing process of iteration and refinement.
- Broadening access to connected learning invites citywide and regional coordination across sectors in networks such as the Hive Learning Networks (hivelearningnetworks.org), Remake Learning Network (remakelearning.org), and/or the Chicago City of Learning (chicagocityoflearning.org) (e.g., Ching et al. 2015; Penuel, Clark, and Bevan 2016). Even in localized connections between high school and regional colleges, afterschool and middle school partners, parents and teachers, higher education and workforce, we have to improve how we speak and network with a wide range of stakeholders.
- Connected learning taps a wider range of stakeholders to support learning, and it asks educators to take on new roles and activities. Near-peer mentors in affinity networks, as well as parents and other caring adults, have important roles to play in connected learning. Teachers, coaches, and librarians need to develop capacities as brokers and sponsors in addition to their roles as content experts. Tapping these broader networks means reconsidering existing models of mentorship and professional development.
- Much work is still to be done in the area of assessment and documentation in the design of connected learning. Connected learning communities are not singular entities, and they embody different viewpoints around learning and documentation. Considering these tensions from the start when designing assessments, portfolios, and credentialing can help designers be aware of the opportunities assessment affords and in which directions it could be pushed in the future.

The research agenda that must accompany this work is expansive, and it is complicated by an ever-evolving economic, social, and media landscape. As we continue with this work, we see some high-priority areas for future research.

- How can our educational institutions and agendas be reconfigured to better guide young people toward connected learning? What are opportunities within existing systems for institutionalizing and sustaining supports for connected learning? Conversely, what are the risks of connected learning becoming routinized and instrumentalized?

5. CHALLENGES AND OPPORTUNITIES ON THE HORIZON

- How can we tap the growing abundance of free and open learning resources to support the learning and interests of diverse young people in ways that close rather than exacerbate equity gaps?
- How can new media be mobilized to forge shared rather than divergent interests and literacies between young people, parents, and teachers? What forms of regulation, design, and educational practices can support creative and connected learning for young people, and conversely, diffuse risks of datafication and commercialization?
- What are the new literacies required by the new media ecosystem? As this environment becomes more global and commercial, how will it respond to the emerging risks to its credibility, trustworthiness, and value?
- What are the new risks and opportunities engendered by digital devices and networks going global and entering the early years?
- What forms of measurement, documentation, and evaluation can capture learning across settings, and how do factors such as social connection, affinity, and belonging influence learning? Can we develop a more robust way of documenting and advocating for the importance of social and cultural measures and collective outcomes?

Despite these many challenges, we are heartened by a growing network of researchers, educators, and designers who are taking up connected learning in their practice and taking steps toward institutionalization. The YOUmedia Learning Labs continue to spread across libraries and museums across the country, supporting a wide variety of youth-centered digital making labs. The Chicago Learning Exchange, which continues the work of the Hive network of informal educators, is knitting together partnerships of learning organizations across the city, guided by the principles of connected learning. Several members of the CLRN have helped establish the Connected Learning Lab at UC Irvine, a campuswide institute of more than 30 faculty continuing research and developing research-practice partnerships for connected learning. The Connected Scholars program developed by Jean Rhodes has now become established at UMass Boston as a freshman seminar course that is being rigorously evaluated. The Connected Learning Alliance represents a growing network of educators, researchers, and innovators working toward connected learning for all, and who gather annually at the Connected Learning Summit. Connected learning, like all systemic efforts, is challenging to realize and institutionalize. At the same time, this means that when it does take root, it is highly resilient and sustained by a broad coalition of stakeholders. We look forward to being part of that coalition in our future.

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REFERENCES

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- AAP Council on Communications and Media. 2016. "Media and Young Minds." *Pediatrics* 138(5).
- Araya, Daniel and Michael A. Peters. 2010. *Education in the Creative Economy: Knowledge and Learning in the Age of Innovation*. New York: Peter Lang Publishing.
- Arum, Richard and Kiley Larson. Forthcoming. *Connected Learning: A Study of Educational Technology and Progressive Pedagogy*. New York: NYU Press.
- Ashcraft, Catherine, Elizabeth K. Eger, and Kimberly A. Scott. 2017. "Becoming Technosocial Change Agents: Intersectionality and Culturally Responsive Pedagogies as Vital Resources for Increasing Girls' Participation in Computing." *Anthropology & Education Quarterly* 48(3):233–51.
- Attwood-Charles, William and Juliet B. Schor. 2019. "Distinction at Work: Status Practices in a Community Production Environment." Boston College, Boston, MA. Unpublished manuscript.
- Azevedo, Flávio S. 2011. "Lines of Practice: A Practice-Centered Theory of Interest Relationships." *Cognition and Instruction* 29(2):147–84.
- Azevedo, Flávio S. 2013. "The Tailored Practice of Hobbies and Its Implication for the Design of Interest-Driven Learning Environments." *Journal of the Learning Sciences* 22(3):462–510.
- Barassi, Veronica. (2018). "The Child as Datafied Citizen. Critical Questions on Data Justice in Family Life." Pp. 169–77 in *Digital Parenting: The Challenges for Families in the Digital Age*, edited by G. Mascheroni, C. Ponte, and A. Jorge. Göteborg, Sweden: Nordicom.
- Baron, Naomi. 2008. *Always On: Language in an Online and Mobile World*. New York: Oxford University Press.
- Barron, Brigid. 2006. "Interest and Self-Sustained Learning as Catalysts of Development : A Learning Ecology Perspective." *Human Development* 49:193–224.
- Barron, Brigid. 2010. "Conceptualizing and Tracing Learning Pathways over Time and Setting." *National Society for the Study of Education* 109(1):113–27.
- Barron, Brigid and Linda Darling-Hammond. 2008. *Teaching for Meaningful Learning: A Review of Research on Inquiry-Based and Cooperative Learning*. San Rafael, CA: George Lucas Educational Foundation.
- Barron, Brigid, Kimberley Gomez, Nichole Pinkard, and Caitlin K. Martin. 2014. *The Digital Youth Network: Cultivating Digital Media Citizenship in Urban Communities*. Cambridge, MA: MIT Press.

- Bauerlein, Mark. 2008. *The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future*. New York: Tarcher.
- Baum, Fran, Colin MacDougall, and Danielle Smith. 2006. "Participatory Action Research." *Journal of Epidemiology and Community Health* 60:854–57.
- Bell, Philip, Christopher M. Hoadley, and Marcia C. Linn. 2004. "Design-Based Research in Education." Pp. 73–85 in *Internet Environments for Science Education*, edited by M. C. Linn, E. A. Davis, and P. Bell. Mahwah, NJ: Erlbaum.
- Bell, Philip, Carrie Tzou, Leah Bricker, and Annemarie D. Baines. 2012. "Learning in Diversities of Structures of Social Practice: Accounting for How, Why and Where People Learn Science." *Human Development* 55:269–84.
- Berardi, Luciano. 2012. "The First Year College Experience: Predictors of Natural Mentoring Relationships and Students' Academic Outcomes." PhD dissertation, College of Science and Health, DePaul University, Chicago, IL.
- Bevan, Bronwyn, Jean J. Ryoo, James Forrest, and William R. Penuel. 2015. *Enriching and Expanding the Possibilities: Research-Practice Partnerships in Informal Science Education*. San Francisco, CA: Research + Practice Collaboratory.
- Blumenfeld, Phyllis C., Elliot Soloway, Ronald W. Marx, Joseph S. Krajcik, Mark Guzdial, and Annemarie Palincsar. 1991. "Motivating Project-based Learning: Sustaining the Doing, Supporting the Learning." *Educational Psychologist* 26(3–4):369–98.
- Blum-Ross, Alicia and Sonia Livingstone. 2016. *Families and Screen Time: Current Advice and Emerging Research*. LSE Media Policy Project (Media Policy Brief 17). London, UK: London School of Economics and Political Science.
- Bodovski, Katerina and George Farkas. 2008. "'Concerted Cultivation' and Unequal Achievement in Elementary School." *Social Science Research* 37(3):903–19.
- Borman, Geoffrey D. 2000. "The Effects of Summer School: Questions Answered, Questions Raised." *Monographs of the Society for Research in Child Development* 65(1):119–27.
- Boser, Ulrich. 2013. *Are Schools Getting a Big Enough Bang for Their Education Technology Buck?* Washington, DC: Center for American Progress.
- Bowles, Samuel, Herbert Gintis, and Melissa Osborne Groves. 2008. *Unequal Chances: Family Background and Economic Success*. Princeton, NJ: Princeton University Press.
- Brandt, Deborah. 1997. *The Sponsors of Literacy*. National Research Center on English Language and Achievement. Washington, DC: Office of Educational Research and Improvement (ED).

REFERENCES

- Brennan, Karen, Andrés Monroy-Hernández, and Mitchel Resnick. 2010. "Making Projects, Making Friends: Online Community as Catalyst for Interactive Media Creation." *New Directions for Youth Development* 2010(128):75–83.
- Bronfenbrenner, Urie. 1979. "Contexts of Child Rearing: Problems and Prospects." *American Psychologist* 34(10), 844–50.
- Brough, Melissa. 2016. *Game On! Connected Learning and Parental Support in the CyberPatriot Program*. Irvine, CA: Digital Media and Learning Research Hub.
- Brown, Phillip, Hugh Lauder, and Dan Ashton. 2011. *The Global Auction: The Broken Promises of Education, Jobs and Incomes*. New York: Oxford University Press.
- Bryk, Anthony S., Louis M. Gomez, Alicia Grunow, and Paul G. LeMahieu. 2015. *Learning to Improve: How America's Schools Can Get Better at Getting Better*. Cambridge, MA: Harvard Education Press.
- Buckingham, David. 2007. *Beyond Technology: Children's Learning in the Age of Digital Culture*. Cambridge, UK: Polity Press.
- Bureau of Labor Statistics. 2018a. *Highlights of Women's Earnings in 2017*. Washington, DC: United States Department of Labor.
- Bureau of Labor Statistics. 2018b. *Labor Force Characteristics by Race and Ethnicity, 2017*. Washington, DC: United States Department of Labor.
- Byron, Paul, Brady Robards, Benjamin Hanckel, Son Vivienne, and Brendan Churchill. 2019. "'Hey, I'm Having These Experiences': Tumblr Use and Young People's Queer (Dis)Connections." *International Journal of Communication* 13:2239–59.
- Cammarota, Julio and Michelle Fine. 2008. "Youth Participatory Action Research: A Pedagogy for Transformational Resistance." Pp. 1–12 in *Revolutionizing Education: Youth Participatory Action Research in Motion*, edited by J. Cammarota and M. Fine. New York: Routledge.
- Cansoy, Mehmet and Juliet B. Schor. 2019. "Who Gets to Share in the 'Sharing Economy': Understanding the Patterns of Participation and Exchange in Airbnb." Boston College, Boston, MA. Unpublished manuscript.
- Carfagna, Lindsey "Luka." 2014. *Beyond Learning-as-Usual: Connected Learning among Open Learners*. Irvine, CA: Digital Media and Learning Research Hub.
- Carfagna, Lindsey B. 2017. "The Pedagogy of Precarity: Laboring to Learn in the New Economy." PhD dissertation, Morrissey College of Arts and Sciences, Boston College, Boston, MA. Retrieved from ProQuest Dissertation and Theses database.

- Carfagna, Lindsey B., Emily A. Dubois, Connor Fitzmaurice, Monique Y. Ouimette, Juliet B. Schor, Margaret Willis, and Thomas Laidley. 2014. "An Emerging Eco-Habitus: The Reconfiguration of High Cultural Capital Practices among Ethical Consumers." *Journal of Consumer Culture* 14(2):158–78.
- Carr, Nicholas. 2010. *The Shallows: What the Internet Is Doing to Our Brains*. New York: W. W. Norton & Company.
- Chávez, Vivian and Elisabeth Soep. 2005. "Youth Radio and the Pedagogy of Collegiality." *Harvard Educational Review* 75(4):409–34.
- Ching, Dixie, Rafi Santo, Chris Hoadley, and Kylie Peppler. 2015. *On-Ramps, Lane Changes, Detours and Destinations: Building Connected Learning Pathways in Hive NYC through Brokering Future Learning Opportunities*. New York: Hive Research Lab
- Cho, Alexander, Roxana G. Herrera, Luis Chaidez, and Adilene Uriostegui. 2019. "The 'Comadre' Project: An Asset-Based Design Approach to Connecting Low-Income Latinx Families to Out-of-School Learning Opportunities." Pp. 607:1–14 in *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, CHI '19*. New York: Association for Computing Machinery (ACM).
- Clark, Lynn Schofield. 2013. *The Parent App: Understanding Families in the Digital Age*. New York: Oxford University Press.
- Cobb, Paul, Jere Confrey, Richard Lehrer, and Leona Schauble. 2003. "Design Experiments in Educational Research." *Educational Researcher* 32(1):9–13.
- Coburn, Cynthia E. and William R. Penuel. 2016. "Research–Practice Partnerships in Education: Outcomes, Dynamics, and Open Questions." *Educational Researcher* 45(1):48–54.
- Cole, Michael. 1998. *Cultural Psychology: A Once and Future Discipline*. Cambridge, MA: Harvard University Press.
- Coleman, James. 1966. *Equality of Educational Opportunity*. Washington, DC: National Center for Educational Statistics.
- Collins, Allan and Richard Halverson. 2009. *Rethinking Education in the Age of Technology: The Digital Revolution and Schooling in America*. New York: Teachers College Press.
- Collins, Allan, Diana Joseph, and Katerine Bielaczyc. 2004. "Design Research : Theoretical and Methodological Issues." *The Journal of the Learning Sciences* 13(1):15–42.
- Condliffe, Barbara, Janet Quint, Mary G. Visher, Michael R. Bangser, Sonia Drohojowska, Larissa Saco, and Elizabeth Nelson. 2017. *Project-Based Learning: A Literature Review*.

REFERENCES

- New York: MDRC.
- Corsaro, William A. 1997. *The Sociology of Childhood*. Thousand Oaks, CA: Sage Publications.
- Covay, Elizabeth and William Carbonaro. 2010. "After the Bell: Participation in Extracurricular Activities, Classroom Behavior, and Academic Achievement." *Sociology of Education* 83(1):20–45.
- Craig, Shelley L., Lauren McInroy, Lance T. McCready, and Ramona Alaggia. 2015. "Media: A Catalyst for Resilience in Lesbian, Gay, Bisexual, Transgender, and Queer Youth." *Journal of LGBT Youth* 12(3): 254–275.
- Davidson, Cathy N. 2017. *The New Education: How to Revolutionize the University to Prepare Students for a World in Flux*. New York: Basic Books.
- Despujol, Ignacio M., Carlos Turró, Jaime Busquéis, and Aristóteles Cañero. 2014. "Analysis of Demographics and Results of Student's Opinion Survey of a Large Scale Mooc Deployment for the Spanish Speaking Community." Pp. 1–8 in 2014 *IEEE Frontiers in Education Conference (FIE) Proceedings*. Madrid, Spain: FIE.
- Dewey, John. 1916. *Democracy and Education: An Introduction to the Philosophy of Education*. New York: The Macmillan Company.
- Diamond, Judy, Mark St. John, Beth Cleary, and Darlene Librero. 1987. "The Exploratorium's Explainer Program: The Long-Term Impact on Teenagers Teaching Science to the Public." *Science Education* 71(5):643–56.
- DiGiacomo, Daniela, Katie Van Horne, Cris Salazar, Arafat Sultan, and William R. Penuel. 2016. *FUSE Studios Evaluation Report*. Boulder: University of Colorado.
- Downey, Douglas B., Beckett A. Broh, and Paul T. von Hippel. 2004. "Are Schools the Great Equalizer? Cognitive Inequality during the Summer Months and the School Year." *American Sociological Review* 69(5):613–35.
- Drotner, Kirsten, Hans Siggaard Jensen, and Kim Christian Schröder. 2008. "Conceptual and Relational Vagaries of Learning and Media." Pp. 1–9 in *Informal Learning and Digital Media*, edited by K. Drotner, H. S. Jensen, and K. C. Schröder. Newcastle, UK: Cambridge Scholars Publishing.
- Dubal, Veena. 2017. "Winning the Battle, Losing the War?: Assessing the Impact of Misclassification Litigation on Workers in the Gig Economy." *Wisconsin Law Review* 239(2017):739–802.
- Dubois, Emilie, Juliet B. Schor, and Lindsey "Luka" Carfagna. 2014. "New Cultures of Consumption in a Boston Time Bank." Pp. 95–124 in *Sustainable Lifestyles and the*

- Quest for Plenitude: Case Studies of the New Economy*, edited by J. B. Schor and C. J. Thompson. New Haven, CT: Yale University Press.
- Duncan, Greg J. and Richard J. Murnane, eds. 2011. *Whither Opportunity?: Rising Inequality, Schools, and Children's Life Chances*. New York: Russell Sage.
- Dweck, Carol S. 2006. *Mindset: The New Psychology of Success: How You Can Fulfill Your Potential*. New York: Random House.
- Dynarski, Susan. 2014. *Rising Inequality in Postsecondary Education*. Washington, DC: Brookings Institute.
- Edelson, Daniel C. 2002. "Design Research: What We Learn When We Engage in Design." *The Journal of the Learning Sciences* 11(1):105–21.
- Entwisle, Doris, Karl Alexander, and Linda Steffel Olson. 1997. *Children, Schools, and Inequality*. Boulder, CO: Westview Press.
- Erete, Sheena, Nichole Pinkard, Caitlin K. Martin, and Jim Sandherr. 2015. "Employing Narratives to Trigger Interest in Computational Activities with Inner-City Girls." Paper presented at the Research in Equity and Sustained Participation in Engineering, Computing, and Technology Conference (RESPECT), August 13–14, Charlotte, NC.
- Erstad, Ola. 2013. *Digital Learning Lives: Trajectories, Literacies, and Schooling*. New York: Peter Lang Publishing.
- Erstad, Ola and Julian Sefton-Green, eds. 2013. *Identity, Community, and Learning Lives in the Digital Age*. New York: Cambridge University Press.
- Erstad, Ola, Julian Sefton-Green, and H. C. Arnseth. 2016. *No Learning Identities, Education, and Community: Young Lives in the Cosmopolitan City*. Cambridge, UK: Cambridge University Press.
- Fass, Paula S. 2006. *Children of a New World: Society, Culture, and Globalization*. New York: New York University Press.
- Fishman, Barry J., William R. Penuel, Anne-Ruth Allen, Britte Haugan Cheng, and Nora Sabelli. 2013. "Design-based Implementation Research: An Emerging Model for Transforming the Relationship of Research and Practice." *National Society for the Study of Education* 112(2):136–56.
- Fitzmaurice, Connor, Isak Ladegaard, Will Attwood-Charles, Mehmet Cansoy, Lindsey B. Carfagna, Juliet B. Schor, and Robert Wengronowitz. 2018. "Domesticating the Market: Moral Exchange and the Sharing Economy." *Socio-Economic Review* mwy003. doi: 10.1093/ser/mwy003
- Fitzmaurice, Connor and Juliet B. Schor. 2018. "Homemade Matters: Logics of Opposition

REFERENCES

- in a Failed Food Swap.” *Social Problems* 66(1):144–161.
- Fredricks, Jennifer A. and Jacquelynne S. Eccles. 2008. “Participation in Extracurricular Activities in the Middle School Years: Are There Developmental Benefits for African American and European American Youth?” *Journal of Youth and Adolescence* 37(9):1029–43.
- Freeland Fischer, Julia. 2018. *Who You Know: Unlocking Innovations That Expand Students’ Networks*. San Francisco, CA: Jossey-Bass.
- Gay, Geneva. 2010. *Culturally Responsive Teaching: Theory, Research, and Practice*. 2nd ed. New York: Teachers College Press.
- Gee, Elisabeth, Lori Takeuchi, and Ellen Wartella. 2017. *Children and Families in the Digital Age: Learning Together in a Media Saturated Culture*. New York: Routledge.
- George, Madeleine J. and Candice L. Odgers. 2015. “Seven Fears and the Science of How Mobile Technologies May Be Influencing Adolescents in the Digital Age” *Perspectives on Psychological Science* 10(6):832–51.
- Gleason, Benjamin W. 2016. “Teens’ Participatory Play: Digital Media Learning through Civic Engagement.” Pp. 231–40 in *Education and Social Media: Toward a Digital Future*, edited by C. Greenhow, J. Sonnevend, and C. Agur. Cambridge, MA: MIT Press.
- González, Norma, Leisy Wyman, and Brendan O’Connor. 2011. “The Past, Present, and Future of ‘Funds of Knowledge.’” Pp. 479–94 in *A Companion to the Anthropology of Education*, edited by B. A. U Levinson and M. Pollock. Malden, MA: Wiley-Blackwell.
- Gray, Mary L. and Siddharth Suri. 2019. *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass*. Boston, MA: Houghton Mifflin.
- Greenfield, Patricia M. 2009. “Technology and Informal Education: What Is Taught, What Is Learned.” *Science* 323(5910): 69–71.
- Greeno, James G. 2006. “Authoritative, Accountable Positioning and Connected, General Knowing: Progressive Themes in Understanding Transfer.” *The Journal of the Learning Sciences* 15(4): 537–47.
- Guernsey, Lisa and Michael H. Levine. 2015. *Tap, Click, Read: Growing Readers in a World of Screens*. San Francisco, CA: Jossey-Bass.
- Guernsey, Lisa and Michael H. Levine. 2017. *How to Bring Early Learning and Family Engagement into a Digital Age: An Action Agenda for City and Community Leaders*. New York: Joan Ganz Cooney Center.
- Guile, David. 2006. “Access, Learning and Development in the Creative and Cultural

- Sectors: From 'Creative Apprenticeship' to 'Being Apprenticed.'" *Journal of Education and Work* 19(5):433–53.
- Gutiérrez, Kris D. 2008. "Developing a Sociocritical Literacy in the Third Space." *Reading Research Quarterly* 43(2):148–64.
- Gutiérrez, Kris D. 2014. "Integrative Research Review: Syncretic Approaches to Literacy Learning: Leveraging Horizontal Knowledge and Expertise." Pp. 48–61 in *63rd Literacy Research Association Yearbook*, edited by P. Dunston, L. Gambrell, K. Headley, S. Fullerton, and P. Stecker. Altamonte Springs, FL: Literacy Research Association.
- Gutiérrez, Kris D. 2016. "Designing Resilient Ecologies: Social Design Experiments and a New Social Imagination." *Educational Researcher* 45(3):187–96.
- Gutiérrez, Kris D., Krista Cortes, Arturo Cortez, Daniela DiGiacomo, Jennifer Higgs, Patrick Johnson, José Ramón Lizárraga, Elizabeth Mendoza, Joanne Tien, and Sepehr Vakil. 2017. "Replacing Representation with Imagination: Finding Ingenuity in Everyday Practices." *Review of Research in Education* 41(1):30–60.
- Gutiérrez, Kris D., Jennifer Higgs, José Lizárraga, and Edward Rivero. 2019. "Learning as Movement in Social Design-Based Experiments: Play as a Leading Activity." *Human Development* 62(1–2):66–82.
- Gutiérrez, Kris D., Carolina Izquierdo, and Tamar Kremer-Sadlik. 2010. "Middle Class Working Families' Beliefs and Engagement in Children's Extra-Curricular Activities: The Social Organization of Children's Futures." *International Journal of Learning* 17(3):633–56.
- Gutiérrez, Kris D. and Johnson, Patrick. 2017. "Understanding Identity Sampling and Cultural Repertoires: Advancing a Historicizing and Syncretic System of Teaching and Learning in Justice Pedagogies." Pp. 247–60 In *Culturally Sustaining Pedagogies: Teaching and Learning for Justice in a Changing World*, edited by D. Paris and H. S. Alim. New York: Teachers College Press.
- Gutiérrez, Kris D. and A. Susan Jurow. 2016. "Social Design Experiments: Toward Equity by Design." *Journal of the Learning Sciences* 25(4):565–98.
- Gutiérrez, Kris D., P. Zitali Morales, and Danny C. Martinez. 2009. "Remediating Literacy: Culture, Difference, and Learning for Students from Nondominant Communities." *Review of Research in Education* 33(1):212–45.
- Gutiérrez, Kris D. and Barbara Rogoff. 2003. "Cultural Ways of Learning: Individual Traits or Repertoires of Practice." *Educational Researcher* 32(5):19–25.
- Gutiérrez, Kris D. and Shirin Vossoughi. 2010. "Lifting Off the Ground to Return Anew: Mediated Praxis, Transformative Learning, and Social Design Experiments." *Journal of*

REFERENCES

- Teacher Education* 61(1–2):100–117.
- Hansen, John D. and Justin Reich. 2015. “Democratizing Education? Examining Access and Usage Patterns in Massive Open Online Courses.” *Science* 350(6265):1245–48.
- Heckman, James J. 2006. “Skill Formation and the Economics of Investing in Disadvantaged Children.” *Science* 312(5782):1900–1902.
- Heckman, James J. and Dimitriy V. Masterov. 2007. “The Productivity Argument for Investing in Young Children.” *Applied Economic Perspectives and Policy* 29(3):446–93.
- Heyns, Barbara. 1978. *Summer Learning and the Effects of Schooling*. New York: Academic Press.
- Hickey, Daniel T. and Steven J. Zuiker. 2012. “Multilevel Assessment for Discourse, Understanding, and Achievement.” *Journal of the Learning Sciences* 21(4):522–82.
- Hidi, Suzanne and K. Ann Renninger. 2006. “The Four-Phase Model of Interest Development.” *Educational Psychologist* 41(2):111–27.
- Hill, Benjamin Mako and Andrés Monroy-Hernández. 2013. “The Cost of Collaboration for Code and Art: Evidence from a Remixing Community.” Pp. 1035–46 in *Proceedings of the 2013 Conference on Computer Supported Cooperative Work (CSCW ‘13)*, edited by A. Bruckman, S. Counts, C. Lampe, and L. Terveen. New York: Association for Computing Machinery (ACM).
- Hobbs, Renee. 2017. “Teaching and Learning in a Post-Truth World.” *Educational Leadership* 75(3):26–31.
- Holm, Margaret. 2011. “Project-Based Instruction: A Review of the Literature on Effectiveness in Prekindergarten through 12th Grade Classrooms.” *InSight: Rivier Academic Journal* 7(2):1–13.
- Hoover, Stewart, Lynn Schofield Clark, and Diane Alters. 2004. *Media, Home, and Family*. New York: Routledge.
- Horst, Heather A., Becky Herr-Stephenson, and Laura Robinson. 2010. *Media Ecologies*. Cambridge, MA: MIT Press.
- Hutchins, Edwin. 1996. *Cognition in the Wild*. Cambridge, MA: MIT Press.
- International Telecommunication Union. 2017. *ICT Facts and Figures 2017*. Geneva, Switzerland: International Telecommunication Union (ITU).
- Irani, Lilly. 2015. “Difference and Dependence among Digital Workers: The Case of Amazon Mechanical Turk.” *South Atlantic Quarterly* 114(1):225–34.

- Israelsen-Hartley, Sara. 2018. "Why Parents Fear Tech More than Drugs, Alcohol and Sexual Activity for Their Teenagers." *Deseret News*, November 27. Retrieved November 15th, 2019 (<https://www.deseret.com/2018/11/28/20659673/why-parents-fear-tech-more-than-drugs-alcohol-and-sexual-activity-for-their-teenagers#andrew-and-betsy-batman-eat-dinner-at-home-with-three-of-their-kids-ellie-jon-and-gavin-in-south-jordan-on-wednesday-nov-7-2018>)
- Ito, Mizuko. 2012. "Contributors versus Leechers: Fansubbing Ethics and a Hybrid Public Culture." Pp. 179–204 in *Fandom Unbound: Otaku Culture in a Connected World*, edited by M. Ito, D. Okabe, and I. Tsuji. New Haven, CT: Yale University Press.
- Ito, Mizuko, Kris Gutiérrez, Sonia Livingstone, Bill Penuel, Jean Rhodes, Katie Salen, Juliet Schor, Julian Sefton-Green, and S. Craig Watkins. 2013. *Connected Learning: An Agenda for Research and Design*. Irvine, CA: Digital Media and Learning Research Hub.
- Ito, Mizuko, Crystle Martin, Rachel Cody Pfister, Matthew H. Rafalow, Katie Salen, and Amanda Wortman. 2018. *Affinity Online: How Connection and Shared Interest Fuel Learning*. New York: NYU Press.
- Ito, Mizuko, Elisabeth Soep, Neta Kligler-Vilenchik, Sangita Shresthova, Liana Gamber-Thompson, and Arely Zimmerman. 2015. "Learning Connected Civics: Narratives, Practices, Infrastructures." *Curriculum Inquiry* 45(1):10–29.
- Jackson, C. Kirabo, Rucker C. Johnson, and Claudia Persico. 2015. "The Effects of School Spending on Educational and Economic Outcomes: Evidence from School Finance Reforms." *The Quarterly Journal of Economics* 131(1):157–218.
- James, Allison, Chris Jenks, and Alan Prout. 1998. *Theorizing Childhood*. Cambridge, UK: Polity Press.
- Järvelä, Sanna and K. Ann Renninger. 2014. "Designing for Learning: Interest, Motivation, and Engagement." Pp. 668–85 in *Cambridge Handbook of the Learning Sciences*, 2nd ed, edited by D. K. Sawyer. Cambridge, UK: Cambridge University Press.
- Jenkins, Henry. 2006. *Convergence Culture: Where Old and New Media Collide*. New York: New York University Press.
- Jenkins, Henry, Mizuko Ito, and danah boyd. 2015. *Participatory Culture in a Networked Era: A Conversation on Youth, Learning, Commerce, and Politics*. Malden, MA: Polity Press.
- Jenkins, Henry, Sangita Shresthova, Liana Gamber-Thompson, Neta Kligler-Vilenchik, and Arely M. Zimmerman. 2016. *By Any Media Necessary: The New Youth Activism*. New York: NYU Press.

REFERENCES

- Johnson, Rucker C. and C. Kirabo Jackson. 2018. "Reducing Inequality through Dynamic Complementarity: Evidence from Head Start and Public School Spending" (NBER Working Paper 23489). Cambridge, MA: National Bureau of Economic Research.
- Jones, Janelle and John Schmitt. 2014. *A College Degree Is No Guarantee*. Washington, DC: Center for Economic and Policy Research.
- Kaufman, Jason and Jay Gabler. 2004. "Cultural Capital and the Extracurricular Activities of Girls and Boys in the College Attainment Process." *Poetics* 32(2):145–68.
- Kenner, Charmian, Ruby Mahera, John Jessel, Eve Gregory, and Arju Tahera. 2007. "Intergenerational Learning between Children and Grandparents in East London." *Journal of Early Childhood Research* 5(3):219–43.
- Keune, Anna and Kylie Pepler. 2017. "Maker Portfolios as Learning and Community-Building Tools Inside and Outside Makerspaces." Pp. 545–48 *In Making a Difference: Prioritizing Equity and Access in CSCL, 12th International Conference on Computer Supported Collaborative Learning Conference Proceedings* (Vol. 2), edited by B. K. Smith, M. Borge, E. Mercier, and K. Y. Lim. Philadelphia, PA: CSCL.
- Kirshner, Ben. 2010. "Productive Tensions in Youth Participatory Action Research." *Yearbook of the National Society for the Study of Education* 109(1):238–51.
- Kirshner, Ben, Kristen Pozzoboni, and Hannah Jones. 2011. "Learning How to Manage Bias: A Case Study of Youth Participatory Action Research." *Applied Developmental Science* 15(3):140–55.
- Kirshner, Ben, Karen Strobel, and Maria Fernández. 2003. "Critical Civic Engagement among Urban Youth." *Penn GSE Perspectives on Urban Education* 2(1):1–20.
- Kornbluh, Mariah, Emily J. Ozer, Carrie D. Allen, and Ben Kirshner. 2015. "Youth Participatory Action Research as an Approach to Sociopolitical Development and the New Academic Standards: Considerations for Educators." *The Urban Review* 47(5):868–92.
- Ladson-Billings, Gloria. 1994. *The Dreamkeepers: Successful Teachers of African American Children*. San Francisco, CA: Jossey-Bass.
- Ladson-Billings, Gloria. 1995a. "But That's Just Good Teaching! The Case for Culturally Relevant Pedagogy." *Theory Into Practice* 34(3):159–65.
- Ladson-Billings, Gloria. 1995b. "Toward a Theory of Culturally Relevant Pedagogy." *American Educational Research Journal* 32(3):465–91.
- Ladson-Billings, Gloria. 2006. "'Yes, But How Do We Do It?' Practicing Culturally Relevant Pedagogy." Pp. 162–77 in *White Teachers/Diverse Classrooms*, edited by J. Landsman

- and C. W. Lewis. Sterling, VA: Stylus Publishers.
- Lareau, Annette. 2003. *Unequal Childhoods: Class, Race, and Family Life*. Berkeley: University of California Press.
- Lareau, Annette and Dalton Conley, eds. 2008. *Social Class: How Does It Work?* New York: Russell Sage Foundation.
- Larson, Kiley, Mizuko Ito, Eric Brown, Mike Hawkins, Nichole Pinkard, and Penny Sebring. 2013. *Safe Space and Shared Interests: YOUmedia Chicago as a Laboratory for Connected Learning*. Irvine, CA: Digital Media and Learning Research Hub.
- Lauricella, Alexis, Drew Cingel, Leanne Beaudoin-Ryan, Michael B. Robb, Melissa Saphir, and Ellen Wartella. 2016. *The Common Sense Census: Plugged-in Parents of Tweens and Teens*. San Francisco, CA: Common Sense Media.
- Lave, Jean. 1996. "Teaching, as Learning, in Practice." *Mind, Culture, and Activity* 3(3):149–64.
- Lee, Carol D. 2007. *Culture, Literacy, and Learning: Taking Bloom in the Midst of the Whirlwind* (Multicultural Education Series). New York: Teachers College Press.
- Lemke, Jay, Robert Locusay, Michael Cole, and Vera Michalchik. 2015. *Documenting and Assessing Learning in Informal and Media-rich Environments*. Cambridge, MA: MIT Press.
- Lenhart, Amanda and Mary Madden. 2005. *Teen Content Creators and Consumers*. Washington, DC: Pew Research Center.
- Levine, Madeline. 2006. *The Price of Privilege: How Parental Pressure and Material Advantage Are Creating a Generation of Disconnected and Unhappy Kids*. New York: Harper Collins.
- Linver, Miriam R., Jodie L. Roth, and Jeanne Brooks-Gunn. 2009. "Patterns of Adolescents' Participation in Organized Activities: Are Sports Best When Combined with Other Activities?" *Developmental Psychology* 45(2):354–67.
- Livingstone, Sonia. 2013. "Online Risk, Harm and Vulnerability: Reflections on the Evidence Base for Child Internet Safety Policy." *ZER: Journal of Communication Studies* 18(35):13–28.
- Livingstone, Sonia and Alicia Blum-Ross. Forthcoming. *Parenting for a Digital Future: How Hopes and Fears about Technology Shape Our Children's Lives*. Oxford, UK: Oxford University Press.
- Livingstone, Sonia, Leslie Haddon, and Anke Görzig, eds. 2012. *Children, Risk and Safety on the Internet: Research and Policy Challenges in Comparative Perspective*. Bristol,

UK: Policy Press.

Livingstone, Sonia and Julian Sefton-Green. 2016. *The Class: Living and Learning in the Digital Age*. New York: New York University Press.

Livingstone, Sonia and Amanda Third. 2017. "Children and Young People's Rights in the Digital Age: An Emerging Agenda." *New Media & Society* 19(5):657–70.

Livingstone, Sonia, Daniel Kardefelt Winther, Petar Kanchev, Patricio Cabello, Magdalena Claro, Patrick Burton, and Joanne Phyfer. 2019. "Is There a Ladder of Children's Online Participation? Findings from Three Global Kids Online Countries." *Innocenti Research Briefs* (No. 2019-02). Innocenti, Florence, Italy: UNICEF Office of Research.

Lombana-Bermudez, Andres. 2017a. "Building a Safe Digital Space for Young Makers and Learners: The Case of DIY.org." *Medium*, July 26, 2017. Retrieved November 15, 2019 (<https://medium.com/berkman-klein-center/building-a-safe-digital-space-for-young-makers-and-learners-the-case-of-diy-org-7c7457b603e9>).

Lombana-Bermudez, Andres. 2017b. "Moderation and Sense of Community in a Youth-oriented Online Platform: Scratch's Governance Strategy for Addressing Harmful Speech." *Medium*, August 15, 2017. Retrieved November 15, 2019 (<https://medium.com/berkman-klein-center/moderation-and-sense-of-community-in-a-youth-oriented-online-platform-scratchs-governance-eeac6941e9c9>).

Lombana-Bermudez, Andres. 2017c. "Positive Social Relationships, Mentorship, and Constructive Dialogue: Connected Camps Governance Strategy for 'Kid-Friendly' Minecraft Servers." *Medium*, November 15, 2017. Retrieved November 15, 2019 (<https://medium.com/berkman-klein-center/positive-social-relationships-and-mentorship-connected-camps-governance-strategy-for-kid-friendly-94a6f98502da>).

Losh, Elizabeth M. 2014. *The War on Learning: Gaining Ground in the Digital University*. Cambridge, MA: MIT Press.

Lupton, Deborah and Ben Williamson. 2017. "The Datafied Child: The Dataveillance of Children and Implications for Their Rights." *SAGE Journals* 19(5):780–94.

Luthar, Suniya S. and Shawn J. Latendresse. 2005. "Children of the Affluent: Challenges to Well-Being." *American Psychological Science* 14(1):49–53.

Ma, Jennifer, Sandy Baum, Matea Pender, and C. J. Libassi. 2019. *Trends in College Pricing 2019*. New York: College Board.

Macenaite, Milda. 2017. "From Universal towards Child-Specific Protection of the Right to Privacy Online: Dilemmas in the EU General Data Protection Regulation." *New Media & Society* 19(5):765–79.

- Madden, Mary, Amanda Lenhart, and Claire Fontaine. 2017. "How Youth Navigate the News Landscape: Recent Qualitative Research" (Data & Society Research Institute report). Miami, FL: Knight Foundation.
- Maher, Brendan. 2016. "Can a Videogame Company Tame Toxic Behaviour?" *Nature* 531(7596):568–71.
- Mahoney, Joseph, Angel Harris, and Jacquelynne S. Eccles. 2006. "Organized Activity Participation, Positive Youth Development, and the Over-scheduling Hypothesis." *Social Policy Report* 20(4):3–30.
- Mahoney, Joseph and Andrea Vest. 2012. "The Over-scheduling Hypothesis Revisited: Intensity of Organized Activity Participation during Adolescence and Young Adult Outcomes." *Journal of Research on Adolescence* 22(3):409–18.
- Manyika, James, Susan Lund, Michael Chui, Jacques Bughin, Jonathan Woetzel, Parul Batra, Ryan Ko, and Saurabh Sanghvi. 2017. *Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills, and Wages*. New York: McKinsey & Company.
- Marglin, Stephen A. and Juliet B. Schor. 1992. *The Golden Age of Capitalism: Reinterpreting the Postwar Experience*. New York: Oxford University Press.
- Margolis, Jane, Rachel Estrella, Joanna Goode, Jennifer Jellison Holme, and Kimberly Nao. 2010. *Stuck in the Shallow End: Education, Race, and Computing*. Cambridge, MA: MIT Press.
- Martin, Crystle. 2017a. "Expressing Youth Voice through Video Games and Coding." *Knowledge Quest* 45(4):50–57.
- Martin, Crystle. 2017b. "Libraries as Facilitators of Coding for All." *Knowledge Quest* 45(3):46–53.
- Mascheroni, Giovanna, Cristina Ponte, and Ana Jorge, eds. 2018. *Digital Parenting: The Challenges for Families in the Digital Age*. Göteborg, Sweden: Nordicom.
- McFarland, Joel, Bill Hussar, Jijun Zhang, Xiaolei Wang, Ke Wang, Sarah Hein, Melissa Diliberti, Emily Forest Cataldi, Farah Bullock Mann, and Amy Barmer. 2019. *The Condition of Education 2019* (NCES 2019-144). Washington, DC: U.S. Department of Education/National Center for Education Statistics.
- McInroy, Lauren B. 2019. "Building Connections and Slaying Basilisks: Fostering Support, Resilience, and Positive Adjustment for Sexual and Gender Minority Youth in Online Fandom Communities." *Information, Communication & Society*. doi: 10.1080/1369118X.2019.1623902
- McIntyre, Alice. 2007. *Participatory Action Research*. Thousand Oaks, CA: Sage

REFERENCES

Publications.

- Meadows, Donella. 2008. *Thinking in Systems: A Primer*. White River Junction, VT: Chelsea Green Publishing.
- Miell, Dorothy and Karen Littleton. 2004. *Collaborative Creativity, Contemporary Perspectives*. London, UK: Free Associate Books.
- Mishel, Lawrence. 2012. *Entry-Level Workers' Wages Fell in Lost Decade* (EPI Issue Brief #327). Washington, DC: Economic Policy Institute.
- Mishel, Lawrence, Josh Bivens, Elise Gould, and Heidi Shierholz. 2012. *The State of Working America* (12th Edition Preview). Washington, DC: Economic Policy Institute.
- Moll, Luis C., Cathy Amanti, Deborah Neff, and Norma Gonzalez. 1992. "Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms." *Theory Into Practice* 31(2):132–41.
- Muro, Mark, Robert Maxim, and Jacob Whiton. 2019. *Automation and Artificial Intelligence: How Machines Are Affecting People and Places*. Washington, DC: Metropolitan Policy Program at Brookings.
- Museum, Samuel D. 2010. "Delineating the Ways That Targeted Support Programs Facilitate Minority Students' Access to Social Networks and Development of Social Capital in College." *Enrollment Management Journal* 4(3):10–41.
- Nasir, Na'ilah Suad and Victoria Hand. 2008. "From the Court to the Classroom: Opportunities for Engagement, Learning, and Identity in Basketball and Classroom Mathematics." *The Journal of the Learning Sciences* 17(2):143–79.
- National Academies of Sciences, Engineering, and Medicine (NASEM). 2018. *How People Learn II: Learners, Contexts, and Cultures*. Washington, DC: The National Academies Press.
- National Research Council. 2012. *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. Washington, DC: National Research Council.
- Niemivirta, Markku. 2002. "Individual Differences and Developmental Trends in Motivation: Integrating Person-Centered and Variable-Centered Methods." *Advances in Motivation and Achievement* 12:241–75.
- Orben, Amy and Andrew K. Przybylski. 2019. "The Association Between Adolescent Well-Being and Technology Use." *Nature Human Behaviour* 3:173–82.
- Owens, Ann, Sean F. Reardon, and Christopher Jencks. 2016. "Income Segregation Between Schools and School Districts." *American Educational Research Journal* 53(4):1159–97.

- Paris, Django and H. Samy Alim, eds. 2017. *Culturally Sustaining Pedagogies: Teaching and Learning for Justice in a Changing World* (Language and Literacy Series). New York: Teachers College Press.
- Pariser, Eli. 2011. *The Filter Bubble: What the Internet is Hiding from You*. New York: Penguin Press.
- Pea, Roy, Clifford Nass, Lyn Meheula, Marcus Rance, Aman Kumar, Holden Bamford, Matthew Nass, Aneesh Simha, Benjamin Stillerman, Steven Yang, and Michael Zhou. 2012. "Media Use, Face-to-Face Communication, Media Multitasking, and Social Well-Being among 8- to 12-year-old Girls." *Developmental Psychology* 48(2):327–36.
- Penuel, William R., Tiffany L. Clark, and Bronwyn Bevan. 2016. "Infrastructures to Support Equitable STEM Learning across Settings." *Afterschool Matters* 24:12–20.
- Penuel, William R., Daniela DiGiacomo, Katie Van Horne, and Ben Kirshner. 2016. "A Social Practice Theory of Learning and Becoming across Contexts and Time." *Frontline Learning Research* 4(4):30–38.
- Penuel, William R. and Daniel J. Gallagher. 2017. *Creating Research Practice Partnerships in Education*. Cambridge, MA: Harvard Education Press.
- Peppler, Kylie and Sophia Bender. 2013. "Maker Movement Spreads Innovation One Project at a Time." *Phi Delta Kappan* 95(3):22–27.
- Peppler, Kylie A. and Mishael Sedas. 2019. "Urban Children Crafting (Making) at Home: Overlooked Intergenerational Funds of Knowledge." Paper presented to the American Educational Research Association (AERA) Conference, April 5–9, 2019, Toronto, Canada.
- Pfister, Rachel Cody. 2014. *Hats for House Elves: Connected Learning and Civic Engagement in Hogwarts at Ravelry*. Irvine, CA: Digital Media and Learning Research Hub.
- Pinkard, Nichole, Sheena Erete, Caitlin K. Martin, and Maxine McKinney de Royston. 2017. "Digital Youth Divas: Exploring Narrative-Driven Curriculum to Spark Middle School Girls' Interest in Computational Activities." *Journal of the Learning Sciences* 26(3):477–516.
- Podkul, Tim, Denise Sauerteig, and Amy Homma. 2016. "Youth as Knowledge Brokers across Learning Environments: Social Capital as a Catalyst for Cross-Setting Learning." Presented at the annual meeting of the American Educational Research Association, April 8–12, Washington, DC.
- Pope, Denise C. 2001. *"Doing School": How We Are Creating a Generation of Stressed Out, Materialistic, and Miseducated Students*. New Haven, CT: Yale University Press.

REFERENCES

- Powers, Cara Berg and Erin Allaman. 2012. "How Participatory Action Research Can Promote Social Change and Help Youth Development" (Berkman Center Research Publication No. 2013-10). Cambridge, MA: Harvard University.
- Prensky, Marc. 2010. *Teaching Digital Natives: Partnering for Real Learning*. Thousand Oaks, CA: Corwin.
- Prior, Markus. 2007. *Post-broadcast Democracy: How Media Choice Increases Inequality in Political Involvement and Polarizes Elections*. Cambridge, UK: Cambridge University Press.
- Pugh, Allison J. 2009. *Longing and Belonging: Parents, Children, and Consumer Culture*. Berkeley: University of California Press.
- Putnam, Robert D. 2015. *Our Kids: The American Dream in Crisis*. New York: Simon and Schuster.
- Rafalow, Matthew H. 2016. "Tinkering Online: Digital Supports for Making and Sharing." Pp. 158–74 in *Makeology: Makerspaces as Learning Environments*, edited by K. A. Peppler, E. Halverson, and Y. B. Kafai. New York: Routledge.
- Rafalow, Matthew H. Forthcoming. *Digital Divisions: How Schools Create Inequality in the Tech Era*. Chicago, IL: University of Chicago Press.
- Rafalow, Matthew H. and Kiley Larson. 2014. "Fashioning Learning: Connected Learning through Fashion Design Programs." Irvine, CA: Digital Media and Learning Research Hub.
- Raposa, Elizabeth B., Adar Ben-Eliyahu, Lauren E. W. Olsho, and Jean Rhodes. 2018. "Birds of a Feather: Is Matching Based on Shared Interests and Characteristics Associated with Longer Youth Mentoring Relationships?" *Journal of Community Psychology* 47(2):385–97 (cited as 2018a).
- Raposa, Elizabeth B., Lance D. Erickson, Matthew Hagler, and Jean E. Rhodes. 2018. "How Economic Disadvantage Affects the Availability and Nature of Mentoring Relationships during the Transition to Adulthood." *American Journal of Community Psychology* 61(1–2):191–203 (cited as 2018b).
- Raposa, Elizabeth B., Jean E. Rhodes, and Carla Herrera. 2016. "The Impact of Youth Risk on Mentoring Relationship Quality: Do Mentor Characteristics Matter?" *American Journal of Community Psychology* 57(3–4):320–29.
- Raposa, Elizabeth B., Jean Rhodes, Geert Jan J. M. Stams, Noel Card, Samantha Burton, Sarah Schwartz, Laura A. Yoviene Sykes, Stella Kanchewa, Janis Kupersmidt, and Saida Hussain. 2019. "The Effects of Youth Mentoring Programs: A Meta-Analysis of Outcome Studies." *Journal of Youth and Adolescence* 48(3):423–43.

- Reardon, Sean F. 2011. "The Widening Academic Achievement Gap between the Rich and the Poor: New Evidence and Possible Explanations." Pp. 91–117 in *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances*. New York: Russell Sage Foundation.
- Reardon, Sean F. and Ann Owens. 2014. "60 Years after Brown: Trends and Consequences of School Segregation." *Annual Review of Sociology* 40(1):199–218.
- Reeves, Richard V. 2017. *How the American Upper Middle Class Is Leaving Everyone Else in the Dust, Why That Is a Problem, and What to Do about It*. Washington DC: Brookings Institution Press.
- Reich, Justin and Mizuko Ito. 2017. *From Good Intentions to Real Outcomes: Equity by Design in Learning Technologies*. Irvine, CA: Digital Media and Learning Research Hub.
- Resnick, Lauren B. 2017. "Toward a Cognitive Theory of Instruction." Pp. 5–38 in *Learning and Motivation in the Classroom*. New York: Routledge.
- Rheingold, Howard. 2012. *Net Smart: How to Thrive Online*. Cambridge, MA: MIT Press.
- Rhodes, Jean E. 2017. "The Future of Youth Mentoring." *Connected Learning Alliance Blog*, June 12, 2017. Retrieved November 15, 2019 (<https://clalliance.org/blog/future-youth-mentoring/>).
- Rideout, Victoria J., Ulla G. Foehr, and Donald R. Roberts. 2010. *Generation M2: Media in the Lives of 8- to 18-year-olds*. Washington, DC: Kaiser Family Foundation.
- Rideout, Victoria J. and Michael B. Robb. 2018. *Social Media, Social Life: Teens Reveal Their Experiences*. San Francisco, CA: Common Sense Media.
- Rideout, Victoria and Michael B. Robb. 2019. *The Common Sense Census: Media Use by Tweens and Teens, 2019*. San Francisco, CA: Common Sense Media.
- Ringland, Kathryn E., Christine T. Wolf, Lynn Dombrowski, and Gillian R. Hayes. 2015. "Making 'Safe': Community-centered Practices in a Virtual World Dedicated to Children with Autism." Pp. 1788–1800 in *Proceedings of the 2015 ACM International Conference on Computer Supported Collaborative Work*, edited by D. Cosley, A. Forte, L. Ciolfi, and D. McDonald. Vancouver, BC: CSCW.
- Rivera, Lauren A. 2011. "Ivies, Extracurriculars, and Exclusion: Elite Employers' Use of Educational Credentials." *Research in Social Stratification and Mobility* 29(1):71–90.
- Rogoff, Barbara. 2003. *The Cultural Nature of Human Development*. New York: Oxford University Press.

REFERENCES

- Rogoff, Barbara and Cathy Angelillo. 2002. "Investigating the Coordinated Functioning of Multifaceted Cultural Practices in Human Development." *Human Development* 45(4):211–25.
- Roque, Ricarose Vallarta. 2016. "Family Creative Learning: Designing Structures to Engage Kids and Parents as Computational Creators." PhD dissertation, Department of Media Arts and Sciences, Massachusetts Institute of Technology, Cambridge, MA. Retrieved November 26, 2019 (<https://dspace.mit.edu/handle/1721.1/107577>).
- Roque, Ricarose, Natalie Rusk, and Amos Blanton. 2013. "Youth Roles and Leadership in an Online Creative Community." Pp. 399–405 in *CSCL 2013 Proceedings Vol. 1: Full Papers and Symposia*, edited by N. Rummel, M. Kapur, M. Nathan, and S. Puntambekar. Madison, WI: CSCL.
- Rose, Robert M. 2000. *Finding Answers to Big Questions: Overcoming Disciplinary Boundaries through Research Networks*. Houston, TX: Robert M. Rose Consulting.
- Rosenblat, Alex and Luke Stark. 2016. "Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers." *International Journal of Communication* 10:3758–84.
- Rosenfeld, Alvin and Nicole Wise. 2001. *The Over-scheduled Child: Avoiding the Hyperparenting Trap*. New York: St. Martin's Press.
- Russakoff, Dale. 2015. *The Prize: Who's in Charge of America's Schools?* New York: First Mariner Books.
- Salen, Katie, Robert Torres, Arana Shapiro, Rebecca Rufo-Tepper, and Loretta Wolozin. 2010. *Quest to Learn: Growing the School for Digital Kids*. Cambridge, MA: MIT Press.
- Schiefele, Ulrich. 1991. "Interest, Learning, and Motivation." *Educational Psychologist* 26(3-4): 299–323.
- Schoon, Ingrid. 2006. *Risk and Resilience: Adaptations in Changing Times*. Cambridge, UK: Cambridge University Press.
- Schor, Juliet B. Forthcoming. *Beyond the Gig: Reclaiming the Sharing Economy*. Berkeley: University of California Press.
- Schor, Juliet B. and William Attwood-Charles. 2017. "The Sharing Economy: Labor, Inequality and Sociability on for-Profit Platforms." *Sociology Compass* 11(8):1–16.
- Schor, Juliet B., William Attwood-Charles, Mehmet Cansoy, Isak Ladegaard, and Robert Wengronowitz. 2018. "Dependence and Precarity in the Platform Economy." Keynote address, Conference on Work and Employment in an Era of Platform Capitalism (CAPLA), June 5–6, 2018, Dauphine University Paris, Paris, France.

- Schor, Juliet B., Connor Fitzmaurice, Lindsey B. Carfagna, Will Attwood-Charles, and Emilie Dubois Poteat. 2016. "Paradoxes of Openness and Distinction in the Sharing Economy." *Poetics* 54:66–81.
- Schwartz, Daniel L. and Dylan Arena. 2013. *Measuring What Matters Most: Choice-based Assessments for the Digital Age*. Cambridge, MA: MIT Press.
- Schwartz, Sarah E. O., Stella S. Kanchewa, Jean E. Rhodes, Evan Cutler, and Jessica L. Cunningham. 2016. "I Didn't Know You Could Just Ask: Empowering Underrepresented College-bound Students to Recruit Academic and Career Mentors." *Children and Youth Services Review* 64:51–59.
- Schwartz, Sarah E. O., Stella S. Kanchewa, Jean E. Rhodes, Grace Gowdy, Abigail M. Stark, John Paul Horn, McKenna Parnes, and Renée Spencer. 2017. "I'm Having a Little Struggle with This, Can You Help Me Out?: Examining Impacts and Processes of a Social Capital Intervention for First-generation College Students." *American Journal of Community Psychology* 61(1–2):166–78.
- Schwartz, Sarah E. O. and Jean E. Rhodes. 2016. "From Treatment to Empowerment: New Approaches to Youth Mentoring." *American Journal of Community Psychology* 58(1–2):150–57.
- Schwartz, Sarah E. O., Jean E. Rhodes, Renée Spencer, and Jean B. Grossman. 2013. "Youth Initiated Mentoring: Investigating a New Approach to Working with Vulnerable Adolescents." *American Journal of Community Psychology* 52(1–2):155–69.
- Scott, Kimberly A. and Patricia Garcia. 2016. "Techno-social Change Agents: Fostering Activist Dispositions among Girls of Color." *Meridians: Feminism, Race, Transnationalism* 15(1):65–85.
- Sefton-Green, Julian. 2017. "WAC Arts." Pp. 823–26 in *The SAGE Encyclopedia of Out-of-school Learning*, edited by K. Peppler. Thousand Oaks, CA: Sage Publications.
- Sefton-Green, Julian and Ola Erstad. 2018. *Learning beyond the School: International Perspectives on the Schooled Society*. New York: Routledge.
- Sefton-Green, Julian, Jackie Marsh, Ola Erstad, and Rosie Flewitt. 2016. *Establishing a Research Agenda for the Digital Literacy Practices of Young Children: A White Paper for COST Action IS1410*. Brussels, Belgium: European Cooperation in Science and Technology (COST).
- Sefton-Green, Julian, Craig S. Watkins, and Ben Kirshner. 2019. *Young People's Transitions into Creative Work: Negotiating Challenges and Opportunities*. New York: Routledge.
- Seiter, Ellen. 1995. *Sold Separately: Parents and Children in Consumer Culture*. Rutgers, NJ: Rutgers University Press.

REFERENCES

- Silva, Kaisa, Jennifer Snellman, and Carl Frederick. 2014. "The Privatization of 'Savvy': Class Reproduction in the Era of College for All" (INSEAD Working Paper No. 2014/47/OBH). *SSRN Electronic Journal*. doi: 10.2139/ssrn.2473462
- Smith, Aaron. 2016. *The Gig Economy: Work, Online Selling and Home Sharing*. Washington, DC: Pew Research Center.
- Soep, Elisabeth and Vivian Chávez. 2011. "Drop That Knowledge: Youth Radio Stories." Book review. *Harvard Educational Review* 81(4):774–75.
- Spencer, Renée, Toni Tugenberg, Mia Ocean, Sarah E. O. Schwartz, and Jean E. Rhodes. 2016. "'Somebody Who Was on My Side': A Qualitative Examination of Youth Initiated Mentoring." *Youth & Society* 48(3):402–24.
- Stanton-Salazar, Ricardo D. 2010. "A Social Capital Framework for the Study of Institutional Agents and Their Role in the Empowerment of Low-status Students and Youth." *Youth & Society* 43(3):1066–1109.
- Stevens, Mitchell L. 2007. *Creating a Class: College Admissions and the Education of Elites*. Cambridge, MA: Harvard University Press.
- Stiglitz, Joseph E. 2015. *The Great Divide: Unequal Societies and What We Can Do about Them*. New York: W. W. Norton & Company.
- Stoilova, Mariya, Rishita Nandagiri, and Sonia Livingstone. 2019. "Children's Understanding of Personal Data and Privacy Online—a Systematic Evidence Mapping." *Information, Communication & Society*. doi: 10.1080/1369118X.2019.1657164
- Strom, Robert D. and Shirley K. Strom. 1995. "Intergenerational Learning: Grandparents in the Schools." *Educational Gerontology: An International Quarterly* 21:321–35.
- Tapscott, Don. 2008. *Grown Up Digital: How the Net Generation Is Changing Your World*. New York: McGraw-Hill.
- Terenzini, Patrick T., Laura I. Rendon, M. Lee Upcraft, Susan B. Millar, Kevin W. Allison, Patricia L. Gregg, and Romero Jalomo. 1994. "The Transition to College: Diverse Students, Diverse Stories." *Research in Higher Education* 35(1):57–73.
- Thomas, Douglas and John Seely Brown. 2011. *A New Culture of Learning: Cultivating the Imagination for a World of Constant Change*. CreateSpace Independent Publishing Platform.
- Tilly, Charles. 1999. *Durable Inequality*. Berkeley and Los Angeles: University of California Press.
- Tinto, Vincent. 1993. *Leaving College: Rethinking the Causes and Cures of Student Attrition*. 2nd ed. Chicago, IL: University of Chicago Press.

- Turkle, Sherry. 2011. *Alone Together: Why We Expect More from Technology and Less from Each Other*. New York: Basic Books.
- Twenge, Jean. 2017. *iGen: Why Today's Super-connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy—and Completely Unprepared for Adulthood—and What That Means for the Rest of Us*. New York: Atria Books.
- United States Department of Agriculture. 2018. *Rural America at a Glance: 2018 Edition*. Washington, DC: U.S. Department of Agriculture.
- Van Dam, Levi, D. Smit, B. Wildschut, Susan Branje, Jean E. Rhodes, Mark Assink, and G. J. J. M. Stams. 2018. "Does Natural Mentoring Matter? A Multilevel Meta-Analysis on the Association Between Natural Mentoring and Youth Outcomes." *American Journal of Community Psychology* 62(1–2):203–20.
- van den Akker, Jan. 1999. "Principles and Methods of Development Research." Pp. 1–14 in *Design Approaches and Tools in Education and Training*, edited by J. van den Akker, R. M. Branch, K. Gustafson, N. Nieveen, and T. Plomp. Dordrecht, the Netherlands: Springer Press.
- Van Horne, Katie, Josie Chang-Order, Daniela DiGiacomo, and Erica Van Steenis. 2016. "Examining Brokering for Future Learning Opportunities over Time." Paper presented at the Annual Meeting of the American Educational Research Association (AERA), April 8–12, Washington, DC.
- Vossoughi, Shirin and Kris D. Gutiérrez. 2014. "Studying Movement, Hybridity, and Change: Toward a Multi-sited Sensibility for Research on Learning across Contexts and Borders." *National Society for the Study of Education* 113(2):603–32.
- Vygotsky, Lev S. 1978. "Interaction between Learning and Development." Pp. 79–91 in *Mind and Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, S. Scribner, and E. Souberman. Cambridge, MA: Harvard University Press.
- Wagner, Tony. 2012. *Creating Innovators: The Making of Young People Who Will Change the World*. New York: Scribner.
- Wang, Feng and Michael J. Hannafin. 2005. "Design-based Research and Technology-enhanced Learning Environments." *Educational Technology Research and Development* 53(4):5–23.
- Warschauer, Mark. 2008. "Laptops and Literacy: A Multi-site Case Study." *Pedagogies: An International Journal* 3(1):52–67.
- Watkins, S. Craig. 2019. *Don't Knock the Hustle: Young Creatives, Tech Ingenuity, and the Making of a New Innovation Economy*. Boston, MA: Beacon Press.

REFERENCES

- Watkins, S. Craig, Andres Lombana-Bermudez, Alexander Cho, Vivian Shaw, Jacqueline Ryan Vickery, and Lauren Weinzimmer. 2018. *The Digital Edge: How Black and Latino Youth Navigate Digital Inequality*. New York: NYU Press.
- Watts, Roderick, Ben Kirshner, Rashida Govan, and Jesica Siham Fernández. 2018. *Powerful Youth, Powerful Communities: An International Study of Youth Organizing*. New York: The Atlantic Philanthropies; Los Angeles, CA: The California Endowment; Brooklyn, NY: The Hazen Foundation; New York: The Cricket Island Foundation.
- Weaver, Andrew. 2017. "The Myth of the Skills Gap." *MIT Technology Review*, August 25. Retrieved November 15, 2019 (<https://www.technologyreview.com/s/608707/the-myth-of-the-skills-gap/>).
- Weininger, Elliot B., Annette Lareau, and Dalton Conley. 2015. "What Money Doesn't Buy: Class Resources and Children's Participation in Organized Extracurricular Activities." *Social Forces* 94(2):479–503.
- Weisner, Thomas S. 2002. "Ecocultural Understanding of Children's Developmental Pathways." *Human Development* 45(4): 275–81.
- Widman, Sari, Josephina Chang-Order, William R. Penuel, and Amanda Wortman. 2019. "Using Evaluation Tools toward More Equitable Youth Engagement in Libraries: Measuring Connected Learning and Beyond." *YALS* 17(4):36–44.
- Wilkinson, Richard and Katie Pickett. 2010. *The Spirit Level: Why Equality Is Better for Everyone*. London, UK: Penguin Press.
- Wilson, Mark. 2005. *Constructing Measures: An Item Response Modeling Approach*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Yosso, Tara J. 2005. "Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth." *Race Ethnicity and Education* 8(1): 69–91.
- Zuckerman, Ethan. 2014. *Digital Cosmopolitans: Why We Think the Internet Connects Us, Why It Doesn't, and How to Rewire It*. New York: Norton.

APPENDIX

PROJECTS OF THE CONNECTED LEARNING RESEARCH NETWORK



The Affinity Project

PI: Jean Rhodes

The Affinity Project investigated mentoring and intergenerational supports within the connected learning framework through a number of research projects. The Understanding and Improving Adult-Youth Matches project explored the extent to which intergenerational relationships can be improved through more careful matching and, working with researchers at Harvard Business School, developing and testing an algorithm to improve adult-youth match closeness, longevity, and outcomes. The Veteran's History Project (VHP), in partnership with the National Mentoring Partnership, WGBH, and members of MacArthur's Digital Youth Network, served the purpose of creating a national VHP mentoring program. A pilot of the program with a small group of youth aged 15–17 led to the development of a website with a strong youth footprint that provides access to PBS documentary footage through American Experience and other archives. In addition, a mobile application was created for young people to interview the veterans in their families and lives, with the ability to immediately submit the video to the Library of Congress. Last, the Affinity Project developed the Connected Scholars program, which teaches first-generation students to recruit mentors. Connected Scholars was launched and evaluated at UMass Boston, leading to a major grant from the WT Grant Foundation to conduct a multiyear experimental evaluation with hundreds of students.

Children's Non-School Activities and Cognitive Outcomes: A Natural Experiment Approach

PI: Dalton Conley

Dalton Conley's research project examined broad social indicators in relation to connected learning, families, and equity, including related policy implications. The project involved research on two nationally representative data sets: (1) analysis of the relation between school, family dynamic, technology use, and connected learning in the Panel Study of Income Dynamics, Child Development Supplement (PSID-CDS) and (2) analysis of the role of school-based, voluntary interest activities in shaping adolescent social networks and connected learning using the National Longitudinal Study of Adolescent Health (Add Health).

The Class

PIs: Sonia Livingstone and Julian Sefton-Green

The Class was an ethnographic exploration of a class of 13- to 14-year-olds attending a fairly typical London comprehensive school over the course of the school year 2011–2012.

The purpose was to examine how the ideals and practices of connected learning enter the everyday experiences of ordinary children. The project, and the subsequent book, is subtitled “living and learning in the digital age” because many out-of-school social experiences and youthful forms of knowledge are now developed within and expressed through the use of a complex and changing array of media and information technologies. But although the digital attracts huge public attention, it is only one of many interlinked strands of change that mark out differences between today’s childhood and that of their parents and teachers. These other changes—in the social, economic, and cultural structures shaping children’s lives and prospects—are also important, sometimes enabling but often constraining young people’s educational, social, and digital opportunities.

Connected Consumption

PI: Juliet Schor

The research on connected consumption, education, and makerspaces was devoted to understanding how processes of learning are changing, how the new platforms are affecting daily life, and how processes of social inequality are being reproduced and undermined in these new platforms and spaces. In addition, these platforms and spaces are opening up new types of economic opportunity, via the exchange of skills, ideas, new products, or owned assets. The Connected Consumption project included ethnographic case studies of a makerspace, market exchange platforms, such as TaskRabbit and RelayRides, Airbnb, and Uber and Lyft. We studied one of the first producer-owned online cooperatives, Stocksy United. We also extended our case study of open-education learners with longitudinal data. In addition, a quantitative case study looking at Airbnb trades was included to address generalizability of the results of the project and to study racial differences in outcomes.

Connected Parenting

PI: Mizuko Ito

The Connected Parenting study sought out lower-income black and Latinx families in Southern California who were effectively supporting their children’s tech interests in order to learn from their parenting practices. Even without a high degree of their own tech expertise or resources for expensive tech enrichment, these parents were finding ways to sponsor their children’s tech interests. Even light touchpoints at which a child sees a parent playing a game or taking digital photos can have a lasting influence. Sharing digital authority, when a child has more digital expertise than the parent, cultivated a climate of trust and youth empowerment that supported budding interests and expertise. Finally, the study identified “sandboxing” as a parental practice in which parents or other caring adults construct a space or provide an opportunity for children to learn playfully, guided by the child’s interests and with low consequences for failure.

The Connecting Youth: Digital Learning Research Project

PI: Richard Arum

The Connecting Youth project was a longitudinal, multimethod study of the youth, educators, and organizations involved in afterschool and summer programs, YOUmedia drop-in sites, Learning Labs, and two schools as part of a growing set of innovations designed to educate youth for the 21st century. The project's team of 20-plus researchers hailed from universities across the country and brought diverse disciplinary lenses such as sociology, education, information and technology studies, and psychology to bear on the research questions. The purpose of this research was to document activities and outcomes associated with these programs, use the findings to provide ongoing feedback to these implementing organizations for formative program improvement, and to publish scholarship to improve academic and public understanding of the potential role of digital media in supporting youth development and educational outcomes.

The Digital Edge

PI: S. Craig Watkins

The Digital Edge explored how black and Latino youth navigate social, economic, and educational inequality. More specifically, the project explored how notions of the digital divide are evolving as the result of the wider diffusion of the internet in homes and schools and via smartphones. Interdisciplinary in its scope, the project team drew from a range of perspectives including digital media studies, the sociology of education, theories of social and cultural capital, learning sciences, gender studies, popular culture, race and ethnic studies, demography, design, and youth and cultural studies. The Digital Edge carefully documented some of the emergent challenges for creating a more equitable digital and educational future. Focusing on the complex interactions between race, class, gender, geography, and social inequality, the team explored the educational perils and possibilities of the expansion of digital media into the lives and learning environments of youth of color. Ultimately, the project addressed how schools can support the ability of students to develop the social, technological, and human capital required to navigate 21st-century life.

The Last Mile

PIs: Julian Sefton-Green, S. Craig Watkins, Ben Kirshner

The Last Mile study explored how both formal and informal education initiatives and training systems in the United States, UK, and Australia try to achieve a socially diverse and varied creative workforce. It offers a series of original detailed case studies describing how young people show initiative and ingenuity as they navigate entry into work in the film, games-production, music, and visual arts fields.

Leveling Up

PIs: Mizuko Ito and Katie Salen Tekinbaş

Varying from boyband One Direction fanfiction writers to gamers who solve math problems together to Harry Potter fans who knit, the Leveling Up project draws on seven in-depth case studies of online affinity networks that expand learning and opportunity for young people. A rare example of collaborative research and analysis among a dozen online ethnographers, the Leveling Up project delved into both shared characteristics and unique cultures and practices of different online affinity networks. By offering an engaging and accessible view into the positive learning dimensions of online youth culture, the Leveling Up project explores how educators and parents might support more young people to take advantage of online affinity network groups to fuel learning, engagement, and achievement.

Leveraging Horizontal Expertise

PI: Kris Gutiérrez

The Leveraging Horizontal Expertise project examined how the social organization of activity settings, forms of mediation, and tool use can be employed to leverage both horizontal (everyday) and vertical (scientific or school-based) kinds of expertise in children and young adults. Special attention was paid to how children leverage new tools, practices, and knowledge across different learning environments, and in particular, how children leverage the expertise acquired in the afterschool setting, El Pueblo Mágico, into home practices. Designed to meet the learning needs of students from nondominant communities in the United States, El Pueblo Mágico aims to mediate the effects of unequal schooling environments.

Longitudinal Survey of Connected Learning and Youth Participatory Action Research

PIs: William Penuel, Vera Michalchik, and Ben Kirshner

The Longitudinal Survey of Connected Learning was a survey-based research study that examined children's participation in connected learning environments in late elementary and middle school and the relationship of participation to valued outcomes. These outcomes include interest development, persistence in learning, civic participation, and development of a positive sense of the future. The CU Boulder team developed and piloted the survey at different research sites and oversaw data collection and analysis of results. A unique feature of the project's methodology was reliance on a team of youth ethnographers as co-researchers on the project, using the youth participatory action research (YPAR) framework. The youth ethnographers used GIS tools and other digital media to map connected learning opportunities for children and youth in their community and helped the survey team refine items related to participation in connected learning environments.

Preparing for a Digital Future

PIs: Sonia Livingstone and Julian Sefton-Green

The Preparing for a Digital Future project involved a series of qualitative case studies investigating how children and young people, along with their parents, carers, mentors, and educators imagine and prepare for their personal and work futures in a digital age. This research built on findings from *The Class*, an ethnographic study that examined the emerging mix of on- and offline experiences in teens' daily learning lives.

Parenting for a Digital Future

Sonia Livingstone and Alicia Blum-Ross conducted in-depth interviews with British parents, educators, and children, together with observational research with families and in out-of-school digital media-learning sites and a nationally representative survey of more than 2,000 parents. The aim was to include parents' voices and experiences in research and practice concerned with young people's learning in a digital age, thereby recognizing their investments and concerns as they variously strive to prepare their children for an uncertain "digital future." The qualitative research especially focused on the everyday imaginaries and future practices of parents who, for a range of reasons, have embraced digital technologies: Some are self-proclaimed geeks, some are parent bloggers, some seek a solution to the difficulties faced by their child with special educational needs. These families were contrasted with those who balance or even resist digital technologies to identify commonalities and differentiation in approaches to parenting for a digital future.

Preparing for Creative Labor

Preparing for Creative Labor was part of a collaboration with Craig Watkins and Ben Kirshner investigating how both formal and informal education initiatives and training systems in the UK and United States try to achieve a socially diverse and varied creative workforce. It conducted a series of original detailed case studies describing how young people show initiative and ingenuity as they navigate entry into work in the film, games-production, music, and visual arts fields. The research considered how young people enter into work in creative and cultural sectors where traditionally high-status and difficult-to-enter occupations have been fundamentally restructured because of the disruptive effects of digital technologies. The research builds on both *The Class* and *The Digital Edge* projects examining how different forms of connective learning might support young people's entry into the workforce.

