**Bringing in the Tech:**
**The Remake Learning Digital Corps,**
**an insert program for enhancing technology in youth programs**

**Draft**

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*I love to give back to young minds and influence theirs perceptions of the world*

*through technology and science. – Digital Corps Member*

Afterschool continues to be promoted as a complementary setting to school for efforts to strengthen STEM education in the U.S. (e.g., Krishnamurthi, Bevan, Rinehart, & Coulon, 2013). This is a reasonable idea: 10.2 million (18%) 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 provides great potential for exposing youth to new things or old things in novel, engaging ways—as Freeman, Dorph, and Chi (2009) suggest, to “generate interest, engagement, and capacity to know and do science” (p. 2).

One area where afterschool may contribute to novel and engaging education is around new technologies. Digital literacy skills—to navigate, evaluate, analyze, communicate, and create information using digital technologies—are increasingly critical for success in today’s world (Jenkins, 2009). Technology, the ‘T’ of STEM, is broadly applicable 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. However, technology is less commonly seen in afterschool than science or math. In the Afterschool Alliance’s (2014) recent panel study on participation, 69% of parents with children or youth in afterschool report that they encounter STEM learning opportunities, but only 30% say their program offers technology and engineering. One reason for this may be that the technology expertise required to produce high quality learning in digital literacy is often not held by youth workers (Freeman et al., 2009). There is great need to establish high quality programs in which youth—especially less privileged youth—can learn digital literacies with supportive and tech-savvy adults.

 If technology content in afterschool is desirable, but existing staff and systems are not prepared to deliver it, bringing in complimentary services to provide that expertise may be a viable solution—one that we explore in this article. There are increasing calls for (and a few working examples of) ecological systems approaches in which afterschool is part of a coordinated set of formal and informal learning opportunities available to youth in a given community (Ito et al., 2013). Insert programs could help with this networked ecosystem approach by coordinating a topical thread of experiences over time and across sites. Bringing content-savvy adults into educational spaces to facilitate these experiences has wide-ranging benefits. However, it raises several important questions about recruitment, professional development, and program implementation.

**Outside Expertise**

*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! – Digital Corps Member*

Bringing in adults with content expertise into educational settings is not a new idea. The “scientist-in-the-classroom” model, for example, where scientists visit school classrooms for one-time demonstrations or activities has happened for decades and is relatively common, though research on the effectiveness of such programs is rare (Laursen, Liston, Thiry, & Graf, 2007). Bringing artists in to the classroom or afterschool setting, as teaching artists, is also an increasingly common practice with a long history. A recent, large-scale study found that teaching artists are able, in many cases, to 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 specifically about this topic, Smith & Van Egeren (2008) investigated partnerships in a dataset with 91% of grantees in Michigan in the 2005-2006 school year. Across 163 sites, partner staff delivered 30% of 8,201 total activities (sometimes together with site staff). Technology was offered by partner staff less often than any other activity type, occurring in only 10% of sites where full management was not outsourced (compare to 26% for arts activities). These partnerships were managed by grantees (versus a central organization) and supports and professional development for the insert program providers varied widely.

In Palm Beach County, insert programs are called “enhancements” or “extended learning opportunities,” and are an important component of a large and well-studied after-school system (For a summary of this countywide system, see Sinisterra & Baker, 2010). 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 for them outstrips supply.

Involving STEM 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 in which STEM professionals work directly with children or youth. However, most of these studies did not feature rigorous designs and their conclusions call for more research. In addition, across research and practice there is little attention to professional development for outside adults that interact with children and youth in insert programs.

**The Digital Corps Initiative**

*The Digital Corps was exactly what we needed to jumpstart digital learning in our program. The children and youth we serve would definitely benefit from continuing to work with this program in the future. - Youth Program Site*

The Remake Learning Digital Corps, coordinated by the Sprout Fund in Pittsburgh, is designed to enable digital savvy adults to conduct technology-based workshops within afterschool programs. Adults with technology expertise are hired as Corps members, trained to deliver particular technology-based content, and then deployed to lead multi-session workshops in existing programs for tweens and teens. Workshops introduce specific technologies focused on coding/programming through animation, robotics, and website making. The Digital Corps rolled out in Winter 2014 and is now in its fourth round with a growing body of Corps members (43), outreach sites (25), and 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 (Webmaker, Thimble, etc.); *Mobile Media* focuses on creative media and creating applications for Android devices (App Inventor); and *Creative Computing* explores physical computing (Scratch and Hummingbird Robotics kit).

Digital Corps operates in partnership with several organizations. Allegheny Partners for Out-of-School-Time (APOST), the local youth program intermediary organization, helps identify afterschool sites to host Digital Corps. APOST also provides training in positive youth development, physical space for Digital Corps member training, and ongoing consultation about operating programs in afterschool settings. Digital Corps is also part of the Pittsburgh Hive Learning Network (*hivepgh.sproutfund.*org), an initiative to promote connected learning experiences for tweens, teens, and young adults (See Ito et al., 2013).

Digital Corps operates at no cost to host sites and provides stipends for Corps members. Generous support from The Grable Foundation makes this possible and helps maintain a small technology-lending library comprised of laptops, robotics kits, mifi hotspots, etc. Over sixty afterschool youth programs have applied to be part of the Digital Corps initiative, indicating the high demand for these services. About a third of those sites have been matched with Digital Corps member thereby reaching about 600 area youth thus far. The goal is to continue to extend the reach of the Corps and build capacity within organizations to continue to support digital literacy for youth.

[INSERT FIGURE 1 ABOUT HERE]

**Methodology**

The Digital Corps initiative provided the context for addressing several important, basic research questions about ways of establishing high quality STEM activities within afterschool programs. A National Afterschool Matters Initiative Edmund A. Stanley Jr. Research Grant provided funding that allowed us to study the Corps as case example to learn about recruiting, training, and engaging adults in this technology insert program. To closely follow the recruitment of professionals to lend their expertise in afterschool programs, the professional development of these individuals, and program quality in content-based afterschool workshops, we worked alongside the leaders of the initiative as participant observers throughout the recruitment and professional development process. Once the Corps members were active in sites, we sat in on youth workshops at various afterschool programs and maintained communication with Corps members providing them opportunities to reflect on their experiences through surveys, focus groups, and one-on-one interviews. In this manner, we sought to answer three main research questions. These questions are specific to this case study but generalize to broad questions about (1) the adults involved in an intentional insert program for afterschool, (2) training for those adults, and (3) their ultimate ability to deliver engaging and skill-building workshops for youth.

* ***Research Question 1: Can we build a Digital Corps?*** Does a population of adults exist with the expertise, availability, and motivation to deliver content-based workshops in afterschool programs?
* ***Research Question 2:*** ***What professional development do Corps members need?*** What professional development do insert providers need to deliver high quality, content-based workshops in afterschool?
* ***Research Question 3: Did it work?*** Are Corps members able to deliver workshops that reach the intended youth, are engaging, and accomplish the program goals?

In order investigate these questions we employed a mixed-methods approach collecting artifacts (such as recruitment materials), administering Digital Corps entry (N=28) and end-of-session (N=27) questionnaires, participating in professional development and soliciting feedback through surveys on each training session (N=79), attending roundtable reflection sessions (N=3 sessions with N=20 participants), observing teen workshops (N=4), collecting teen session surveys (N=176), and conducting exit interviews with Corps members (N=12). Data were compiled, analyzed, and reported back to the program coordinator throughout the process to inform productive change.

**Results**

**Can We Build A Digital Corps?**

*I love youth, tech, and community building. Who wouldn't want to practice their three favorite things all at once? – Digital Corps Member*

Recruitment of adults for the Digital Corps was overwhelming successful and provided powerful evidence that the key resource—a population of tech-savvy adults with the expertise, availability, and motivation to participate in afterschool programs—does exist. Leaders of the Remake Learning Digital Corps initiative received 55 serious applications from adults wishing to be Corps members, and they hired 34 for the pilot round. Additional members were hired for the subsequent summer session and a few new members have been added to the Corps each round since.

Through analysis of questionnaires, we found that Digital Corps members are typically in their 20s and 30s and are well educated, but do not report relatively high household incomes. The pilot group was 61% female and 68% White, 14% Black. We expected the Corps to function like mentoring programs in terms of the population of adults who would participate; that is, we expected Corps members to primarily be non-youth worker professionals that wanted to spend some time with kids. However, the pilot Corps members come more from the youth program world than the professional technologist realm: 84% reported having been informal educators, 48% school teachers, nearly 60% reported having at least five years of experience working with youth, and about 40% work with youth daily in their current jobs.

Adults became DC members for a variety of reasons. In survey and interview responses to our questions about why they joined, the most common reason mentioned, by 77% of members, was the same as the goal of the DC program: To increase digital technology skills and experiences for youth. Several of these members (17%) specifically described a desire to serve youth who may not otherwise have such opportunities. A related motivation, given by 20% of members, was to improve technology offerings in established programs or in the region—several Corps members were already connected to youth programs, and they brought the DC program and/or the things they learned in DC back to those 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% of respondents, was to further their own learning and development. For example, one Corps member wrote, “The exciting opportunity to expand my skill set with these brilliant programs, and the opportunity to gain some teaching experience.” This aspect—the opportunity to build marketable skills—should not be overlooked. One DC member even stated, “To be totally honest, I was like this would probably look good on a resume.” A related motivation was networking (20%). One Corps member wrote that he was drawn to, “the opportunity to work with local youth and other Corps members and contribute to local community centers/youth programs.”

Finally, only two members specifically mentioned the stipend as being an important motivating factor. However, in a separate survey question the vast majority of DC pilot members (86%) rated compensation as important or very important to their decision to participate.

**What Professional Development Do Corps Members Need?**

*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. – Digital Corps Member*

Corps members differed in their strengths and types of resources they needed to be successful. As noted earlier, few were professional technologists looking to work with youth in their free time; rather, most were youth workers expanding their program repertoire (and making a little extra money). To meet these needs the Digital Corps created training for busy professionals with some non-standard aspects, such a relatively open PD delivery schedule, which included sessions offered on multiple days and at various sites around the city and an online community to facilitate continued sharing of resources. These workshops were generally well liked, with 67%-93% of participants (depending on the training) agreeing with the statement “Today’s training was of high quality.” In particular, DC members appreciated the open, can-do, tech-friendly atmosphere fostered in PD workshops. Many survey responses indicated important peer-to-peer learning during “geeking out or messing around” time, which was allotted at the end of most training sessions for people to explore the digital tools on their own or in small groups. The provision of such time is based on HOMAGO—hanging out, messing around, and geeking out—an experiential learning theory developed through ethnographic observation of youth engaging with new media (See Ito et al., 2010).

However, participants did not always feel like the workshops prepared them to teach. In questionnaire responses, Corps members reported a desire for more support and training in how to develop and deliver technology workshops that engage and appropriately challenge the teens. In an early workshop, only 62% agreed that, “Today’s training made me feel more prepared to teach Scratch.” One member expressed this sentiment, “I would have really appreciated (and, in fact, I expected) a workshop/training on instruction and education.” More specifically, the first cohort indicated they would have liked help with: setting the tone, establishing a daily routine, co-teaching (negotiating roles and responsibilities), lesson planning (it takes a lot of time), practicing lesson delivery, differentiating for various ability levels, and scaling projects for limited timeframes.

[INSERT FIGURE 2 ABOUT HERE]

Although about half (57%) of the Corps member felt adequately prepared both to use digital tools and to facilitate with youth, about 36% felt prepared in one area but not the other (See Figure 2). That is, 18% believed they would be good at understanding the tools but not good at facilitating with youth (and 18% vice versa). In order to investigate this further, we interviewed 12 Corps members, specifically chosen to represent these different confidence types. Interview data indicates that Corps members who came into the program confident in their youth development skills may very well have had their technology knowledge needs met in the trainings. Acquiring youth development and pedagogy knowledge, however, was a need not as well met in the professional development. Participants did note that pairing a Corps member with strong youth facilitation skills together with a member with high technology content knowledge was in some cases effective. Those situations that were less effective were pairings in which there were differing perspectives on education in formal and informal learning environments. Like the teen workshops themselves, PD can take advantage of the skillsets of the group, but needs to be differentiated to meet the various needs of the Corps and address expectations. Although some aspects of the PD were innovative (scheduling, virtual community, and technology tools), the PD staff wrested with age-old pedagogy questions of discovery verses knowledge transmission, and there was a tendency to default to teaching the technology content in a step-by-step, transmission fashion.

When these findings surfaced, the program coordinator took steps to address them, including providing a training workshop about interacting with youth from a local mentoring organization. However, the remedy sought—an approximately 2-hour workshop on how to understand and facilitate workshops with young teenagers—did not exist locally and had to be created for this purpose. In addition, when possible, more pedagogy was embedded into training. Participants noticed and valued these efforts: “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.”

In an effort to continually improve and meet both the needs of the Corps and the teens, the next round of Digital Corps professional development will begin to move away from the “tutorial style” seen thus far and will instead rely more heavily upon a “flipped material” format. This type of PD calls on Corps members to explore digital technologies outside of scheduled training times in order to be prepared to work together and engage in scaffolded challenges during group training sessions. Bringing more relevant forms of pedagogy into professional development and testing demands on time and access to technology may unearth valuable points for further research and provide a model for technology-based insert programs.

**Did it work?**

*“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.” – Teen Participant*

Corps members overall reported high confidence in their abilities to work with youth and teach digital technologies. At the end of the program 96% of Corps members indicated they were glad they participated, and 92% of Corps members in the pilot round indicated their desire to continue in the program. This desire to continue can, in part, be attributed to the positive reach the Corps was seeing.

The Corps reached a diverse set of youth within existing afterschool programs. Based on questionnaires, youth were primarily the target age (M=13) 30% white, 70% racial minority; but majority male (64%). The vast majority of youth responded positively to the workshops and agreed or strongly agreed to the following statements: Using the digital tools was fun (95%), I learned new skills at today’s session (91%), Today’s workshop increased my interest in technology (78%), The leader of this workshop is good at teaching (91%), The leader of this workshop knows a lot about technology (90%). Almost all of the teens indicated they liked the sessions and 94% would recommend the program to a friend.

We also asked youth in surveys what they learned in Digital Corps workshops. This was a limited, exploratory way to explore this topic—we did not expect to comprehensively address this question, but rather hoped to identify areas for future investigation. Youth responses indicated teens gained the ability to make a website, upload pictures, make an app, remake games, make videos, identify different 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 gonna pass it to [other] youth so they can get an interest in technology.” Youth expressed satisfaction with their experience (e.g. “I’ll impress people with my newfound skills.” and “I think that it was cool to see nothing become something.”) and appreciated the program structure (e.g. “The thing I liked most was the different challenges.” and “The way that the teacher was able to take time with each student individually.”)

Perhaps the most critical challenge was designing and supporting a curriculum that is flexible enough to allow youth to run with content, yet structured enough to maintain clear learning objectives both for the benefit of the youth and the Corps members. Many Corps members indicated they wanted some sort of reassurance from the program that they were on track in their workshops, that they were “doing it right.” They mentioned a desire to have goals articulated more clearly and to understand the intended outcomes of the program and how success (both their own and the programs) was to be measured. These comments came from members with experience all along the formal-informal spectrum.

**Putting It All Together: What’s new and what’s old?**

*Maya is a little girl who is 8 years old. 8 years old! She made a whole website by herself. That came from her having a self-awareness and an understanding that the tools that we were giving her, in Scratch, Mozilla, Hummingbird, were really there to become like play-dough in her hands. I was amazed and shocked. – Digital Corps Member*

Our findings about the pilot of the Digital Corps, summarized in Figure 3, can apply to afterschool insert programs in general. First, it was not difficult, in our mid-sized city (with a county population of 1.2 million), to find adults with content expertise and an interest in leading insert programs in existing afterschool sites. This is similar to Rabkin et al.’s (2011) finding that teaching artists are “an abundant but underdeveloped resource” (p. 19). It also speaks to Littky and Grabelle’s (2004) assertion that “education is everyone’s business.” Adults in the community are willing to bring their expertise to afterschool programs if the right structures emerge to support their involvement.

Second, we found that these adults varied in their degree of background experiences in content and in facilitation with youth, and that this variation impacted their experience in 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 confidence in one or both of these areas. Based on what Corps members said in later interviews, members varied in how much they would have benefited from training in content versus facilitation.

The initial training for the Corps focused on learning the digital technologies at the expense of focusing on facilitation and understanding youth learners. This type of imbalance is likely to be common in programs like this: Network-directed insert programs with a particular content focus that are operating for the first time. However, a quick fix for this training dilemma—finding a local two-hour workshop in tween facilitation to offer Corps members—was not available. This challenge is described in Finding 3 in Figure 3. Although numerous programs involve non-trained adults with youth in afterschool programs, simple on-ramp trainings are rare.

Our fourth finding is the least simple. A prominent aspect of promotion of the Digital Corps is that the program is innovative—working toward the goal of “remaking learning.” This is rooted in the concept of disruptive innovation, the change which occurs when new technologies render old products and/or companies obsolete (Lepore, 2014). Disruptive innovation in education is the idea that learning systems built around new media technology will replace traditional, school-based educational structures and pedagogies—and in particular, replace the less effective aspects of these settings. We found that the overall Digital Corps program had important, innovative aspects, but also areas in which traditional tensions and features held sway; and importantly, areas in which years of educational research and expertise may provide a valuable foundation.

These longstanding tensions or issues and promising new approaches are summarized in the table within Figure 3. As described in the introduction, the insert structure—content providers bringing their expertise into existing youth programs—is not new, but (a) applying it through an intentional citywide approach is promising and relatively novel. Second (b & c), the professional development (PD) training workshops were scheduled in innovative ways and made use of social media for scheduling and knowledge sharing. The workshops were offered multiple times and in locations across the city to increase access, introduce participants to community resources, and to meet the needs of working people. Finally (d), the youth workshops themselves contained novel elements: exposing young people to programming and robotics content they are unlikely to get elsewhere.

However, amidst this novelty, several tensions and issues with a long history in educational settings were salient. These included issues that will be present in any voluntary learning setting; namely struggles with (e) youth engagement and (f) attendance variations. However, many of these tensions were (g) pedagogical, involving the “how” of teaching or facilitating content-based learning activities with youth.

First, the idea of content knowledge versus facilitation knowledge (and their combination, pedagogical content knowledge; SHULMAN, 1986) has been explored in numerous subject areas in education, including technology (Harris, Koehler, Koehler, & Mishra, 2009), and was an important aspect in the Corps. Second, a leader in any educational setting must wrestle with how much material to “transmit” using direct methods, and how much to guide youth through exploration—the latter of which has many forms including discovery learning, guided discovery, and constructivist learning (For example, see Mayer, 2004). Relatedly, we list a third pedagogical tension—that traditional, transmission-based methods have a sort of inertia; that is, even in a program with designs on disruptive innovation, traditional pedagogy is commonly seen.

The PD in the Corps tended to be pedagogically traditional—i.e., transmission models to teach DC members how to use the tech tools, a walk-you-through-it model commonly used in tech training. One DC member expressed this: “The trainings were all pretty good, but often were more like tutorials. ‘Click this, enter that’ without explaining WHY. It left me feeling comfortable with what we did, but if I couldn't remember a step in the process.” Rather than being encouraged to use a new style of teaching or model of facilitating, pedagogical approach was really left to the discretion of each Corps member. At some sites this created friction between Corps members as they tried to reconcile differing pedagogical approaches and expectations of after-school. 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.” Another Corps member noted the importance of having someone on each team who understands learning and said there is merit to pairing techies and teachers together.

The issues and tensions of pedagogy (including the sometimes surprising resilience of traditional, transmission-based models) are likely to be salient for any afterschool insert program, particularly systematic, multi-site initiatives like the Corps. This is a factor that requires attention, especially if disrupting traditional education is a goal. Technology programs in particular, may tend towards traditional pedagogy because of the procedural nature of using computer applications (i.e., they can lend themselves to “how-to” type engagement). Another possible explanation is that instructors fear “breaking” the device or software and then being unable to troubleshoot if learners go off a designated path. In addition, it is easy to assume that a focus on the “how” of teaching is not necessary based on the assumption that inserting knowledgeable technologists into the world of out-of-school time may be disruptive enough in itself. However, perhaps the largest challenge in this area may be the limited time available to work with the adult leaders and provide a full suite of trainings incorporating content knowledge and pedagogical approaches.

**Conclusion**

*If you give the child the tools, they will do with it what they need to.*

 *– Digital Corps Member*

 Perhaps a good frame for thinking about educational innovations is the idea of *remixing* – to borrow a word from the tech world. Established practices and years of research can be applied and 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 there is a ready and willing public with the desire to help. Insert programs can capitalize on community expertise, provide a bridge, and build valuable organizational and personal relationships. One Corps member told the story of a young man, an aspiring rapper, who became really interested in the workshops and asked, “How can I make this a website where I can put my YouTube videos?” The Corps member went on to say that the young man had participated in the prescribed portion of the lesson, but that “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.” If bringing outside adults with expertise into afterschool programs can produce such experiences, it is an innovation worth pursuing.

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Figure 2

*Beliefs About Technology vs Facilitation Skills*

***What We Learned About Insert Programs***

1. There are adults with content expertise and a willingness to work with youth.

2. Such adults may need training in content and/or facilitation. Individual adults vary in how much they need either.

3. Short training workshops in facilitation or youth development are often not easy to find or deliver.

4. Innovative educational programs like the Digital Corps encounter age-old tensions. An embrace-the-new-but-learn-from-the-old approach makes sense:

|  |  |
| --- | --- |
| Promising new approaches | Longstanding tensions & issues |
| 1. Network-based (citywide) insert programs for afterschool to bring in adults with content expertise
2. Flexible professional development structures/schedule
3. Use of digital technologies in professional development
4. Novel content in afterschool; e.g., programming, web development, robotics
 | 1. Youth motivation and engagement
2. Irregular, voluntary attendance in afterschool
3. Pedagogical tensions

- Content knowledge vs facilitation skills- Directed versus exploratory learning- The inertia of transmission-based pedagogy |

Figure 3

*What We Learned About Insert Programs*