



# Bringing in the Tech:

Using Outside Expertise to Enhance Technology Learning in Youth Programs

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Afterschool continues to be promoted as a complementary setting to school for strengthening science, technology, engineering, and math (STEM) education (for example, Krishnamurthi, Bevan, Rinehart, & Coulon, 2013). This is a reasonable idea: 10.2 million children and youth in the U.S. participate in structured afterschool programs (Afterschool Alliance, 2014), and the flexibility of afterschool settings allows for innovative approaches to STEM exploration and engagement.

Without the curricular constraints of school, afterschool has great potential to expose youth to new ideas or to old ideas in novel, engaging ways. As Freeman, Dorph, and Chi (2009) suggest, afterschool can “generate interest, engagement, and capacity to know and do science” (p. 2).

One area where afterschool may contribute to novel and engaging education is new technologies. Digital literacy skills—the ability to navigate, evaluate, analyze, communicate, and create information using digital technologies—are increasingly critical for success (Jenkins, 2009). Technology, the “T” of STEM, is broadly applicable in today’s world and will only grow in importance as innovation continues. Regardless of how many youth enter technology jobs—one primary rationale for the STEM education push—enhancing digital literacies is good for the populace.

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However, technology is less commonly seen in afterschool than science or math. In the Afterschool Alliance's (2014) recent panel study, 69 percent of parents with children or youth in afterschool reported that they encountered STEM learning, but only 30 percent said that their program offered technology and engineering. One reason for this finding may be that youth workers often do not have the technology expertise required to produce high-quality learning in digital literacy (Freeman et al., 2009).

If technology content in afterschool is desirable, but existing staff and systems are not prepared to deliver it, complementary services may be a viable way to provide that expertise. This article explores what we call "insert programs": the increasingly common practice in which an outside provider brings facilitators, content, and (usually) curriculum into an existing afterschool program. We use this term to distinguish *insert programs* from broader arrangements such as *partnerships* and *vendor relationships*.

Using insert programs to bring expertise into educational spaces may have wide-ranging benefits. However, it raises important questions about adult recruitment, professional development, and program implementation. This article presents a case study of an insert program that brings technology learning to afterschool programs. The content is computer programming, robotics, and web development. The outside provider recruits and trains adults to provide technological expertise. This case study highlights the promise of insert programs in STEM and other content areas while also revealing important challenges in implementation.

### Bringing in Outside Expertise

Bringing adults with content expertise into educational settings is not a new idea. Scientists have been visiting school classrooms for one-time demonstrations or activities for decades, though research on the effectiveness of such visits is rare (Laursen, Liston, Thiry, & Graf, 2007). Bringing teaching artists into classrooms or afterschool settings is also a common practice with a long history. A recent large-scale study found that teaching artists often bring innovative, student-centered practices into school classrooms (Rabkin, Reynolds, Hedberg, & Shelby, 2011).

Insert programs are common in 21st Century Community Learning Centers (CCLCs), the federal funding stream for afterschool programs. In the only study we could locate about this topic specifically, Smith and Van Egeren (2008) investigated partnerships in 21st CCLCs in Michigan. Across 163 sites, partner staff delivered 30 percent of all activities, sometimes together with site staff. Technology was offered by partner staff less often than any other activity type—in only 10 percent of sites where full management was not outsourced, as compared to 26 percent for arts activities. Supports and professional development for the insert program providers varied widely.

In Palm Beach County, insert programs are called "enhancements" or "extended learning opportunities"; they are an important component of a large and well-studied afterschool system. (For summaries of this countywide system, see Sinisterra & Baker, 2010; Smith, Akiva, Blazeovski, Devaney, & Pelle, 2008). Afterschool providers in the county select enhancement providers from a menu of offerings. In 2008–2009, 14 organizations provided nearly 1,800 enhancements for children in 134 afterschool programs (Baker, Spielberger, Lockaby, & Guterman, 2010). The countywide intermediary organization manages this system. Enhancements are well received by providers and children, and demand outstrips supply (Baker et al., 2010).

Involving professionals in STEM activities for youth is also not a rare practice. Gamse, Martinez, Bozzi, and Didriksen (2014) identified 29 research papers published since 2000 that evaluate the effectiveness of educational programs, both in and out school, in which STEM professionals worked directly with children or youth. However, most of these studies did not feature rigorous designs, and their conclusions call for more research. In addition, the research on insert programs so far has paid little attention to professional development for the adults who interact with children and youth.

### The Digital Corps Initiative

The Remake Learning Digital Corps, coordinated by the Sprout Fund and funded by the Grable Foundation, is designed to enable digital-savvy adults to conduct technology-based workshops in afterschool programs in Pittsburgh. Digital Corps operates at no cost to host sites

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and provides stipends for corps members. Adults with technology expertise are hired as corps members, trained to deliver particular technology-based content, and then deployed to lead multi-session workshops for tweens and teens. The Digital Corps launched in winter 2014 and, at the time of this writing, is in its fourth round, with a growing body of corps members (43) and outreach sites (25) and with an expanded tool kit of digital technologies. The curriculum now includes three distinct tracks:

- Webmaking uses storytelling-driven content to help students learn web development using such tools as Mozilla Webmaker and Thimble.
- Mobile Media focuses on creative media and developing applications for Android devices using MIT's App Inventor.
- Creative Computing explores visual programming and robotics using MIT's Scratch tool and the Hummingbird Robotics Kit.

Digital Corps operates in partnership with Allegheny Partners for Out-of-School-Time (APOST), the local youth program intermediary organization. APOST helps identify afterschool sites to host Digital Corps; it also provides introductory training in positive youth development, physical space for training, and ongoing consultation about operating afterschool programs. The ways in which Digital Corps and APOST collaborate is illustrated in Figure 1, which also shows the alignment of specific processes to the research questions discussed in the next section.

## Methods

Funded by an Edmund A. Stanley, Jr., Research Grant from the Robert Bowne Foundation, we used the Digital Corps insert program as a case study to address important basic questions about providing STEM activities in afterschool programs. One of the authors of this paper, Ani Martinez, is the program coordinator; the other two are university researchers. To closely follow the recruitment of professionals who would lend their expertise in afterschool programs, their professional development, and the quality of the afterschool workshops they led, we worked alongside Digital Corps leaders as participant-observers. Once the Digital Corps members were active in sites, we sat in on youth workshops at various afterschool programs and gave corps members opportunities to reflect on their experiences through surveys, roundtable reflections, and interviews.

We sought to answer three main questions, which are aligned with three processes depicted in Figure 1. Each question has a version that is applicable to insert

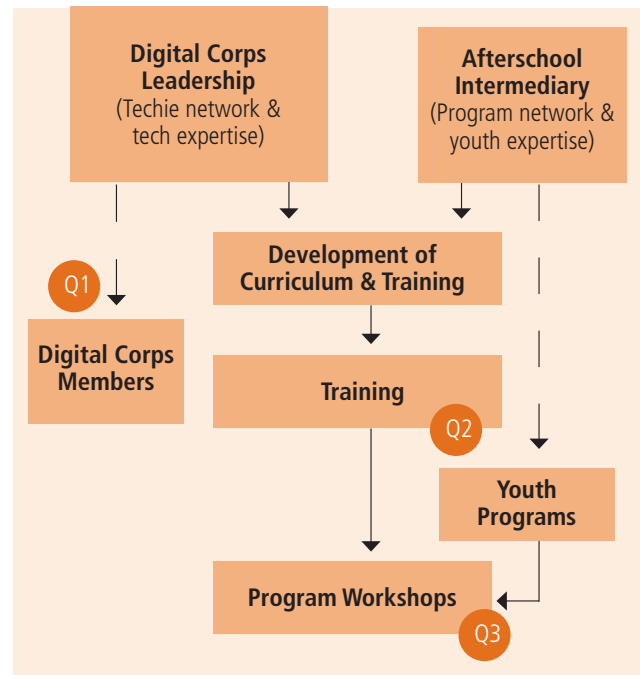


Figure 1. Flowchart of the Digital Corps Model

programs generally and a version that is specific to Digital Corps and our case study, as shown in Table 1.

We employed a mixed-methods approach, collecting artifacts such as recruitment materials, administering entry ( $N = 28$ ) and end-of-session ( $N = 27$ ) questionnaires to Digital Corps members, participating in professional development and soliciting feedback through surveys ( $N = 79$ ) on each training session, attending three roundtable reflection sessions with a total of 20 participants, and conducting exit interviews with 12 corps members. We also observed four teen workshops and collected an in-program survey from 176 teens. Data were compiled, analyzed, and reported back to the program coordinator throughout the process to inform program improvements. Analyses were primarily qualitative, involving thematic coding of data. Basic quantitative analyses served to inform our qualitative analysis.

## Case Study Findings

This presentation of our results is organized by the case study questions (Table 1). The following section discusses the general research questions.

### Question 1: Can We Build a Digital Corps?

Recruitment of adults for the Digital Corps was overwhelmingly successful, providing powerful evidence that the key resource—a population of tech-savvy adults with the expertise, availability, and motivation to participate

**Table 1. Research Question**

Process	Insert Program Question	Case Study Question
<b>ADULT RECRUITMENT</b>	Does a population of adults exist with the expertise, availability, and motivation to deliver content-based workshops in afterschool programs?	Can we build a Digital Corps?
<b>PROFESSIONAL DEVELOPMENT</b>	What professional development do insert providers need to deliver high-quality, content-based workshops in afterschool?	What professional development do corps members need?
<b>PROGRAM IMPLEMENTATION</b>	Are insert providers able to deliver workshops that reach the intended youth, are engaging, and accomplish the program goals?	Did it work?

in afterschool programs—does exist. The Remake Learning Digital Corps initiative received 55 serious applications and hired 34 corps members for the pilot round. Additional members were hired for the subsequent summer session, and a few new members have been added each round since. Analysis of questionnaires showed that Digital Corps members were typically in their 20s and 30s. They were well educated but did not report high household incomes. The pilot group was 61 percent female and was 68 percent White, 14 percent Black.

We expected that Digital Corps members would be like volunteers in mentoring programs: Most would be non-youth-worker professionals who wanted to spend time with kids. However, more pilot corps members came from youth programming than from technology: 84 percent reported having been informal educators, and 48 percent had been school teachers. Nearly 60 percent had at least five years of experience working with youth, and about 40 percent worked with youth daily in their current jobs.

Adults became corps members for a variety of reasons. In survey and interview responses, the most common reason, mentioned by 77 percent of members, was the same as the goal of the initiative: To increase digital technology skills and experiences for youth. Digital Corps members were proponents of this mission. One member put it this way:

Digital literacy is a new facet to success in today's world, and it's important for [youth and teens] to learn and

understand it. My hope with Digital Corps was to be able to expose youth in Pittsburgh to new technologies and to spark an interest in creativity and innovation!

Another facet of this motivation was a desire to serve youth who might not otherwise have opportunities to learn technology skills, as expressed by 17 percent of members. Another 20 percent wanted to improve technology offerings in established programs or in the region. Several corps members who were already connected to youth programs wanted to bring the Digital Corps or their learning from it back to their programs. For example, one wrote, "I'm looking forward to taking what I've learned and applying it to my program."

The second most common motivation for joining the program, given by 47 percent of respondents, was to further their own learning and development. For example, one corps member cited the "exciting opportunity to expand my skill set with these brilliant programs, and the opportunity to gain some teaching experience." The importance of the opportunity to build marketable skills should not be overlooked; insert programs may act as components in the professionalization of youth work (see Fusco, 2012). One corps member stated, "To be totally honest, I was, like, 'This would probably look good on a résumé.'"

Only two members specifically mentioned the stipend as being an important motivating factor. However, in a separate survey question, fully 86 percent of pilot

corps members rated compensation as important or very important in their decision to participate. This aspect also relates to the professionalization of youth work. Providing stipends supports the notion that digital literacy in afterschool is important and that facilitating learning in this area requires expertise.

### **Question 2: What Professional Development Do Corps Members Need?**

Digital Corps members generally liked the professional development workshops. Depending on the workshop, between 67 and 93 percent of attendees agreed with the statement “Today’s training was of high quality.” In particular, members appreciated the open, can-do, tech-friendly atmosphere fostered in the workshops. Survey responses indicated that attendees valued peer-to-peer learning during the time allotted at the end of most sessions for exploration of the digital tools. Time for HOMAGO—hanging out, messing around, and geeking out—is part of an experiential learning theory developed through ethnographic observation of youth engaging with new media (see Ito et al., 2010). Additionally, members appreciated aspects of the training created to meet the needs of busy professionals. For example, a relatively open schedule included sessions offered on multiple days and at various sites around the city. An online community on Google+ facilitated continued sharing of resources.

Although they generally liked the training, corps members noted that it tended to be pedagogically traditional. The walk-you-through-it model commonly used in technology training is essentially the old transmission model of education. One corps member said, “The trainings were all pretty good, but often were more like tutorials. ‘Click this, enter that’ without explaining why.” Rather than being encouraged to use a new facilitation model, corps members were left to figure out pedagogical approaches on their own. At some sites, this approach created friction between corps members as they tried to reconcile differing pedagogical approaches and expectations of afterschool. In her interview, one corps member spoke highly of her co-teachers on a personal and professional level but said that they had “different ideas of why we were there and how to structure lesson plans” as well as “completely different teaching styles and backgrounds, which is hard.”

Corps members differed in their strengths and in the training they needed to be successful. The needs of youth

workers who were expanding their program repertoire (and making a little extra money) tended to be different from those of the technology professionals looking to work with youth in their free time. One of the latter noted in an interview:

I would have really liked someone to tell me how to teach, and I felt a little outnumbered because it seemed like a lot more people were educators. I felt like one of the outliers; I was, like, a technology guy who just happened to be trying to get into it. So, I feel like maybe that was one of the reasons why there wasn’t actually any sort of instruction on instruction there.

This corps member was not alone. Although respondents indicated that many of their needs were taken into consideration, they did not always feel that the trainings

prepared them to facilitate programs with youth. On surveys, corps members reported a desire for more support and training in how to develop and deliver technology workshops that engage and challenge teens. In an early workshop, only 62 percent agreed that, “Today’s training made me feel more prepared to teach Scratch.” One member said, “I would have really appreciated (and, in fact, I expected)

a workshop/training on instruction and education.” More specifically, members of the first cohort indicated that they would have liked help with setting the tone, establishing a daily routine, co-teaching, lesson planning, practicing lesson delivery, differentiating for various ability levels, and scaling projects for limited timeframes.

Survey data provided additional information, shown in Figure 2. Although about half (57 percent) of the corps members felt adequately prepared after training both to use digital tools and to facilitate learning with youth, about a third (36 percent) felt prepared in one area but not the other. That is, 18 percent believed they would be good at understanding the tools but not good at facilitating with youth, and 18 percent believed they would be good with youth but not with the tools. In order to investigate further, we interviewed 12 corps members chosen specifically to represent these different confidence types. Interview data indicate that corps members who came into the program confident in their youth development skills may well have had their need for technology knowledge met. However,

Time for HOMAGO—hanging out, messing around, and geeking out—is part of an experiential learning theory developed through ethnographic observation of youth engaging with new media.

those who needed knowledge of youth development and pedagogy were not as well served. Respondents did note that the practice of pairing corps members who had strong youth facilitation skills with members who had good technology knowledge was in some cases effective.

As these findings surfaced, the program coordinator took steps to address them: A local mentoring organization provided a workshop about interacting with youth. However, the coordinator was not able to locate a short workshop on how to manage informal, hands-on workshops with young teenagers. To address this issue, the coordinator—along with some corps members—pieced together a set of classroom management and hands-on learning strategies applicable to informal learning. These strategies aimed to help the corps design an inclusive and productive program culture at each site. In addition, more pedagogy was embedded into training when possible. Participants noticed and valued these efforts, as indicated by a response later in the initiative:

I liked the way [the program coordinator] did trainings. They felt closer to how we would do them with kids, and were more experimental. I also enjoyed the mentorship training, specifically for suggesting phrases to use to make kids feel appreciated.

### Question 3: Did It Work?

Digital Corps members generally reported high confidence in their abilities to work with youth and teach digital technologies. At the end of the pilot year, 96 percent of corps members said they were glad they participated, and 92 percent indicated a desire to continue in the program. This

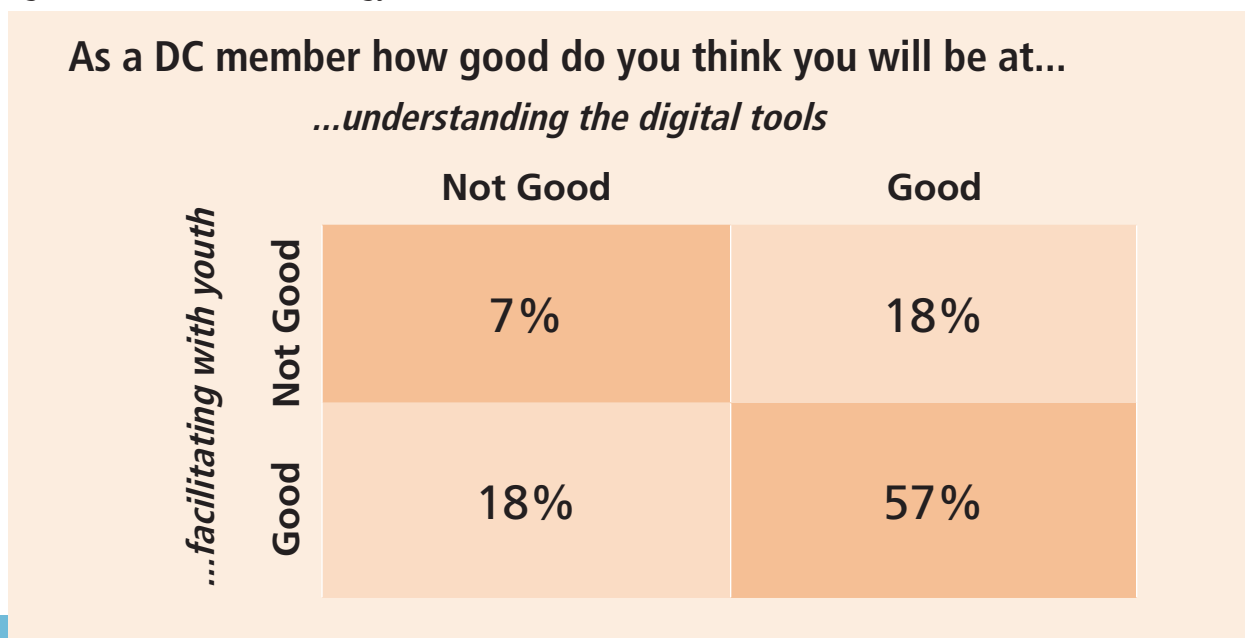
desire can be attributed, in part, to the positive effects the corps was seeing. In interviews, members revealed compelling stories of the youth, including one teen who, on completing a project, said, “Wow, I had never seen I could do something like this and had never had anybody invest the time to tell me that I could even be this good at something—at coding, at science and technology.”

The Digital Corps reached diverse youth in afterschool programs. Surveys showed that the youth were at the target age,

with the median being 13. The majority (64 percent) of youth were male; they were 30 percent white and 70 percent youth of color. Youth responded positively to the workshops and agreed or strongly agreed with the following statements: using the digital tools was fun (95 percent); I learned new skills at today’s session (91 percent); today’s workshop increased my interest in technology (78 percent); the leader

The findings also suggest that afterschool mentoring programs require program evaluation and improvement in order to align with the effective components and activities revealed in the literature.

Figure 2. Beliefs About Technology and Facilitation Skills



of this workshop is good at teaching (91 percent); the leader of this workshop knows a lot about technology (90 percent). Almost all of the teens indicated that they liked the sessions, and 94 percent would recommend the program to a friend.

We also asked youth in surveys what they learned in Digital Corps workshops—not expecting a comprehensive answer, but rather hoping to identify areas for future investigation. Responses indicated that the youth learned, in various workshops, to make a website, upload pictures, make apps, remake games, make videos, identify various motors and sensors, and code. In the words of one youth participant: “I learned that there are endless websites that help you create and discover technology. With my new skills I [am going to] pass it to [other] youth so they can get an interest in technology.” Youth expressed satisfaction with their experience: “I’ll impress people with my newfound skills” and “I think that it was cool to see nothing become something.” They appreciated the program structure: “The thing I liked most was the different challenges.” Another student appreciated “the way that the teacher was able to take time with each student individually.”

### **Generalizations From the Case Study**

Our findings about the Digital Corps are relevant to afterschool insert programs in general. In this section, we discuss how our results may apply outside of our case study, using the generalized forms of our research questions.

#### ***Question 1: Does a population of adults exist with the expertise, availability, and motivation to deliver content-based workshops in afterschool programs?***

In our mid-sized city with a county population of 1.2 million, it was not difficult to find adults with content expertise and an interest in leading afterschool insert programs. This finding is similar to the finding of Rabkin and colleagues (2011) that teaching artists are “an abundant but underdeveloped resource” (p. 19). Pittsburgh adults were willing to bring their expertise to afterschool programs if structures were in place to support their involvement. Indeed, they weren’t just willing; many Digital Corps members were excited to be involved. One said, “I love youth, tech, and community building. Who wouldn’t want to practice their three favorite things all at once?”

#### ***Question 2: What professional development do insert providers need to deliver high-quality, content-based workshops in afterschool?***

The variation in Digital Corps members’ experience with technology and with youth affected what they wanted

from training. Although slightly over half of the Digital Corps members felt well prepared in both the content of this insert program and their youth facilitation skills, a substantial number felt less confident in one or both areas. Some needed more training in content and some in facilitation. This variation is likely to be common in insert programs, particularly those that employ part-time staff.

Professional development in our case study tended to focus on content—in this case, how to use digital apps and tools—at the expense of facilitation and understanding of youth learners. This imbalance is likely to be common in insert programs, particularly those that involve technology. After all, facilitators do need to understand the content they are facilitating. However, insert program developers would be wise to ensure that ample attention is given to understanding youth and how to work with them.

In our case study, a quick fix for this training challenge—a local two-hour workshop in classroom management and facilitation—was not available. Although many afterschool programs bring in outside adults to work with youth, the coordinator was not able to locate a simple training to quickly bring novice facilitators up to speed. Specifically, the Digital Corps needed quick “onboarding” to help new corps members work with middle school youth in an open, hands-on environment while providing structure to curb classic behavior issues.

In fact, such a “quick fix” may not be possible. The skills required to establish a classroom culture and manage behavior are honed through experience; they are not quickly or easily taught in a workshop. Embedding youth development and facilitation throughout a longer content-based training may be a more viable option.

#### ***Question 3: Are insert providers able to deliver workshops that reach the intended youth, are engaging, and accomplish the program goals?***

Evidence suggests that our case study insert program reached its intended audience: diverse middle school youth, particularly those with limited access to technology. The vast majority of youth who completed surveys held the program in high regard. Although our research design did not allow for a rigorous assessment of youth outcomes, surveys and interviews told many stories of youth who could identify skills they had learned. The simple answer to Question 3 is “Yes, insert programs can be successful.” The more nuanced view is that insert programs seem to provide exciting, viable ways to get adults to share their expertise with youth, although much remains to be learned about how to make these programs successful.

## What's New and What's Old?

The Digital Corps works toward the goal of “remaking learning.” It is rooted in the concept of *disruptive innovation*, the change that occurs when new technologies render old products and companies obsolete (Lepore, 2014). In education, disruptive innovation results as learning systems built around new media technology replace traditional educational structures and pedagogies—especially their less effective aspects. The Digital Corps program had important innovative aspects, but traditional tensions and features held sway in other areas.

These promising new approaches and longstanding tensions are summarized in the box “What We Learned About Insert Programs.” Though insert programming is not new, applying it through an intentional citywide approach (a) is promising and relatively novel. Second, the professional development workshops were scheduled in flexible ways (b) and made use of online forums, such as a Google+ Community page, for scheduling and knowledge sharing (c). Finally, the youth workshops themselves contained novel elements (d), exposing young people to content they were unlikely to get elsewhere. Amidst this novelty, longstanding issues that affect any voluntary

learning setting included struggles with youth engagement (e) and attendance (f).

Other tensions were related not to the youth but to pedagogy (g). One important issue in the Digital Corps training was content knowledge versus facilitation knowledge. This tension has been explored in numerous subject areas in education, including technology (Harris, Koehler, Koehler, & Mishra, 2009). Another issue was with how much to “transmit” material using direct methods and how much to guide youth through exploration, using such forms as discovery learning, guided discovery, and constructivist learning (see Mayer, 2004). A related pedagogical tension is that traditional, transmission-based methods have a sort of inertia; even in a program with designs on disruptive innovation, traditional pedagogy is common.

These pedagogical issues are likely to emerge in any afterschool insert program, particularly in systematic, multisite initiatives like the Digital Corps. If disruptive innovation is a goal, this factor requires attention. Technology programs, in particular, may tend toward traditional pedagogy because the procedural nature of using computer applications can lend itself to how-to instruction. Also, instructors may fear “breaking” the device or software and then being unable to

### What We Learned About Insert Programs

1. Adults with content expertise and a willingness to work with youth are available.
2. The tendency, at least with technology, is to focus professional development on content at the expense of facilitation and youth development.
3. Adults may need training in content, facilitation, or both. Individual adults vary in how much they need either one.
4. Short workshops on facilitation or youth development may not be easy to find or deliver.
5. Innovative educational programs like the Digital Corps encounter age-old tensions. One approach that can work is to embrace the new while learning from the old.

Promising new approaches	Longstanding tensions & issues
a) Network-based (citywide) insert programs for afterschool to bring in adults with content expertise	e) Youth motivation and engagement
b) Flexible professional development structures and schedule	f) Irregular voluntary attendance in afterschool
c) Use of digital technologies in professional development	g) Pedagogical tensions: Content knowledge versus facilitation skills Directed versus exploratory learning The inertia of transmission-based pedagogy
d) Novel content in afterschool, such as programming, web development, and robotics	



troubleshoot. In addition, program developers may decide not to focus on teaching facilitators how to teach because they assume that inserting technology professionals into afterschool is in itself disruptive. However, the largest challenge in this area may be the limited time available to provide facilitators with a full suite of trainings that incorporates both content knowledge and pedagogical approaches.

### Remixing for Innovation

Perhaps a good way to think about educational innovation is to frame it as remixing, to borrow a word from the tech world. Belshaw (2014) says that food recipes offer a way to understand remixing. Recipes cannot be copyrighted, but they are good starting places for experimentation and adaptation (Belshaw, 2014). This thinking can be applied not only to web development but also to educational innovation. Established practices and research can be integrated into novel learning opportunities that restructure elements of a learning environment such as who the teacher is and what the learning goals are.

It is encouraging to find that members of the public are ready and willing to help. Insert programs can capitalize on community expertise and build valuable relationships. One corps member told the story of a young man, an aspiring rapper, who became so interested in a webmaking workshop that he asked, "How can I make this a website where I can put my YouTube videos?" The corps member went on to say, "By the end of the lesson, it had become a jumping-off point for him to further pursue that knowledge. That was awesome to see." Another corps member, after sharing a similar story, noted, "If you give the child the tools, they will do with it what they need to." If bringing outside adults with expertise into afterschool programs can provide such tools and produce such experiences, that is an innovation worth pursuing.

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