“He saw I had a loving for it”: Youth Interest Signaling as a Means of Generating Social Support in Technology Pathways

Prepared by

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As a 10th grader in Jamaica, Anthony loved software and hardware design, interests that began when his aunt in the United States sent him an iPod for his 13th birthday. Because he wanted to play “the good games” without paying for them, he learned how to “jailbreak” his iPod so he could bypass any software installation restrictions. His family and friends came to see him as “a computer whiz,” a label Anthony lived up to by tinkering with discarded hardware and distributing CDs with the latest operating system software to his friends, sometimes selling these CDs to earn some pocket money. He also had a close circle of friends who shared his interests; they would often trade technology news and share their latest accomplishments.

One day at school, Anthony overheard some older students declare that it was impossible to break into their school’s firewall system, and he found the implied challenge too irresistible to ignore. After reading articles and posts from online discussion forums, Anthony eventually found a vulnerability in the school’s system and was able to get past the security system (though not without getting caught in the process). He was subsequently banned from the computer lab, but the information technology (IT) coach at his school interpreted this as a signal of Anthony’s interest in technology — “He saw I had a loving for it,” as Anthony put it — and recommended him for a new technology club that was opening up at the school.

Anthony shared that story with us to show how his IT coach, as he put it, “put him on the right path” regarding his technology interests. In this report, we want to highlight how, in addition to the importance of noticing that his coach had displayed, Anthony himself played a key role in contributing to his own pathway-building support and opening up of opportunities through signals he conveyed to those around him. To highlight the youth-driven side of such opportunity-garnering, we apply the concept of youth interest signaling, which we define as actions youth undertake to communicate their needs in ways that motivate adults and peers to mobilize resources to support them. In afterschool digital media-making programs we observed and in interviews we conducted with focal youth, program staff, and other support providers at school and home over a two-year period, we gathered evidence of a range of youth actions that brought them support. These included sharing accomplishments, reaching out for guidance, openly displaying expertise, and networking.

The study offered here was undertaken in the context of Hive Research Lab, a research-practice partnership project between the authors, researchers at Indiana University and New York University, ...
and the stewards and members of the Mozilla Hive NYC Learning Network (Hive NYC), a city-based collective of youth-serving organizations that includes library systems, cultural institutions, and community-based organizations. Member organizations of Hive NYC collaboratively develop innovative out-of-school programs in which young people use digital and online tools to develop 21st-century literacies and empowered civic identities.

Supporting the interest-driven learning and identity-building trajectories of all youth\(^2\) (Ching, Santo, Hoadley, & Peppler, 2014) as well as ways to design robust and responsive learning ecologies within cities that support such trajectories (Santo, Peppler, Ching, & Hoadley, 2015; Santo, Ching, Hoadley, & Peppler, 2016; Santo, Ching, Peppler, & Hoadley, 2017) have been two long-standing goals of this partnership. A key driver of our work was to understand when and in what contexts youth perceived receiving support from providers, and what they saw as opportunities and barriers to persist in their interests. Our work revealed two broad types of signaling:

- **Open-ended displays of interest** performed without a provider target in mind and without necessarily intending to generate support; and
- **Direct bids for help** aimed at a specific provider with the specific goal of generating support.

Both types of interest signaling led to the accumulation of diverse resources contributing to youth learning pathways, whether that be equipment to support an interest, skill-building help, or a recommendation letter for an internship or college application. However, each form had distinct affordances. Direct interest signaling had a dimension of reliability in terms of providing just-in-time instances of support that youth recognized and valued. Open-ended interest signaling, by contrast, had the potential benefit of recruiting support from sources not previously identified by a young person, as well as support that they might not have imagined they needed or even seen as possible. We also distinguished different ways in which engaging in these types of interest signaling posed a challenge for young people. Direct interest signaling, because it is more intentional and involves targeting specific people, could produce feelings of anxiety and fears of rejection. Open-ended interest signaling, when it involved posting artifacts online, also required youth to contend with feelings of apprehension associated with public feedback.

Also, while prior scholarship indicates that an individual’s history of interactions with others can affect their help-seeking behavior, as can modeling by parents or others, our analysis suggests a developmental component to one’s orientation around support solicitation. Through our longitudinal case studies, we found that youth who were more tentative around interest signaling could become more confident signalers as they gained experience in the domain of interest around which they wanted support. We reason that as a young person develops a deeper commitment to an area of interest and also develops a more robust set of skills around it, their motivations to develop social and cultural capital in that area — and thus engagement in signaling practices that support such capital-building — may also increase.

Finally, we discuss the important issue of how providers receive and interpret these interest signals from youth and their personal and institutional logics concerning whether and how to respond. Understanding these motivations and interrogating possible unintended consequences that flow from these motivations may help to inform conversations around how to continue promoting equitable access to opportunity.

We close with recommendations geared primarily toward educators and other youth development...
staff who may be interested in helping young people develop the confidence around and facility with youth signaling, or who wish to promote more opportunities for youth to engage in support-generating signaling. We suggest that educators and organizational staff:

1. Provide “youth interest signaling” support as part of out-of-school programming.
2. Incorporate ways to extend interactions between youth and providers after a program is over.
3. Provide youth with artifact-creation and sharing activities as a way to promote interest signaling.
4. Consider the individual and cultural barriers preventing youth from fully engaging in interest signaling opportunities and how those barriers might be addressed.
5. Use youth interest signaling to drive their organization’s educator professional development and programmatic offerings.

Overall, we hope this report provides valued insights into how we may continue to interrogate and improve ways to be responsive and attuned to the needs of the young people we serve.

Clarence Johnson⁵, 18 years old and a self-described “Renaissance Teenager,” largely credits his love of physical computing and creative coding to his mentor Hannah, an experienced game designer and media artist whom he met a few years ago when he was volunteering at an event organized by a local indie video game and art collective. As he recalled,

Someone frantically came into [the volunteer area] and was like, “Does anyone know how to solder?” And I was like, “Yeah I know how to solder,” and they were like, “Come with me.” So we went to a separate room, and they were like, “You’re going to work with Hannah.” [Interview, October 10, 2013]

He and Hannah became friendly after that and kept in touch through Facebook and by email. One day, Hannah posted an invitation on Facebook to a game-design and fashion-technology weekend workshop she was piloting. Clarence saw her post and immediately signed up, thinking, “What, hang out with Hannah? Let’s do it!” During the workshop, he was introduced to the programming language Processing and the use of e-textiles, fabric materials that are designed to be combined with electronic components. Clarence had stopped coding a few years previously because he felt burnt out by the tediousness of the websites he had been building, but, in this program, he felt his interest in coding coming back to life. Clarence and his partner made a “tickling game” in which one player activated touch sensors on the second player’s body. It was his

⁵Clarence chose this pseudonym to pay homage to an accomplished aeronautical engineer.
first foray into using code as a form of personal expression that went beyond creating custom websites, and he was hooked. As Clarence put it, “At one point, me and my co-creator were just on the floor [poking] the other person...since then I have been in love with Processing.”

Clarence’s story of how his interest in creative coding was sparked and then fortified by subsequent experiences illustrates the crucial role that others play in supporting learning and identity development. His interactions with Hannah were essential to the deepening of his creative coding skills and the development of his identity as a digital media artist. Clarence secured opportunities for learning and growth — which ranged from instruction in Processing to being recommended for other opportunities to creating coding projects — through the social support he received.

This story also highlights the crucial interactions that took place for Clarence to garner support. Clarence took deliberate steps to find those that could help him “geek out” (Ito, et al., 2009) around his emergent interest: He attended events where creative coders and digital artists might be, he offered to help with tasks like soldering, and he took the initiative to impress the people around him. Clarence sent signals conveying important clues about his interests, needs, and expertise, and Hannah and other support providers responded to these signals with opportunities and support that they felt would be a good match for him. He was, as we will expand upon later, a motivated and confident signaler, due in large part to his strong practice-linked identity as a creative coder, his understanding of the effectiveness of actively reaching out, and his comfort and understanding of the intricacies of various signaling strategies.

In this report, we focus on the concept of youth “interest signaling” as one mechanism through which youth may build pathways of learning and identity-building. We define interest signaling as actions youth undertake to communicate their needs in ways that motivate adults and peers to mobilize resources to support them. Examples of interest signaling include sharing accomplishments, reaching out for help, openly displaying expertise, and networking or relationship-building. We drew on ethnographic case studies of youth engaging in digital media-making activities such as filmmaking, creative coding, and game design to analyze these support-generating signaling actions and how they activated support from various individuals in their lives. Interest signaling is useful to consider not only in better understanding how youth act to further their own learning interests, but in how adults and other learning partners can better support youth as they signal what they are interested in and what they need.

While reports of the importance of youth interest signaling are not new, our data make a distinction between open-ended signaling — displays of interest performed without a particular individual in mind and without necessarily intending to generate support — and direct signaling — bids for support aimed at a specific provider. We explain how each type of signaling bears different considerations in terms of a young person’s proclivity to engage in them as well as the types of opportunities they represent as support-mobilizing mechanisms. For example, direct signaling, while a straightforward way for a young person to voice their needs, often required a trusting relationship between youth and potential providers or an institutional context in which a young person felt that it was acceptable to reach out for help, as well as some sense that the desired resources were likely to be available through that provider. We also found that focusing on strengthening a young person’s identity and understanding around a particular practice may change that person’s orientation towards interest

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4While providers can be anyone in a young person’s life, including family members, individuals at school or out-of-school programs, and fellow peers, for this analysis we spoke to adults who had formal ties to out-of-school programs offered by organizations in the Hive NYC Learning Network that our focal youth attended. Generally speaking, this included adults who were responsible for the logistics and planning of the program and those who were hired or tapped to teach the content and provide mentorships.
signaling; they may become more motivated to engage in both types of signaling practices. A young person’s comfort with and know-how around interest signaling may be a promising area to further examine and consider ways to support.

Attending to how providers perceive and act upon youth signals is another important part of support provision. Providers may have particular notions that motivate when and how they respond to support requests. These bear examining more closely in order to consider how we may notice and respond in ways that support all young people to pursue productive pathways around technology-linked interests, as well as any unintended barriers to getting youth the support they need.

Youth interest signaling is an essential mechanism for youth to develop learning and mentorship ecologies that support them over the long term. Figuring out how to help all young people to do so, not just those with ‘natural’ inclinations or assertive messaging to build cultural capital, is a critical issue in creating equitable opportunities for learning. We hope that these findings will inform a wider dialogue about designing interventions and environments that can help all young people obtain support from afterschool program facilitators, mentors, teaching artists, and other individuals in their lives.

**Youth interest signaling and promoting equitable pathways of digital media making**

Effective youth development requires supportive relationships with adults who can recognize a young person’s interests and strengths and use that information to guide them into meaningful endeavors, particularly those related to long-term learning pathways (Barron, Gomez, Pinkard, & Martin, 2014; Barron, Martin, Takeuchi, & Fithian, 2009; Nacu, Martin, Pinkard, & Gray, 2014). The promise of having a deep relationship with someone who “knows you” has been the basis of initiatives like Big Brothers Big Sisters, whereby youth are ‘matched’ with adults who volunteer to provide that kind of support. However, given the mixed results from such one-on-one formal mentoring initiatives (Grossman & Tierney, 1998; Herrera, Grossman, Kauh, Feldman, & McMaken, 2007), some researchers have more recently started to examine how mentor-like relationships may develop more organically.

Our focus on youth interest signaling highlights the importance of youth agency as an important component of relationship building. For example, Spencer and Rhodes (2014) have argued that youth-initiated mentoring relationships may be more enduring and supportive in nature, compared with adult-youth relationships that form through other mechanisms. Barron, Mertl, and Martin (2014) in their study of the Digital Youth Network (DYN) initiative, an afterschool learning environment for students in Chicago’s South Side that was designed to promote digital media-making identities, described the importance of youth signaling to recruit technical support or feedback on their projects, classifying youth signaling as one of three “self-sustaining practices and processes” that are important for youth to contribute to their own learning and identity-building.

Designing impactful learning environments requires attending to not just the availability of support but whether or not young people access it. Our prior findings indicate that youth in the same program reported receiving different types of social support, differences that could be consequential in terms of whether or not they were able to continue with their interests (Ching, et al., 2014, 2015). Similarly, Barron and colleagues also point out that differences in how visible youth were in promoting their work and asking for help were consequential in terms of the support they received from DYN educators, writing:

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*The program leaders also developed a custom online environment and enacted professional development activities as part of the model (Barron, Gomez, Pinkard, & Martin, 2014).*

*The other processes are “creating personal projects and pursuits outside DYN, alone or with others” and “sharing expertise with family and community, by invitation or self-initiated” (p. 169).*
Learners who more actively demonstrated their interests and intentions to learn positioned themselves to recruit support in the form of advice and other resources. In turn, adults’ perceptions of DYN participants were shaped by the frequency or absence of these gestures for recognition, attention, and support (Barron, Gomez, Pinkard, & Martin, 2014, p. 169).

This observation that support was differentially given based on learners’ and educators’ actions and perception leaves open the need to understand this phenomenon more fully.

Given that sharing or reaching out to others is an important ingredient in generating support, it is necessary to understand what might drive the differences in why certain youth reach out while others do not. One documented difference in signaling for support is related to socioeconomic status. For example, educational sociologist Jessica Calarco (2011) reported on differences in help-seeking patterns among classroom students from middle-class and working-class families, noting that while middle-class children would take more proactive steps to get a teacher’s attention — sometimes ignoring a teacher’s exasperated plea to figure something out on their own — children from working class families tended to be more tentative with their help seeking, would not challenge teacher’s directive to stop seeking help, and would wait for moments when the teacher seemed available and not attending to something else. Due to these two distinct help-seeking patterns, Calarco showed that middle-class children had a greater percentage of their questions answered compared to their working class peers — a small difference in one classroom session that could mean significant differences over time. It is reasonable to expect that this phenomenon may not be limited to formal classroom settings.

A concept that pertains to issues of proactive support-seeking and possibly artifact-sharing is an individual’s network orientation, a concept that was first introduced in social anthropology (Barnes, 1972; Boissevain, 1974) and later used in community psychology and sociology studies (Vaux, Burda, & Stewart, 1986; Wallace & Vaux, 1993). An individual’s network orientation refers to their ability and inclination to resolve personal, academic, and family problems through the mobilization of relationships within their social web. Help-seeking orientation combines the interrelated issues of social support (i.e., what’s available) and help seeking (i.e., whether or not one seeks it out). In this way, a help-seeking orientation is “an important mediating link between the systemic forces of class, race, and gender and young people’s life chances (Stanton-Salazar, Chavez & Tai, 2001, p. 50). Such concepts have been shown to be consequential to network development in that people who exhibit a more positive help-seeking orientation tend to report larger networks (Vaux, Burda, & Stewart, 1986). Another study reported that such individuals are also more likely to feel socially connected and cared for, more likely to actively cultivate supportive ties with significant others, and less likely to experience psychological distress (Vaux & Wood, 1987).

Although influenced by social status and network orientation, help seeking and signaling are not immutable, but contingent on context. While these lines of research seem to converge on the prospect that a history of observing or experiencing negative interactions can diminish a person’s desire to reach out to others for help, Barron et al. (2014) have reported that youth habits can change based on, for example, increased identity alignment or skill improvement leading to more accomplished-looking artifacts that a youth might feel more proud to share.

It is also important to note how a potential support provider’s norms and expectations around support provision may also influence the effectiveness of youth signaling when it comes to garnering support.
Barron and colleagues (2014) reported that regular attendance and participation in activities and otherwise showing a “commitment to learning” were often the kinds of signals that mentors noticed and perhaps even looked out for. Similarly, in her classroom study, Calarco (2011) concluded that teachers tended to respond to proactive requests and that, because of this, “middle-class children’s help-seeking propensities and strategies became a form of cultural capital that, when used in the classroom, yielded meaningful situational advantages” (p. 865). For support provision to occur, one needs to rely on shared social understandings or culture between support receiver and provider. This relates to the prospect of cultural capital, which, building off of Bourdieu’s concepts, Lareau and Weininger (2003) define as “micro-interactional processes whereby individuals’ strategic use of knowledge, skills, and competence comes into contact with institutional standards of evaluation. These specialized skills are transmissible across generations, are subject to monopoly, and may yield advantages or ‘profits.’” (p. 569). Stanton-Salazar (2011) also alludes to more macro-level differences in teacher provision of support, describing effective procurement of support as “…an outcome of various successful communications and exchanges between student and teacher — that is, of a successful relationship.” This is achieved when a student “effectively exhibits ‘ability’ and academic potential through society’s dominant and high-status discourse” (p. 1085), which, again, relates to a young person’s ability to mobilize valued cultural capital in that setting.

These insights connect to the need for educators to reflect on their natural reactions and also to be given the opportunity to change their practice. This report on youth interest-signaling practices draws a distinction between two forms of interest signaling and describing how they differ in terms of affordances for garnering support as well as challenges youth have in terms of enacting it. We also expand on the notion of how learners ‘earn’ support from providers and underscore how youth orientations toward signaling are malleable and can improve through specific strategies. Previous studies that examine how supportive environments may lead to certain outcomes have relegated youth to being passive recipients of aid, and have not sufficiently captured how personal agency is involved in the generation and acquisition of assistance (Dika & Singh, 2001). Finally, we highlight some of the motivations the providers we talked to had around providing support as a way to contribute to more discussions regarding how we can serve the youth in our contexts in ever more equitable ways.

In our report we aim to inform the actions of educators and support providers by better understanding what youth do in terms of signaling their interests and need for support, and how the provision of support can shape the types of help youth ask for. We do not assume that learner characteristics (e.g., socioeconomic status) or program design fully determine learners’ signaling and help-seeking orientation, but rather look at the interplay between youth interests, social learning ecologies, and the context of signaling.
Methodology

This study employed an ethnographic and case study approach to investigate signaling practices and the contexts in which youth interest signaling led to support (or not). We were interested in creating a clearer taxonomy of the types of signaling; how youth in our study might differ in their orientation toward signaling, and also how providers responded to signaling in ways that were consequential to support giving. Eight young people, all either in or recently graduated from high school, were interviewed periodically for 6–23 months to develop cases studies of their interest-driven learning (Edelson & Joseph, 2001) and practice-linked identity development (Nasir & Hand, 2008) connected to digital media making. Basic demographic information is provided for each youth participant in Table 1, and Table 2 groups the youth and providers connected to each program. Table 4 in Appendix B includes additional descriptions of each youth participant.

Because we wanted to focus on how youth managed their learning with and through the help of others, we recruited from programs offered by organizational members of the Hive NYC network, which afforded us contexts in which youth interacted with potential providers such as teaching artists and facilitators, as well as other peers in the program (see Appendix B for a description of the recruitment sites). We selected “information-rich” cases of practice-linked identity and interest development that we thought would be fruitful for understanding young people’s practices of support generation. We recruited high school students who had been pursuing their interest in digital media making for at least one month.

Interviews with program providers and observations of programs in Hive member organizations were also included, as they helped us gain a better understanding of how providers responded to youth signals as well as the dynamics of signaling within the context of an after school program session. We centered our analysis on instances when youth and providers were co-located or interacting with each other. During a day’s formal activities, providers and youth had many opportunities to interact, when providers were presenting to a whole group, facilitating group discussions, and when they were helping youth individually. The period when youth and providers were settling in and waiting for the program to “officially” start also represented a significant time when youth and providers could mingle and chat in a more casual way. We also noted the “post-program routine” — for example, taking the elevator down to the building exit together and walking to the subway — as times when one-on-one conversations occurred.

After a program had formally ended and providers and youth were no longer meeting face-to-face regularly, the modes of connection shifted to more asynchronous forms of communication. For youth and providers who remained in contact, interactions occurred through Facebook and e-mail. Some youth continued face-to-face interactions with providers if there was another opportunity that brought them together, such as an internship. Some youth also dropped by a facilitator’s organization occasionally, affording an opportunity to catch up. Youth sometimes updated providers by calling them when something good happened in their lives — for example, when they were accepted into a college. Program facilitators also sometimes checked in with youth after the program had ended.

1While the case studies of all youth participants contributed to our analysis, in this report, we highlight the stories and include quotes from a subset.
2We include the pseudonyms of only the participants mentioned in this report. For a complete list of participants, see Ching (2016).
3“Hive program” refers to programs that are funded by a collaborative donor fund that is accessible to organizations considered lead organizations within the Hive NYC Learning Network, as well as organizations that partner with a lead organization. Programs must be free, based in New York City, and geared toward middle and high school-aged youth; they also typically involve some form of digital media making.
4Patton (1990) defines such cases as “those from which one can learn a great deal about issues of central importance to the purpose of the research” (p. 169).
5Recent reports have shown how social media may be used to support offline relationships, including relationships with mentors (see Schwartz, et al., 2014).
Providers who were still in touch with youth after a program was over said their insights into youths’ lives were more limited and they often relied on youth to reach out to them when they needed something or had an update. There were also rarer cases in which providers and youth were connected via Facebook or Instagram, a situation that allowed for more ambient awareness. For example, Sylvia, the executive director of an organization dedicated to the development of youth skateboarders, was connected to several hundred youth skateboarders on Facebook and mentioned that she used her feed to monitor their lives and to detect any problems they were facing. For the purposes of this report, we mainly focused on the support provision of program-affiliated adults, although we recognize the crucial support provided by other adults, such as family members and educators, as well as peers (see Ching, 2016).

Table 1. Demographic information about youth participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Gender</th>
<th>Self-described ethnicity</th>
<th>Interest</th>
<th>Study length (mos)</th>
<th>Educational attainment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthony</td>
<td>17</td>
<td>Male</td>
<td>“Jamaican”</td>
<td>Photography</td>
<td>23</td>
<td>10th grade</td>
</tr>
<tr>
<td>Cerebral</td>
<td>17</td>
<td>Male</td>
<td>“African American, Puerto Rican”</td>
<td>Game design</td>
<td>8</td>
<td>High school graduate (taking gap year)</td>
</tr>
<tr>
<td>Clarence</td>
<td>18</td>
<td>Male</td>
<td>“Southeast Asian”</td>
<td>Creative coding</td>
<td>17</td>
<td>High school graduate (taking gap year)</td>
</tr>
<tr>
<td>Freélyn</td>
<td>18</td>
<td>Female</td>
<td>“Hispanic”</td>
<td>Filmmaking, Graphic design</td>
<td>22.5</td>
<td>College freshman</td>
</tr>
<tr>
<td>Krissy</td>
<td>18</td>
<td>Female</td>
<td>“Hispanic, Dominican… mixed”</td>
<td>Filmmaking</td>
<td>6</td>
<td>College freshman</td>
</tr>
<tr>
<td>MCM</td>
<td>17</td>
<td>Female</td>
<td>“African”</td>
<td>Technology design</td>
<td>23</td>
<td>12th grade</td>
</tr>
<tr>
<td>Sapphire</td>
<td>15</td>
<td>Male</td>
<td>“Black”</td>
<td>Game design</td>
<td>14</td>
<td>10th grade</td>
</tr>
</tbody>
</table>

Table 2. Summary of focal youth and adults associated with each program

<table>
<thead>
<tr>
<th>Program</th>
<th>Brief Description</th>
<th>Focal Youth</th>
<th>Program-affiliated Adults</th>
</tr>
</thead>
</table>
| **Ollie 2.0** | Youth designed and developed technology-enhanced skateboarding games using Arduino microcontroller kits. “Video pros” documented the program. | • Freélyn  
• Sapphire  
• Domenico  
• Krissy  
• Clarence Johnson  
• Cerebral | • Ilana, program facilitator
• Sylvia, executive director and co-founder of Youth Skate Organization
• Duncan, teaching artist (game design)
• 3 teaching artists (physical computing, filmmaking) |

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12At one point, Sylvia and a Hive member organized a free law- and college-prep clinic after some youth reported on Facebook that they had had encounters with police.
13During our initial interview, we asked each participant to describe their ethnicity.
Design Brigade  
(fall–spring; year round)  
Youth designed and developed assisted-living tools to help users more easily engage in everyday activities such as eating and dressing. Youth are nominated to apply.  

- MGM  
- Josephine, program facilitator  
- Program facilitator  
- Multiple teaching artists (hired each year to serve as mentors for each youth project team)

City Stomps  
(fall 2013)  
Youth designed and developed a location-based game using archival library resources and TaleBlazer software.  

- Anthony  
- 2 program facilitators  
- Carlos, teaching artist (game design)

First Person Style  
(spring 2014)  
Youth designed and developed a Unity 3D game and custom game controllers, connecting the two using a FLORA microcontroller.  

- Sapphire  
- Clarence Johnson  
- 1 program facilitator  
- Hannah, teaching artist (game design, e-textiles)  
- Teaching artist (game design, programming)

Ollie 3.0  
(summer 2014)  
Youth skaters designed and developed a skateboarding game to be played at various local skate parks; the game used an HTML-based web application to keep score.  

- Freélun Sapphire Domenico  
- Krissy  
- Cerebral  
- Ilana, program facilitator  
- Sylvia, executive director and co-founder of Youth Skate Organization  
- Duncan, teaching artist (game design)  
- Teaching artist (programming, web development)

We generated and gathered a range of data, including recordings and transcripts of semi-structured interviews, field notes of program and interest engagement, document evidence, and youth artifacts. We focused on how youth articulated their needs related to their pursuit of an interest, the actions and interactions within and outside of the program that seemed to contribute to social support of that interest, and changes related to a young person’s interest, identity, and expertise. Data was analyzed holistically as well as used to develop biographic case studies (Barron, 2015; Merriam, 1998). Cross-case analyses were used to compare the activities and the array of support providers that each focal youth participant engaged in and had access to, respectively. We also examined the interactions between youth and providers, focusing on the strategies that youth engaged in to solicit support. Our analytic process comprised multiple, iterative stages, with each stage involving inductive and deductive coding followed by content summarization and analytic memo writing and refinement of research questions. Data displays such as Social Learning Ecology maps (see Figure 2, Appendix A) were used to facilitate sensemaking.
Findings

What does youth signaling entail? Open-ended and direct practices

Two distinct forms of signaling emerged from our interviews and observations (see Table 3). Open-ended signaling encompasses practices that serve to put a young person’s interest “on display.” This category of practices encompasses a wide range of actions, including showing interest (or disinterest) during a program session and posting digital media artifacts to social media sites or an online portfolio. Because of the open and public nature of the display, this set of practices could generate support from sources that may not have been predicted or pre-specified by the youth. Direct signaling speaks to practices aimed at a specific provider with the goal of garnering support. These are direct bids for support and include asking for support either in conversation or through online channels such as e-mail, texting, or chat.

Both types of signaling were apparent in Clarence’s story on p. 5. For example, Clarence’s offer to solder was an open display of his interest and aptitude in physical computing and circuitry, and it helped others steer him toward a technical activity that involved interacting with professional game designers. During that interaction, he was able to converse with and receive direction from game-design professionals, communicate interest-related information about himself, and display his competency to potential support providers. Indeed, it was through this interaction that he came to develop a mentoring relationship with Hannah, a development that led to other opportunities down the road. Clarence’s signaling also demonstrated loyalty and commitment to both the art collective and to Hannah — these were associated messages that helped to facilitate support provision, an issue we return to later in this report.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DEFINING FEATURES</th>
<th>EXAMPLES DRAWN FROM STUDY DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open displays of interest and needs</td>
<td>• Not directed at a specific provider target&lt;br&gt;• May be enacted for purposes other than support recruitment</td>
<td>• Examples drawn from study data&lt;br&gt;• Demonstrating facility with project tasks&lt;br&gt;• Demonstrating facility with an interest linked practice through use of terminology, equipment, etc.&lt;br&gt;• Being alert and responsive during teaching moments (lectures, demonstrations, facilitated exercises, etc.)&lt;br&gt;• Asking questions, attending most or all program sessions&lt;br&gt;• Lingering in the space after a session ends&lt;br&gt;• Posting a video of program activity to YouTube or other social media sites&lt;br&gt;• Updating an online portfolio site&lt;br&gt;• Attending networking events</td>
</tr>
<tr>
<td>Direct bids for support</td>
<td>• Directed at a specific provider or set of providers&lt;br&gt;• Enacted explicitly to recruit support</td>
<td>• Directly asking for help during a program&lt;br&gt;• Emailing questions to a provider&lt;br&gt;• Asking program staff for equipment or supplies&lt;br&gt;• Signing up for a program&lt;br&gt;• Sending a “cold call” to a potential provider (unsolicited email to someone with whom the youth did not have a prior relationship)</td>
</tr>
</tbody>
</table>
The sections below describe each type of signaling in more detail, including how youth engaged in these kinds of signaling both during a program and after the program was over.

**Open-ended signaling: Displays of interests and needs**

Open-ended signaling during program sessions was a key mechanism by which youth communicated information about their interests and needs to providers in their lives. Signaling we observed and heard about during interviews included the degree to which a young person seemed alert and responsive during group discussions, the kinds of questions they asked, their pattern of attendance, and if they tended to linger in the program space after each session ended. A young person might also display expertise in relation to various aspects of a digital media making practice through showing understanding of technical content, displaying familiarity with professional equipment, and using practice-related “technical” language.

While youth may have been engaging in such practices for purposes other than signaling for support, their actions contributed to the impressions that program-affiliated adults formed about the young person, impressions that could lead to different responses around support-giving. One, teaching artist, Duncan, who was brought on to teach the game-design component of the Ollie programs, mentioned that he considered program participant Freélyn to be significantly interested and committed to filmmaking because of her familiarity with equipment. Said Duncan:

> Freélyn understands how her camera works, right? She understands it in a pretty deep way, and she understands it because she has used that camera a lot, because that’s the only way you get that comfortable with things is by playing with them that way. So I’m like, “Okay, she’s serious,” because she clearly has put the time in. I can tell she’s put the time in, because she already has some of the expertise. [Interview, August 12, 2014]

This is an example of how a potential support provider might use their observations of a young person’s expertise with equipment in order to assess that person’s level of interest and skill. As a successful and well-known professional in the game design and media production community, Duncan is what sociologists might call a “high-status” individual with abundant cultural and social capital in the form of knowledge of the practice and connections to valued opportunities. Thus, his positive evaluation of Freélyn as a competent filmmaker could help her attain future learning or job opportunities. Duncan also mentioned Freélyn’s facility with academic or practice-related language as another indication of her interest, commitment, and skill level regarding filmmaking. He said:

> When you actually know how to do what you’re doing, you just have a different language about it and a different familiarity with it, and that’s usually what I’m looking for. I want to see somebody who knows how to speak the language of a game designer or the language of a programmer or the language of an artist. [Interview, August 12, 2014]

Duncan’s perspective provides an example of one way in which the words young people choose may signal information about themselves to others. While that connection is certainly not new (for example, see Gee, 2000), in this report, we highlight how practice-related language acts as a signal...
that support providers may respond to by offering specific kinds of help.

Such signaling outside or beyond the confines of a program differed from signaling during programs, because youth were no longer in regular contact with program-affiliated adults. For example, some young people sought out opportunities to socialize with members of a larger community of practice connected with their interest via meetups or other networking opportunities (see Clarence’s story on p. 5). Others posted digital-media artifacts and updates of their digital media making activities on social media and blogging sites such as Twitter and Tumblr. One mentioned updating her résumé on the professional networking website LinkedIn.

When youth engaged in displays of interests and needs, they did not necessarily have a particular provider or set of providers in mind. Anthony’s determination to break through his high school’s firewall was not done to convey his interest in and aptitude for computers and technology to his information technology coach (p. 1). Anthony had not asked his IT coach for the opportunity to join the computer club; in fact, he hadn’t even been aware that the club existed. He was simply acting on his desire to pursue a line of activity that was in part socially motivated by an older student. The IT coach observed Anthony’s behavior and acted upon that information by brokering an appropriate learning opportunity to him.

In this way, such open display practices may represent something of a “wide-net” approach that offered young people some important affordances in their efforts to recruit support. Open-ended signaling had the potential to reach providers outside of a young person’s immediate network; an important feature, especially when a young person does not recognize all the potential support providers or potential opportunities that might be available. For example, one youth participant, MCM, had an active online presence that attracted an organizer of a worldwide movement to end violence against women. The organizer contacted MCM via Twitter and asked her to contribute a post to the organization’s blog, an action that was both a learning opportunity and one that further signaled MCM’s interests and capabilities to a wider network of potential support providers.

Despite the potential affordances of open-ended signaling, there are limitations as well. The very open-ended nature of this form of signaling also means that its effectiveness at recruiting support relies on a young person’s ability to communicate in ways that are recognizable to a provider, as well as a provider’s ability to both notice such signals and have the wherewithal to help.

Direct-signaling practices: Bids for support

Youth in this study also engaged in practices with the explicit purpose of soliciting help from a specific support provider or set of providers. Like open-ended signaling, direct signaling occurred both during and outside program time. During program sessions, young people asked providers for various kinds of help, including accessing specific materials, sharing technical knowledge, making connections to other people, and proofreading applications for fellowships or college admission. They usually made these requests face-to-face, since programs put them in close contact with providers on a regular basis, but a few young people emailed or texted questions to teaching artists in between sessions.

Once a program was over, direct signaling still involved making bids for support. For example, after her program had ended, Freélyn asked the owner of a skateboarding team if she could be
the team’s videographer; she also asked the education director of a Hive member organization for access to the organization’s filmmaking equipment. Anthony sought knowledge-building support after his program was over by approaching professional photographers at a public park and asking for advice and tips.

Engaging in direct bids for support proved to be an effective way for young people to continue engaging in their interest, because it helped young people obtain the various types of support they needed. Making specific asks of other individuals was especially effective when timing was critical or when support would not have been provided otherwise. For example, Freélyn recounted a time when, as an intern for Sylvia, she asked if she could design the promotional materials for an upcoming skating event that Sylvia’s organization produced every year. Since Sylvia usually assigned those materials to another intern, it was critical that Freélyn asserted herself as she did in order to obtain this learning and professional opportunity. It’s less likely that an open-ended signaling practice such as posting graphic design work on an online portfolio would have produced the same outcome; Sylvia would have needed to come across Freélyn’s portfolio and also have had a need for someone else to take over this task. In this case, a direct bid for an opportunity proved to be a more effective strategy by which Freélyn activated support within her social learning ecology.

Overall, our data indicate that these two types of signaling are effective for different reasons. Open displays may be especially useful for garnering unexpected opportunities and when the opportunity landscape is unfamiliar to the young person. Direct bids for support, on the other hand, may be a more efficient way to obtain support because it involves being explicit about a request for help and is directed to a specific supporter or set of supporters. However, opportunities for direct signaling were directed by the kinds of relationships a young person had and what sort of social capital they perceived they had access to. In the next section, we attend to the different challenges around enactment that these two types of signaling presented.

Youth differences in enacting interest-signaling practices

Barron et al. confirmed in their survey of middle school students that they expressed different levels of comfort with interest signaling, indicating that they engaged in such practices with different frequency. The two vignettes below illustrate the kind of differing inclinations towards signaling we encountered in our data set. Clarence was more comfortable with reaching out and recognized specific ways in which he liked to signal. Krissy, on the other hand, expressed discomfort about posting her video online or making overtures to others. In this section, we discuss why youth may hold different perspectives and levels of comfort with signaling for support. We identify at least three factors related to a young person’s propensity to engage in interest-signaling: help-seeking orientation, knowledge of domain, and commitment to interest. A young person’s relationship with a provider seemed to drive whether or not a young person reached out with a direct bid for help.

Help-seeking orientation

A young person’s comfort with signaling suggests a relationship to their help-seeking orientation, which relates to an individual’s comfort with turning to others for support. Youth with a more ‘negative’ help-seeking orientation were more tentative about signaling. This manifested itself in being less inclined to engage in open-signaling practices such as sharing one’s works online, which
in turn indicated an apprehension around receiving negative criticism. Direct signaling in the form of asking providers for help was also avoided by youth with a negative help-seeking orientation. Explicit requests for help may have felt like a risky endeavor and to be avoided due to the possibility of rejection; in some cases, youth also felt that reaching out (for example, after a program was over) would be inappropriate.

The influence of a young person’s help-seeking orientation on their propensity to signal for support may have especially serious implications when a program has ended and youth and potential support providers no longer have an institutionally-supported reason to mingle. Providers recognized, and found it an unfortunate reality, that youth alumni who were most proactive about signaling were most likely to receive support. For example, Ilana, the program facilitator for the Ollie programs, said, “When someone comes [into the office] and asks me for something, I can give it to them, but I’m not always good at or able to look back and be like, ‘Oh, this other [person, who is] not asking for my attention right now needs my help.’” Duncan was also clearly interested in supporting youth in long-term ways. But in terms of maintaining relationships with youth after a program has ended, he said he needs to “leave that up to them.”
Clarence still remembers the time when he was five years old and in the parking lot of his sister’s school with his dad, getting a crash course on how computers worked. His dad, who had been invited to talk to his daughter’s fourth grade class about his job as a web designer, “thought it would be funny if [instead] a little baby was teaching all these kids.” Ever since then, said Clarence, “a part of me has always liked learning something, because I always thought it was funny learning things that only adults are supposed to learn, and then just schooling them as a little kid.”

This was the reputation that he sought to preserve through his signaling practices both in face-to-face interactions and online. Clarence’s description of his interactions while volunteering at the indie video-game event indicates his awareness that he probably garnered attention from others because he stood out as a young person who knew how to solder.

I’m just a friendly person, so I just talked to them; you get along. Obviously they were amazed that a seventeen-year-old knew how to solder and knew how to code and things like that, so they wanted to talk to you. [Interview, October 10, 2013]

He also favored a description of himself as a “Renaissance Teenager,” so much so that he decided to include that label on his business card even after he turned twenty. He admitted that he was reluctant to let go of that image, saying jokingly that “Renaissance Adult” just didn’t have the same cachet, recognizing the importance of self-positioning for garnering support. Clarence was aware of the fact that the people he encountered at social events and during job interviews might look him up online and evaluate him holistically based on what they found. Because of that, he said,

I get very precautious [sic] about what goes up and making sure it’s only representing my best self and that there aren’t any faults… If people use [my] site to understand what I do, I don’t want them to get the wrong picture. [Interview, December 19, 2013]

Clarence had multiple artifacts that he could choose to share online, and his primary concern in doing so was to select those that would convey the identity that he wanted to project to others.

Clarence was also comfortable with both open-ended and direct-signaling practices. Unlike some of the other young people we followed, Clarence reached out to various Hive-affiliated adults even after the Hive program he was involved in had ended. For example, when he saw that the education director at a nonprofit new media arts organization was offering a projection-mapping workshop geared toward adults, he emailed her to ask if he and his friend could attend at a discounted rate.

He also recognized networking as an important way to “create your own opportunities. If you’re lost for things to do, you can definitely build your own life per se, build your own curriculum for the next few months just by reaching out to people.” Clarence frequently attended events and lectures featuring people who worked at the intersection of arts and code. He said that he had developed good strategies for meeting people:

[I would] go to events and ask to clean. That’s how I do it every time. Then make connections after that, and then usually find some way I can work with them. When I start working with them and they see my skill, they’ll usually reference [sic] me to other people. [Interview, December 19, 2013]
Comparing the signaling practices of Clarence and Krissy, it is evident that youth with a certain degree of experience in their practice of interest were more confident and proactive about signaling. Clarence had a sense that he was likely to make a positive impression on most of the digital media professionals that he encountered, based on the juxtaposition of his level of expertise with his age. This was an impressive aspect of his identity that began when presented to his sister’s class when he was six years old and continued when his dad passed along some of his website design jobs when Clarence was in his early teens. The positive reception to the promotion of himself as a “Renaissance Teen” created a positive-feedback loop that further reinforced his confidence. This expectation was shared among youth who demonstrated a positive stance toward signaling. They were comfortable meeting new potential support providers as well as engaging in direct-signaling practices to obtain help from members of their social learning ecologies. Often times, having the perspective that they could successfully position themselves as impressive young people worth supporting helped them develop and maintain a positive orientation toward help-seeking.

Clarence — and other confident signalers in our study — also demonstrated a fluency in the norms of relationship-building and reaching out, as well as maintaining an online digital presence. Clarence started openly signaling when he was very young and his father coached him on how to present the inner workings of a computer to his older sister’s classroom. Another youth, MCM, started learning about technology, physical computing, and design as part of her participation in Design Brigade, and it was during that program that she was exposed to activities around crafting and tending to her online persona and reputation. Overall, our findings suggest that support in two key areas may lead to more confident signaling: focusing on developing practice-related expertise, as well as opportunities to practice signaling including specific tips and guidelines.

This may help to explain Krissy’s perspectives on signaling. Krissy’s relative newness to filmmaking and her self-assessment of the video she made may have brought up concerns about posting it (even though various peers and adults associated with the program complimented her on it). Krissy also spoke of a lack of familiarity with the norms of emailing in professional contexts, echoing what researchers studying ethnic-minority and first-generation college freshmen have reported regarding why such students may not reach out to professors for help. For example, some may belong to cultures that value self- and familial reliance, which may make seeking support outside of the family seem unnatural. They may also want to seek help but lack experience or guidance in doing so (Colin, 2001; Sánchez, Reyes & Singh, 2005). Berardi (2013) has described some young people’s discomfort with communicating by email, which makes it hard to connect with potential support providers. Krissy was similarly reluctant to email the teaching artists from Ollie 2.0 after the program was over.

It is also worth considering whether or not Krissy might have been helped by suggestions of other signaling practices that might have seemed less risky, or if she had been given strategies around not only signaling but also how to cope with a negative response (or no response at all). The signaling activities she mentioned using (posting videos on YouTube or emailing someone for help) were ones that arguably left a greater chance for a negative response (or no response at all) than the signaling practice that Clarence mentioned (approaching event organizers and offering to help clean up afterward). In the former examples, the interaction is less direct and might represent a request for support; in the latter case, the interaction is more direct and represent an offer of support. The subtle differences in help-seeking practices that surfaced in Clarence and Krissy’s case studies help to underscore the need to view signaling as an important skill to develop among youth. Schwartz
Her perspectives may be reflective of larger societal trends. For example, Hargittai and Walejko (2008) surveyed a socioeconomically and ethnically diverse sample of college freshman and reported that individuals who engaged in "creative contributions"—producing music, poetry or fiction, artistic photography, and film or video—were more likely to have parents who completed a higher level of education. They also reported that males were more likely to share their artifacts online, attributing this to differences in Internet user skill.

In contrast to Clarence, Krissy was new to her interest in filmmaking and did not necessarily see herself as an "impressive youth" when it came to the interest she was exploring. Rather, she preferred to emphasize her novice status. When we asked her about her familiarity with the video editing software Final Cut Pro, she told us, "I can use Final Cut, but I’m not a pro."

Krissy was not as accustomed as Clarence was to sharing original artifacts online and documenting her production and learning processes. Because she was trying to decide whether she should major in video production in college, Krissy was hesitant to post the video she had created during the program to YouTube, due to both her tenuous evaluation of herself as a filmmaker and a sensitivity to the risk of receiving negative feedback. Said Krissy, "I refused to put mine up on YouTube or anything, because I was scared of what other people would think or say of it, like, ‘It’s really bad, oh my God.’"

Krissy also seemed unfamiliar with norms of signaling to non-family adults. She generally preferred to communicate by mobile texting, but believed that email was a more appropriate way of communicating with potential support providers. However, she was less familiar with the norms of email as a form of communication, saying, "I always feel like I do something wrong in an email, or like, an email should be more formal than it really is. I structure it like an essay or I...it’s weird for me.”

Krissy also attributed any negative or lack of responses to her help-seeking as being her own fault. Krissy told us that when she did not receive any replies to her inquiries about filmmaking-related job ads she had found on Craigslist, she had wondered to herself, “Was my grammar bad, or did I structure [my email] wrong? Did I say something wrong? Was I missing something?”

Krissy also mentioned being interested in applying for an internship that she heard about in her video production class at college, but said that she was not sure what a cover letter should include.

While Krissy did recognize the benefits of being around knowledgeable adults, in general, she was tentative about networking and building mentor-like relationships with them. When we asked Krissy to give advice to a "shy high-school student" about pursuing her interests, she started by stating in a firm manner, ”No one can stop your dreams.”

Her advice to this fictional student also reflected an understanding of the potential social-capital-building benefits of networking, but she ended up making recommendations that she acknowledged that she would not be able to follow:

Interviewer: So, what advice would you give [this student]?
Krissy: Don’t miss opportunities. You can network.
Interviewer: What opportunities are there for her?
Krissy: Just talking to them, getting your name out there, and getting business cards and emailing. It makes a little difference.
Interviewer: What should she do with those if she gets those business cards?
Krissy: Email.
Interviewer: What would she email them?
Krissy: “Hey, is there an opportunity for me to learn?” It’s funny how I say these things, but I would never actually do it.

[Interview, February 19, 2014]
and colleagues (2016) have pointed to the importance of helping youth learn not only how to frame a request for help, but also how to respond to a polite refusal, for example, by thanking the individual and asking if there might be someone else they recommend. They also recommend discussing with young people that such outcomes are not uncommon and not linked to the young person’s capability. Arming a young person with such knowledge and practice — an important form of cultural capital that youth are privy to in varying degrees — may make it more likely for the young person to engage with such signaling in the first place.

We now turn to another important issue: how do youth develop the confidence to signal. Here, we focus on the necessity of ongoing engagement in an interest, how it deepens one’s practice-linked identity connected to an interest and increases one’s expertise in an interest domain. Those conditions may lead to the confidence to signal, the clarity around what to signal for, and possibly some nuances to signaling specific to the community of practice one wants to be a part of. Connecting this insight to Krissy’s story leads one to surmise that if Krissy wanted and had the means to continue working on her filmmaking practice and if she were to receive scaffolding and support around both types of signaling practices, there is a conceivable likelihood that over time her tentativeness around signaling would fade. In the next section, we describe the developmental nature of signaling, an important consideration when designing learning environments that can support long term interest-driven pathways for youth.

**Interest signaling as a developmental phenomenon**

In the previous section, we discussed how youth at different points in their interest trajectory may have different orientations toward enacting signaling practices that could help them generate support from providers. This pattern raises a new set of questions: Were the factors mediating these differences stable or dynamic? Did they change as young people continued to develop their practice-related abilities and identities? We found that supporting youth in their ongoing engagement with a practice can deepen their identity and boost their confidence in their own abilities, developments that will make it more likely for them to signal. To illustrate this process, we recount Cerebral’s experience over two iterations of Ollie. We show how Cerebral’s decision to signal for support coincided with and was influenced by the deepening of his identity as a game designer, his increasing connection to the community of game designers, and his growing ability to see himself in relation to that community. This motivated him to start a game-design project with his friends — a development that gave Cerebral what he considered a valid reason to reach out to others for advice.
Cerebral did not have high expectations when his friend told him about an intensive summer game design program for skateboarders called Ollie 2.0. The main draw was the program stipend and the fact that “it would put me near [a park] at a good time of the day to skate [after the program].” He was surprised, then, by how much he enjoyed being there, thanks in large part to the presence of Duncan, a well-regarded game designer and design-school faculty member who was teaching the game design portion of the program. Said Cerebral, “...when I first came to Ollie 2.0, I was a little quiet because I didn’t know what was going on, but when [Duncan] started talking about games, I just wanted to talk.” When Duncan began to describe the components of games and the practices of game design, Cerebral had an epiphany: “Seeing that there was actually a way to learn how to do this, and it’s something that you can learn how to do: it was just something that I took an interest to.”

Cerebral’s growing engagement in game design did not go unnoticed by the program staff. Ilana, the program facilitator, commented on his motivation, saying, “Some kids are off to the side, rolling their eyes, and some kids are half engaged but waiting for something to catch their attention. I see him hyper-engaged most of the time. He’s into it.” Duncan, too, noticed that in Cerebral and recognized his aptitude based on the work he’d produced during the program, the conversations Duncan had with him, and the conversations Duncan heard him having with other program participants. Said Duncan, “He just clearly has a head for game design... He was capable of thinking abstractly about systems. He was capable of looking at something that had a surface and taking the surface off and just looking at the underlying mechanics that made it work.”

Cerebral, in turn, recognized that Duncan was trying to cultivate his game-design interest, telling him about other youth-oriented game-design programs, and offering to vouch for him to ensure that he would be accepted. Toward the end of the program, he also described how Duncan made a specific overture to him, providing him with a business card and explicit instructions for how Cerebral could get in touch.

After Ollie 2.0 ended, Cerebral did not seek to deepen any relationships he made during the program. When we discussed the issue of keeping in touch with program staff, Cerebral said:

I don’t know. It was like, why would they want to keep in touch with me? What would I even ask them? “How is it going?” Did I make enough of an impact on them for me to ask them how their life is? I just was like ‘eh.’ I was just another kid in the program so I just didn’t think about doing it.

Interview, July 28, 2014

Cerebral mentioned holding a “pessimistic view” toward meeting new people because, as he put it, he expected “a lot of negative from people.” Having been bullied as a child, he said he had to change his demeanor to protect himself: “I was a soft kid, but I grew up, and now people don’t mess with me. I think they’re afraid of me, to tell you the truth.” Related to this, Cerebral often expressed a deep indignation toward “people [who] abuse their power;” another time, he said, “I don’t like people who are in power to be jerks about their power.”

During this time, Cerebral started learning more...
about game design by reading online articles and watching YouTube videos. During one of our earlier conversations, Cerebral told us, “I learn stuff on my own. If I’m interested in something, I will look it up and I will read books. That’s what I do.” While at the time we took that to mean that Cerebral was a self-directed learner, after hearing his perspectives on those he described as “outside people,” we wonder if Cerebral was also communicating a preference for learning strategies that did not rely on asking others for support. In any case, our conversations about what he had learned demonstrated his growing understanding of the practice of game design and interface design, essentially how “everything was done for a reason.”

Cerebral was also on a ‘forced’ gap year, due to missing the filing deadline for his college financial aid form. While he was upset about this setback, he realized that this also gave him the opportunity to enroll in another, less expensive college that would allow him to try out a wider variety of courses and continue to explore the idea of being a game designer instead of a police detective, his prior career goal. Then, in a move that deviated somewhat from his perspectives regarding leveraging the help of ‘outside people,’ he contacted Duncan for advice. They chatted on the phone about Cerebral’s college plans; Cerebral mentioned that the new college he selected didn’t offer classes in game design and Duncan assured him that he could major in computer science and use that knowledge to make games during his free time, which mirrored what Duncan had done.

Several months later, when an opportunity to sign up for Ollie 3.0 was circulated, Cerebral expressed excitement over the opportunity to interact with Duncan again. It was a fortuitous reunion that served to deepen their relationship. The opportunity to interact again not only strengthened their relationship, but also enabled Duncan to continue guiding Cerebral’s learning and identity development. Duncan knew what Cerebral was capable of and wanted to help him continue to learn by challenging him a little more than he had done in Ollie 2.0. Said Duncan, “I was attempting to get him to really process things, as a way of kind of cultivating a critical lens on what he was doing, and I pushed him to do more of the nuts and bolts math of the experience.” Accordingly, he introduced Cerebral to a common game-design practice, that of “balancing a game,” which involved testing and iterating a game’s scoring structure so as to improve the experience of the game. Cerebral also showed a clear investment in the programming lessons (taught by another teaching artist), taking screenshots of any code presented on the screen so he could type it into a computer emulator later. Said Cerebral, “This is actually the best notes that I’ve probably kept.”

After Ollie 3.0 ended, Cerebral embarked on activities reflecting the progress he had made around his learning goals and his connection to the wider practice of game design. He started designing and developing a game, using a freely accessible online game-making platform, collaborating with two friends who had also participated in the program. A coworker noticed Cerebral working on his game during a lunch break and offered the services of his brother, an artist, in case Cerebral would like someone to provide character art. With this game design project in place, Cerebral sent Clarence a Facebook message to ask him for some technical help.
This vignette shows how Cerebral’s identity as a game designer grew over the course of two programs, leading him to develop his first independent project about a year after his first exposure to game design as a practice. His self-directed involvement in the practice of game design after completing two instances of the Ollie program prompted Cerebral to engage his former program partner Clarence in a direct bid for support, an important development and a marker of Cerebral’s shifting orientation toward signaling. From Cerebral’s perspective, he was engaging in the game designer practice of seeking technical help. This suggests that when one feels a stronger connection to a practice-linked identity (“I am a game designer...”) and is able to come up with a concrete ask (“I have a technical question”), one’s proclivity to signal may increase as well. We further hypothesize that one may need to reach a certain “identity threshold” around a particular interest before embarking on signaling for support. Cerebral’s development also demonstrates how intrapersonal characteristics such as confidence and self-efficacy are developed through accumulated experience, which often requires resources and social support; this, again, points to the importance of social support in sustained engagement in an interest. In addition to curricular support around signaling, effective youth signaling needs to be developed through experience in an interest-linked practice, ideally within a context of rich social and material support that can serve to develop those aspects.

There are several reasons as to why Cerebral may have felt comfortable engaging in direct signaling for support with Duncan after Ollie 2.0. First, Cerebral told us that he felt somewhat stalled during his ‘forced’ gap year, and reaching out to Duncan made him feel like he was still moving forward. It was also significant that Duncan had made a specific overture to Cerebral and performed the professional practice of giving him a business card, thus affording to Cerebral the respect he would extend to another professional in his field. Finally, Duncan provided explicit permission to contact him and explicit instructions regarding how (i.e., information on the card) and when (i.e., “If you need help and this is really what you want to do”) to do so. As mentioned earlier, Calarco (2011, 2012) has conjectured that younger children, especially those from working-class families, may not always be aware or comfortable with ‘acceptable’ ways to reach out for help to adults such as teachers. Cerebral’s description of how Duncan approached him seems to have included the specificity that Calarco recommends. While following through felt somewhat risky to Cerebral, the steps Duncan took served, from Cerebral’s perspective, to lower that risk to an acceptable level. It should also be noted that Cerebral seemed to have framed his reaching out to Duncan as more of a transactional, information-seeking request, as opposed to a more ongoing, relationship-building one. Unlike the example of Clarence and Hannah, Cerebral was not entertaining any thoughts of engaging Duncan as a mentor.

Much as signaling could depend on intrapersonal characteristics that may change as a young person gains experience and clarity around a practice, our data also pointed to external factors that could help. Youth were more inclined to engage in signaling when they felt they had a “valid” reason to do so, for example, an opportunity that required outside help, a specific question that a provider could answer, or an artifact that they were proud of and willing to share. There were numerous cases in our data in which youth sought to mobilize support in their networks in response to an opportunity or when they were engaged in a new endeavor. Having an artifact may also be used as a basis for asking for feedback, as in the case of Cerebral reaching out to Clarence described above. Despite Cerebral’s prior interactions with Duncan, he was reluctant to contact Duncan about the game he was designing with his friends (his first serious attempt at game design outside the program), even though Duncan would have been very happy to hear about Cerebral’s activity and offer feedback or other support. Cerebral explained that without a concrete reason, it would have felt pointless

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21 Duncan told us that, while his other responsibilities prevented him from being as proactive as he would like to have been about keeping in touch with former students, “if they do contact me, I respond.”
I don’t even know what to tell him. Like I, I don’t want, I don’t want, I don’t know what to say to him. I’m like, “Hey Duncan, I’m working on a game...” I don’t know what to say, so I haven’t really thought about contacting him. I was going to wait until I have more of the game made to kind of show him something. It will be like, “Yeah, this is what I’ve been doing,” you know, just—I don’t want just to hit him, just to like hit him up and say, “Hey.” Like, I don’t know if that’s okay to do, so I was trying to wait until I have something for him to look at, at least, and then, yeah, that’s when I was going to wait to speak to him.

- Interview, March 20, 2015

Like all the youth we spoke to, Cerebral was cautious about his relationships with providers and generally did not expect any support beyond what was given during a program. He did not want to overstep his relationship with Duncan, even if it meant relinquishing the opportunity to benefit from his encouragement or guidance. In another example, Freélyn started asking for camera equipment after the owner of a skateboarding team tapped her as the team filmer. She explained, “I didn’t want [the owner] to think it was a mistake putting me on or something.” When Clarence was nominated for the Thiel Fellowship, he immediately asked people in his social circle for help with his application. Similarly, new opportunities tended to prompt providers to offer resources. Clarence mentioned that, after his Thiel nomination, various people he knew volunteered their support and prioritized helping him because of the valuable and time-sensitive nature of the opportunity.

Overall, our analysis suggests that as a young person develops a deeper commitment to a particular interest and also develops a more robust set of skills around it, their motivation to generate social and cultural capital in that area may also increase. While prior scholarship indicates that an individual’s history of interactions with others can affect their help-seeking behavior (Colleta, 1987), as can modeling by parents or others (Lareau, 2000), here we identify other factors that contribute to youth signaling and one’s orientation toward it.

Provider views on signaling

In this final section, we turn to providers’ views on how signals are perceived, as well as the factors that motivated them to respond with support. Support ‘provision’ in many ways represents a transaction, with certain norms and assumptions governing whether or not support is offered. As one mentor, a beloved and deeply committed artist, activist, poet, and digital media educator, noted, “I teach everybody, but my mentorship needs to be earned” (Barron, Mertl, & Martin, 2014, p. 180). Providers privileged qualities such as commitment, maturity, and responsibility over skill level when it came to inviting a young person into a Hive program, as the shared goal of many Hive programs was to give youth an opportunity to engage in digital media making activities to which they may not have had wide or any previous access; they also mentioned other factors such as commitment (to the interest or to the provider), and demonstration of growth or change. There were also times when a provider’s assessment of youth expertise was consequential for a young person’s ability to take advantage of future learning opportunities.

22Founded by technology entrepreneur Peter Thiel, the Thiel Fellowship offers young people a $100,000 grant to pursue personal projects instead of attending college.

23Often, program facilitators asked youth to “apply” to a program by filling out an online form or contacting the facilitator. Generally, there were more seats available than applicants, but in some cases, facilitators had to make a decision (e.g., Power ON’s Design Brigade program).
We identified a few places of mismatch that may be important to address if we are to create more supportive environments. First, while focal youth expressed sensitivity to certain norms around contacting potential providers such as program facilitators and teaching artists, providers themselves seemed less concerned with such rules. Educators we spoke with conveyed their attitude in largely the same way: If they recognized a need for support among youth in their circles, and if they had the means to fulfill that need, they would reach out to that youth. They expressed openness to receiving direct requests from any of these youth, and they were not concerned about being bothered or taken advantage of. They admitted that they might not remember all the youth they have come into contact with, but they did not consider a deep relationship to be a prerequisite for helping a young person. Also, because of their busy schedules, many providers generally expected or recommended that youth take the initiative to reach out. These findings suggest that youth and potential support providers may make different assumptions about “appropriate” ways to interact and that these differences may significantly constrain providers’ long-term support of youth who might be interested in their help. In this section, we address factors that affected how providers responded to youth signals.

Our conversations with Duncan illuminated how open-ended signaling during program sessions helped him formulate impressions of young people’s interests and aptitudes and influence his decisions to support. For example, he described knowing that Cerebral was interested in game design “because he’s engaged, vocally engaged; because he’s clearly not parroting back to me things I’m saying. He’s clearly thinking about them and having his own answers.” He also contrasted Cerebral’s behavior with that of another young person in the same program:

I look at him, and I’m like, “Pay attention.” And then he’ll pay attention. But as soon as I take my eyes off him, he’ll just drift back to whatever he was doing… My teaching on the street tells me that he’s not actually interested. He’s more concerned that I’m going to be mad at him or get him into trouble, so he wants to show he’s focused when he needs to show he’s focused. I just don’t totally believe he would do anything unless I was really pushing him to do it.

Interview, August 12, 2014

This type of assessment may explain why Duncan made a special overture to Cerebral toward the end of the program, giving him his business card and urging him to keep in touch. These excerpts demonstrate how providers may observe the behavior of young people in a program, form impressions of the young people based on those observations, and draw on those impressions to make decisions as to how to provide support.

Providers also recognized and valued direct signaling that reflected a commitment to the interest or the provider. For example, Sylvia, who leads an organization that provides scholarships for urban youth skaters to attend an out-of-state skating camp, mentioned that an overwhelming part of her job was to field the many requests she receives from youth; in other words, she received a significant number of direct signals for support. However, she remembered that Freélyn’s email stood out to her. Sylvia appreciated that Freélyn did not just ask for a scholarship, and instead wrote compellingly about her love of skateboarding and her appreciation of Sylvia’s organization:
You know, most kids say, “I want to go to camp. Will you sponsor me?” [or] “I want to get a sponsor” or whatever it is. They want something from us. [Freélyn] was the first to say something really sort of impassioned about how she loved [my organization] and what we were doing and wanted to be a part of it and wanted to help out.

Interview, March 21, 2014

Freélyn showed her genuine interest by conveying a larger purpose and an authentic connection to the organization’s work, behavior that recalls Stanton-Salazar’s (2001) assertion that mutuality is an important aspect of relationship building and that support from providers may be the outcome of a “successful relationship” (Stanton-Salazar, 2011). Providers also noticed when youth seemed aligned with their organization’s larger goals. For example, Josephine, the program facilitator for Design Brigade, admired Sapphire’s motivation to apply his growing understanding of technology to addressing larger issues:

His application made it clear that, like, part of why he was excited to join Design Brigade was because he wanted to contribute something to the world. Most kids come because they want to learn tech, and that’s totally valid, but I’m always struck by those who say, “I want to build something for someone else, and that’s why I’m here.”

Interview, February 6, 2015

Josephine was indicating that, in evaluating applications for the Design Brigade program, she tended to give more weight to youth who articulated a desire to engage in technology design to contribute to the well-being of others. The Design Brigade program shared those commitments (for example, a program goal in recent years was to design technology projects for individuals living with physical and mental impairments), and as such it is understandable that she would be more receptive to a signal from a young person more aligned with her organization’s values.

Demonstration of growth or change was also motivating to providers. Carlos, an educator who served as the teaching artist for a program called CityStomps, recalled seeing a former student at the CityStomps program a year after he had introduced him to a popular programming environment and language called Scratch. He could tell, based on the programming questions that his former student24 asked him, that he had been spending a lot of time with Scratch and had come up with a “very innovative” project. Carlos spent a lot of his personal time helping the young man with this project (which did not overlap with the official activities of the CityStomps program). He would look over his former student’s code at home after work and would arrive early before the CityStomps session started to offer him feedback. Carlos did these things during a very busy period while he was juggling the teaching responsibilities of CityStomps along with his usual duties overseeing a bustling department at his organization. When asked why he was putting so much extra time and energy into helping this young man, Carlos said, “When I see kids that are really trying to make something work, [I give them] extra support, [because I know it] is going to really get them more interested.” He continued:

Ultimately, that’s really what you want…to inspire [students] to continue after they leave the class. If you gave a workshop and then the interest continues after the workshop, then you’re really successful.

Interview, December 11, 2013

24Not one of our case study focal youth.
Carlos was motivated by his former student's transformation from a non-coder to someone engaged in his own programming project; Carlos could see that his investment in him had paid off and that he would value any future support — these aspects of his relationship with the young person, in addition to the commitment it shows to the provider — helped to motivate Carlos to respond positively to the young person's signaling for help.

We heard a similar perspective from Freélyn's high school graphic design teacher, George, who was motivated to provide her with support that went beyond his duties as her instructor. This included giving her his old laptop and a new mouse, continuously encouraging her and recognizing her achievements during class, and looking for and sending her fellowship and scholarship opportunities. George explained his actions by saying,

She pulled ahead of every other student, and I saw design as a means to give her direction in her studies and possible career. I was in a position to give [my old laptop] to her so I had no problem doing so. I knew she'd put it to good use, especially if her home situation was unable to provide this for her. I guess I did it because I could, and she deserved a shot…. [Also,] I enjoyed how tough she came off at first and then did a complete 180 to pull ahead of every other student I have. She stood out, like any job applicant should, and I was in a position to foster that.

Interview, October 30, 2015

Like Carlos, George enjoyed seeing his student’s transformation. It was his first year of teaching, and Freélyn's growth may also have served as positive feedback for his efforts to be an effective educator.25

Provider perception of youth expertise did at times become consequential for support of youth ongoing learning and identity development. Youth who displayed significant aptitude in digital media making tended to stand out as good candidates for other opportunities and were often tapped for youth leadership opportunities at a future instantiation of the program or recommended as an appropriate candidate for another program. For youth who were already somewhat accomplished in their chosen digital media making interest, sharing their work online or at structured showcase events tended to attract support, sometimes in the form of youth mentorship and speaking opportunities.

While providers generally characterized their norms for helping young people as straightforward, their discussions of past interactions suggested a more complex and varied pattern. Often, providers acted as gatekeepers who chose which youth would benefit from opportunities or as recommenders of young people to gatekeepers. Our data indicated that in such situations, a prior relationship did lead to provision of more valuable support and that providers valued and rewarded aptitude and loyalty. Support, whether it is given through irregular and discrete interactions or through a sustained and deep relationship, is crucial to promoting positive futures for young people. Close examination of how these transactions of support occur may help educators design more equitable learning environments through more equitable responses to support seeking.

25 It should also be noted, in connection to our earlier discussion of signaling, that this was a clear example of a provider recognizing a young person's needs in relation to an interest. George knew that Freélyn did not have a laptop to use outside school, so gave her one that he no longer used.
Summary of Findings

This report focused on youth signaling as a key strategy for support recruitment. We found that young people signaled their interest in receiving support either in an open-ended manner or directly to a specific provider. Signals contained information about the young person that helped providers decide whether or not to support them and how; for example, a signal might indicate the young person’s interest, aptitude, or needs regarding the interest. To successfully attract support for their needs, youth needed to feel comfortable with signaling and know how to get their signals noticed by potential providers.

We also identified characteristic differences between various signaling practices and a variety of factors that may mediate those differences. Some youth were more tentative than others about signaling, especially over the prospect of signaling providers outside of their immediate circle. We also found, however, that developing a more proactive help-seeking orientation could be supported by providing young people with more experience, both with regard to the practice of interest as well as strategies they may engage with to signal for possible future support. Over time, as young people’s practice-linked identities developed and their understandings of the practice became more precise and detailed, their confidence and determination to signal for support increased as well. Knowing various ways to signal their commitment and needs around continuing to engage in this interest is also important and not something that youth will naturally find support around how to do otherwise.

Youth were also motivated to generate support by specific events that gave them what they saw as an appropriate reason to reach out, as in the completion of a shareable artifact or a formal opportunity that required support. We know that a history of prior interaction can mediate one’s orientation toward help-seeking, as can the modeling of cultural repertoires by parents or others. This analysis suggests other possible mediators of signaling for support among youth. It should also be noted that developing experience and a deepening identity in a disciplinary practice like game design often requires resources and social support, which again points to the importance of social support in sustained engagement in an interest.

Finally, we found that providers have expectations that influence how and when they offer support. Individuals in various educational roles — including teaching artists, program facilitators, and classroom teachers — were motivated to help youth who could show commitment to an interest and, relatedly, in moments when they saw positive change and growth. We close here with recommendations for helping more youth undertake signaling so that they can use this important strategy to recruit support.

Recommendations

Given the importance of youth signaling as a strategy for support generation and the different perspectives young people bring to signaling, we have identified some key recommendations that
may help more young people develop greater facility with youth signaling.

1) Provide “youth signaling” support as part of out-of-school programming. Although this study indicates that a deepened practice-linked identity can lead to more signaling, youth may benefit from other ways to support their signaling practices as well. For example, Schwartz, Rhodes, Spencer, and Grossman (2013) have piloted a “youth-initiated mentoring” curriculum to help youth understand the importance of soliciting support from others and to help them develop the skills and confidence to do so. We have also observed instances where signaling lessons and role-playing exercises were integrated within the larger curriculum of an after-school program. Such activities included the practice of digital-media sharing that is common in many digital media making communities. The key issue here is to help young people gain comfort and practice around open-ended and direct forms of signaling for support.

Suggestions:

- Experiment with supporting “cold emailing” as part of the program; encourage youth to familiarize themselves with e-mail norms.
- Create “scaffolded” contexts in which signaling can occur with low stakes (e.g., closed Facebook groups for a program where youth can use the group to share things they are working on and ask for help).
- Organize networking opportunities and public sharing opportunities with friendly audiences.
- Have educators and teaching artists make their own signaling practices transparent to young people.
- Have youth share practices they have used and found successful, such as sharing work on Facebook and tagging specific individuals in the comments section.
- Provide different options for signaling, as some options may feel more comfortable to youth than others. For example, asking an event host if one can help clean afterwards — something Clarence mentioned always doing as a way to network — may seem more actionable than sending an email to someone requesting help.

2) Incorporate ways to extend interactions between youth and providers after a program is over. Programs may also be designed in a way where signaling is more likely to emerge organically. Repeated or prolonged interactions deepen relationships and may enable providers to notice changes in young people’s technical knowledge, practical knowledge, motivation, and sense of belonging within a particular community of practice. Seeing this growth over time may motivate providers to continue providing support.
Suggestions:

- Enact incentives to encourage adults and young people involved in a program to return.
- Organize post-program “reunions.” This strategy also sidesteps the challenge of changing youth norms about reaching out to providers.
- Create possibilities or norms around informal “drop-in spaces” at an organization’s offices where providers are around, creating possibilities for interacting beyond a program.
- Consider strategies to stay in contact with youth alumni.

3) Provide youth with artifact-creation and sharing activities as a way to promote signaling.

Some youth, especially those still new to a practice, may be less able to clearly and explicitly articulate what they have accomplished, lacking the specialist language required to do so. Here is where artifacts (or photographs or videos of the artifact) may help, in two key ways. First, potential providers viewing these artifacts may still be able to read signals about the youth and use that information as the basis for offering support. For example, pictures of a scythe-like game controller that Sapphire had made during the FPS program (see above) were posted on a wall at his high school, and seeing what Sapphire had accomplished contributed to the technology coordinator’s decision to put him on the short list to apply for the Design Brigade program. Having a shareable artifact may also compel youth to reach out for help or to share what they had done, or to ask specific questions, as Cerebral’s vignette illustrates. Overall, this recommendation suggests ways to leverage artifact-creation and sharing as ways to support youth signaling for support.

Suggestions:

- Create opportunities for youth to create artifacts and for potential providers to see them.
- Participate in events where youth may present their artifacts to others (e.g., Emoti-Con!, an annual youth technology showcase and competition attended by more than 200 youth from organizations across New York City.)
- Use artifacts as a way to communicate information about a young person’s interests and aptitude.
- Encourage ways for artifacts to travel to different settings where they may come into contact with other providers.
4) Consider the individual and cultural barriers preventing youth from fully engaging in signaling opportunities and how those barriers might be addressed. In addition to helping all young people develop into confident and competent signalers, we should continue to understand how youth perceptions, prior history, and culture may pose barriers. Providers should be aware that youth new to an interest may be more tentative about signaling their need for support, especially after a program has ended.

Suggestions:

• Gather advice from program youth and colleagues about the possible perspectives that youth from different backgrounds might have around signaling. Use this information to experiment with various activities to help young people feel more comfortable and more informed about signaling overall.

• Explore culturally-sensitive approaches to helping youth become confident signalers.

• Because one prominent barrier to signaling might be fear of rejection, focus on ways to mitigate that fear. This might include discussing reasons why potential support providers may refuse to help a young person (or not respond at all); also consider giving youth specific strategies that they can use in such situations.

5) Use youth signaling to drive your organization’s educator professional development and programmatic offerings. One way to respond to youth signaling is to adjust programming and professional development according to signals offered by youth. This recommendation was brought up during a community call with the Hive NYC community and the suggestions offered below come from examples that organizations shared with us.

Suggestions:

• Teachers at schools participating in the Games for Change Student Challenge noticed how interested their students were about their game projects, so during the subsequent year, they started looking for instructional and professional development support to brings game-based learning and game design to the classroom.

• During an augmented reality comic workshop, staff at one organization noticed that some youth were struggling with assignments while others would finish early and need other things to do. They adjusted their programmatic curriculum to meet “the needs and passions” of all their students; this included creating additional opportunities for youth to present their work at a public art exhibit.

• After meeting youth who signaling their interest in an activity genre and the organization through attending this organization’s monthly event, the organization decided to change the way they conducted outreach for one of their programs.

Conclusion

Effective youth development requires supportive relationships with adults who can recognize a young person’s interests and strengths and use that information to guide them into meaningful
endeavors, particularly those related to long-term learning pathways. In this report, we highlight how signaling can help youth garner support from people outside their immediate circle, an important concern for young people seeking to expand their social networks to accomplish their goals. Reports have encouraged supportive adults to recognize the interests and strengths of young people as a starting point for encouraging their development (NRC, 2015). Spencer and Rhodes (2014) encourage program adults to be better skilled at developing “growth promoting relationships,” which includes understanding good practices that will “cultivate and respond to youth initiative” (p. 60). This report highlights the importance of signaling practices as the “youth side” of this relationship-building enterprise. Perhaps by considering the myriad ways that youth signal their desire for support and the contexts in which they engage in such signaling, potential providers may become more attuned to additional ways to shape positive interactions with youth.

The efforts in recent years to produce equitable pathways of learning and identity development for all young people has advanced in productive ways. Recent scholarship indicates that such pathways are not just the purview of one setting (e.g., school, afterschool programs, or home) and that different youth assemble support from these settings in more and less productive ways. This understanding has helped bring about a new generation of interventional designs. These designs rest on metaphors that promote cross-setting linkages and the gathering of a wide circle of individuals who can help young people across a range of time frames. This report builds upon those efforts and adds a dimension that we hope will support future conceptualizations of how to develop successful designs to promote learning that is “life-long, life-wide, and life-deep.”

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Appendix A. Prior Findings on Supporting Youth Pathways

Drawing from Barron’s Learning Ecology Framework (2004, 2006), which articulates the central role that youth play in driving their own learning, we conducted interviews with youth participating in Hive member programs, reporting on the kinds of support youth valued in digital media making activities. We found that youth interviewees recognized social support in five general areas (see Figure 1) corresponding to material support (e.g., filmmaking equipment, a laptop computer), knowledge-based support (e.g., technical advice), emotional support (e.g., encouragement to continue), brokering support (e.g., information about another youth program or other learning opportunity), and institutional support (e.g., an internship or mentoring relationship).

We also applied an ecological perspective to support-provision (Bronfenbrenner, 1979), examining whom youth might recognize as supportive individuals as they make their daily rounds (Taylor & Hall, 2013) to their homes, schools, communities, and online spaces. With these two sources of information—the kinds of social support that youth valued in their digital media making pursuits and the people who provided that support—we gained a sense of each young person’s social learning ecology (SLE; Ching, et al., 2014), “the assemblage of individuals including family adults, non-family adults and peers that provide material, knowledge building, emotional, brokering and/or institutional forms of support for the purposes of initiating or sustaining a youth’s interest-related pursuit(s) at particular points in time” (p. 4).

By creating maps of a young person’s SLE at specific time points (Figure 2), we found that youth-perception of support for their interest-driven learning with digital media was typically fairly robust while they were engaging in a youth program but that it often tapered off or disappeared altogether once a program ended, due to the loss of ties with the individuals in that program. We have characterized that as a “post-program slump in support” (Ching et al., 2014) and have hypothesized that this slump can have serious negative consequences for a young person’s ongoing learning and identity-building within that domain. This was especially the case if the young person was new to a digital media making practice and was generally more tentative about their commitment to it, less knowledgeable about how to continue it, and less connected to individuals who may be able to help.

Based on this research, we argued that learning environments should be designed to provide the

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Figure 1. Youth-articulated forms of support.

![Figure 1](image-url)

All youth in this study were recruited from digital media making programs offered by organizational members of the Hive NYC Learning Network; we refer to such programs as “Hive programs.”
resources that youth need; in addition we must ensure that this support is perceptible to all youth and that they feel comfortable accessing it, especially during times that our analysis has identified as critical, such as immediately after a program has formally ended (Ching, 2016).

Figure 2. Comparing Social Learning Ecology (SLE) Maps of a youth participant during and after a Hive program illustrating the phenomenon of “post-program slump in support.” Darkened colored squares indicate areas of received support according to youth reports; the comparative lack of support in the table at bottom illustrates what we call “post-program slump in support.” The symbol (“▼”) was used to help visualize which sources of support were tied to a Hive NYC-affiliated program.

These observations have highlighted an important area for investigation, namely, what are the interactions between youth and the people in their lives that can lead to support? How do young people activate the social capital they need to continue their pathways of learning and identity? By understanding the interactions involved between youth and the social and material resources in their environment, we might help youth achieve support ecologies more like those experienced in-program, rather than those experienced in the ‘post-program slump’.
Appendix B. Descriptions of Youth and Recruitment Sites

In this section, we describe the youth participants mentioned in this report as well as the Hive programs they participated in.

Table 4. Descriptions of youth participants

<table>
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<tr>
<th>Youth Name</th>
<th>Description</th>
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<tr>
<td><strong>Anthony</strong></td>
<td>Emigrated from Jamaica nine months before our first interview. He lived in Brooklyn with his parents, aunt, uncle. His interests included photography, mobile technology, and languages. In Jamaica, Anthony had a supportive set of resource providers, including a group of friends who regularly gathered to talk about mobile technology and a technology coach who recommended Anthony for a technology program in which he learned about computer hardware and productivity software. After he moved to the U.S., many of those ties disappeared or changed in nature. Nevertheless, Anthony built more relationships, starting with individuals connected to his neighborhood library where he was a volunteer. Those connections led him to many Hive-affiliated opportunities, including a game design program called CityStomps.</td>
</tr>
<tr>
<td><strong>Clarence Johnson</strong></td>
<td>Lived with his older sister lived with their mother in Queens. He mentioned many interests, including creative coding, longboarding, photography, video editing, industrial design, and educational reform. He participated in various Hive-affiliated programs, including Ollie 2.0, in which he was a mentor-videographer, and First Person Playable, in which he was a youth mentor. Clarence drew support from both family and nonfamily individuals. These individuals included his father, who owned a video editing company, a high school technology administrator who provided Clarence with expensive equipment, and several employees from a youth-development organization that operated a program at Clarence’s school to help students pursue individual projects based on their interests.</td>
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<tr>
<td><strong>Cerebral</strong></td>
<td>Lived with his brother and mother in Brooklyn. His interests at the start of the study centered on skateboarding, playing video games, and learning things from the internet. Since the age of five, Cerebral had been interested in being a detective and he was accepted to a four-year college with a criminal justice program. His engagement in Hive-affiliated programs Ollie 2.0 and 3.0 introduced him to the practice of game design, and he subsequently switched his major to computer science, with the intent to become a game designer. Cerebral’s support providers included his mother, grandfather, and grandmother. He also derived support from a Duncan, a game designer who served as a teaching artist for Ollie 2.0 and 3.0, as well as friends who also participated in those programs.</td>
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<tr>
<td><strong>Freélyn Sapphire Domenico</strong></td>
<td>Lived with her mother and an older brother and sister in Queens. Her interests included photography, graphic design, filmmaking, and skateboarding. Freélyn participated in Hive-affiliated programs Ollie 1.0, 2.0, and 3.0. Ollie 1.0 introduced Freélyn to videography and sparked her interest in becoming an action sports filmmaker in the skating community. After Ollie 2.0, during which she was a mentor-videographer, Freélyn started producing short skating films outside of a program context and began making skate films for various individuals in the skateboarding community. Freélyn’s support providers included an executive director of a youth skating organization and Hive program-affiliated staff. She and Krissy were also best friends and supported each other in various ways.</td>
</tr>
<tr>
<td><strong>Krissy</strong></td>
<td>Lived with her younger sister and their mom in Queens. Her interests included film editing, skateboarding, and law. During high school, she participated in mock law and was accepted to a 4-year college with the intention of majoring in law. She ended up not enrolling, however, because it was far away and too expensive. She was hired as a mentor-videographer for the Hive affiliated program Ollie 2.0 and developed an interest in filmmaking through that experience. After a gap year, she started classes at a local community college and decided at the last minute to major in video art and technology. Krissy’s resource providers included Hive-affiliated program adults and peers, including her boyfriend and Freélyn, her best friend.</td>
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**MCMotherboard** emigrated from Nigeria about five years before our first interview. She and her two siblings lived with foster parents in Manhattan’s Upper West Side. Her interests included technology, engineering, design, volleyball, and reading. For the four years preceding our study, she had been a member of a year-round technology and design program called Design Brigade, an engagement that opened doors to many meaningful opportunities, including a visit to the annual White House Science Fair and a summer internship at a small company that developed mobile applications. MCMotherboard’s support circle was largely comprised of nonfamily individuals and peers affiliated with Design Brigade, teachers at her high school, and a former employee at a company where MCMotherboard was a summer intern.

**Sapphire** lived in the Bronx with her mother and uncle. He had a long history of engagement with video games and was interested in game design as a possible career. As a junior in high school, he participated in the Hive-affiliated program First Playable Style (FPS), an experience that helped him seek out other afterschool opportunities. He eventually applied for and was accepted to Design Brigade. His array of resource providers included a high school administrator who supervised a technology club at Sapphire’s school, and an employee at an art and technology organization that hosted FPS. In addition, Sapphire’s parents offered general encouragement and bought him video game paraphernalia.

**Ollie (Freélyn, Krissy, Clarence), and Cerebral**

The Ollie 2.0 and 3.0 were both collaborations between two nonprofit youth-development organizations—UrbanTimes and Skater Youth Organization—and a prominent design university. Ollie, which refers to a skateboarding trick, was designed to expose youth skateboarders from less-privileged urban communities to game design and programming by engaging them in a group project to develop technology-enhanced physical skateboarding games for a skate park. Both iterations of the intensive summer program took place in classrooms on the design school’s campus. The program met for three hours, three times a week, for six weeks. During Ollie 2.0, which occurred during the summer of 2013, youth designed and constructed technology-enhanced street games for skateboarders. One of their games used Arduino microcontrollers that were stashed in nylon backpacks and connected to small lights programmed to react according to whether or not a metal connector remained plugged into the micro-controller device. For Ollie 3.0, which occurred during the summer of 2014, youth developed a game for a local skate park that included a web-based mobile application that would guide players through the game and keep track of the score. Both program instantiations included youth leadership roles in which youth, in addition to participating in the game design and programming aspect of the curriculum, also filmed program activity and interviewed youth participants to create videos documenting the program. Four focal youth were recruited from this program: Freélyn, Krissy, Clarence, and Cerebral. Freélyn participated in Ollie 1.0; Freélyn, Krissy, and Clarence played youth leadership roles during Ollie 2.0; and Freélyn and Krissy were youth interns for Ollie 3.0. Cerebral was a youth participant during both Ollie 2.0 and 3.0.

**Design Brigade (MCM)**

Design Brigade was a yearlong technology and design afterschool program for high school students organized by Power ON, a technology-oriented, youth-development nonprofit organization. Design Brigade was open to high school students who participated in school-based technology clubs (affiliated with the Power ON organization; I refer to them later as “Power ON clubs”). The program, which met once a week for two hours at the Power ON office, engaged teenagers in real-world, service-oriented, technology-based design projects that introduced them to principles of Human-Centered Design and a range of programming and physical computing skills (depending on what the particular project required). In the past, youth have designed tools that aim to help individuals living with cerebral palsy perform activities ranging from eating to painting to putting on shoes. In terms of the participation structure, Design Brigade youth organize into smaller groups to work on projects, and each group is assigned a mentor who provides the required technical assistance. In addition to engaging in this design project, the program also includes college and workforce readiness training, exercises to help youth gain practice in public speaking, and help with curating their online identities (via blog and LinkedIn profiles). Finally, during the summer, youth are matched with local organizations that engage them in paid apprenticeships. Focal youth MCM was part of Design Brigade for four years.

**City Stomps (Anthony)**

The goal of the City Stomps program, which took place over fifteen weeks during the fall of 2013 at the Urban Public Library, was to engage high school students who were part of the library’s technology training and volunteer program in creating a location-based narrative game using a program called TaleBlazer that had been developed at Massachusetts Institute of Technology. The other partner in the program was YoungWorld, a youth-development nonprofit organization. The game was accessible on a GPS-enabled mobile device and included a narrative as well as instructions to the player regarding specific sites (in this case, monuments in neighborhoods surrounding the library) to which the player was

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28Clarence also participated in First Person Style.

29Ollie 1.0, which was enacted during the summer of 2012 (and before the start of the study), helped skater youth develop short videos focused on issues and narratives in their community. The organizations involved were UrbanTimes, Skater Youth Organization, and a community-based organization that helped youth develop video production skills.
invited to travel. When a player holding the mobile device stood in the vicinity of the specified site, the device would display a question that the player had to answer correctly to advance to the next level in the game. To develop this game, youth used the library’s archives to uncover local news and ephemera that could be incorporated into the game’s narrative and questions; youth also learned basic principles of game design as well as block-based programming to construct a viable game within the TaleBlazer environment. Focal youth Anthony was recruited from this program.

First Person Style (Sapphire, Clarence)

In First Person Style, youth learned how to design and code their own games within the Unity3D game engine, create a custom game controller, and link the game and the controller through the open-source Flora microcontroller. The program met twice a week for two hours over nineteen weeks at the offices of Art+Tech, a digital art atelier with an active youth education department. As an example of one of the games, Sapphire created a side-scrolling game in which his onscreen character avoided obstacles and attacked enemies by wielding her scythe. Players controlled the game by holding a full-sized scythe with motion sensors. Players made a “hacking” motion to attack and moved up and down on the screen by pressing arrow keys on the keyboard. Focal youth Sapphire was a program participant. Focal youth Clarence had participated in earlier iterations of the program and had been hired to be a youth mentor during the instantiation of the program that I observed.