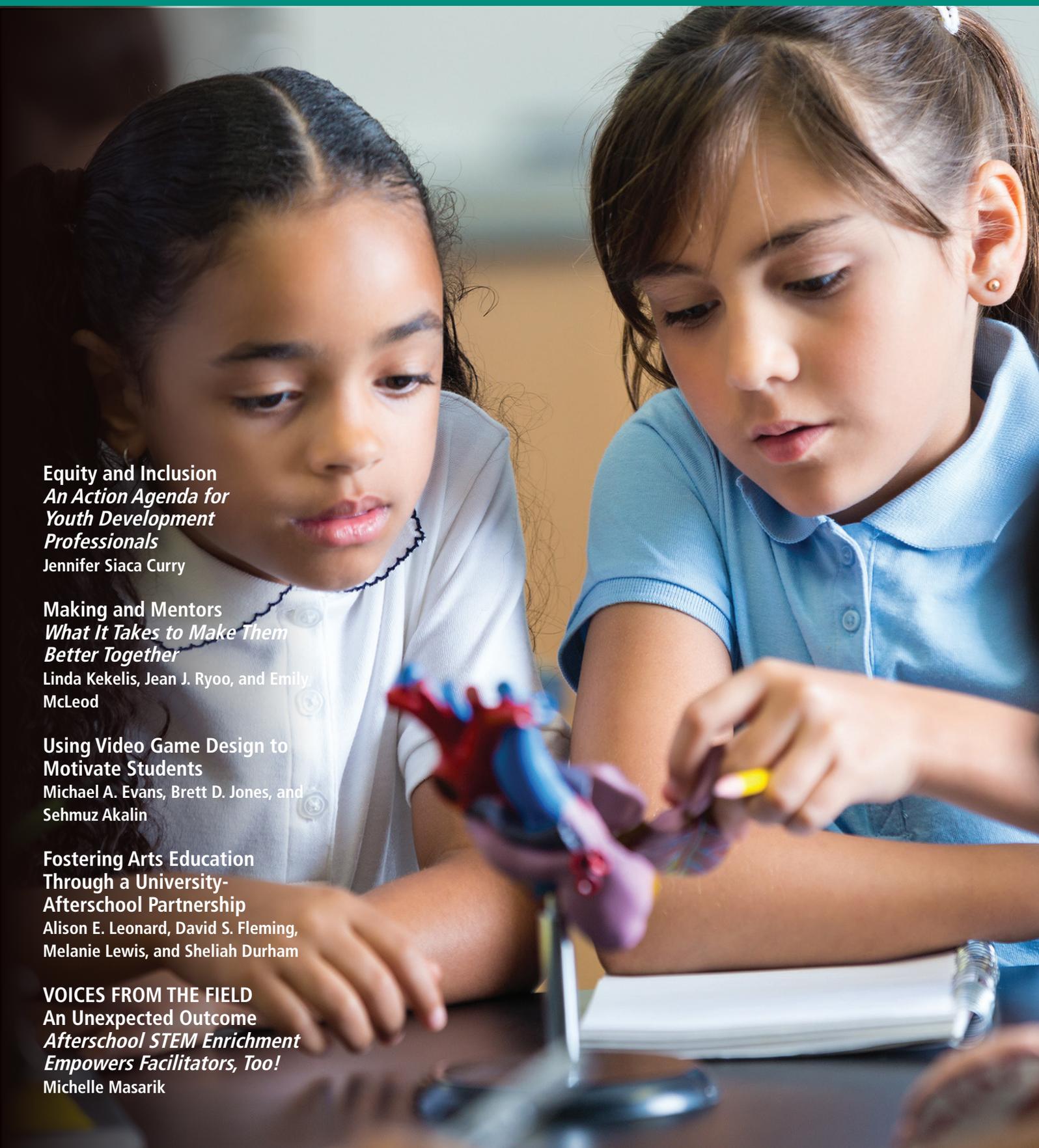


Afterschool Matters

Number 26 • Fall 2017



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Youth Development
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National
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WELCOME

The National Institute on Out-of-School Time (NIOST) was thrilled to welcome our second cohort of National Afterschool Matters Fellows earlier this fall to the campus of Wellesley College. For the next two years, these 25 amazing afterschool professionals will work with us and our partners at the National Writing Project to engage in practitioner-centered inquiry, research, and writing.

The fellows, who hail from 18 different states, represent a variety of out-of-school time (OST) experience: citywide initiatives, community nonprofits, public school districts, museums, zoos, and longstanding youth-serving organizations. I am excited to see how this second class of fellows will build knowledge and enrich the field.

Meeting these diverse fellows reminded me again of how much OST practitioners have in common. No matter where we are located or what kind of programming we provide, we are challenged to find enough time and money to train staff. We yearn to understand how best to support children with all their varied needs and backgrounds. We look for measurement and evaluation systems that will help us be accountable without being burdensome. Most of all, we strive to be present for our kids, with all the energy and enthusiasm they need us to bring.

This issue of *Afterschool Matters* underscores our common goals while demonstrating the diverse paths we follow: from Making and video games to arts education supported by university students and more. The lead article takes unity in diversity as its theme, challenging us to adopt fully inclusive language, practices, and attitudes. Our Voices from the Field essay—by a fellow from the previous iteration of the Afterschool Matters fellowship—emphasizes what all OST practitioners know in our hearts: that we learn as much as we teach and receive even more than we give.

Like Voices writer Michelle Masarik, participants in the fellowship retreat charted the journeys that brought them into the OST field. Several fellows talked about how their own experiences in afterschool programs or camps shaped their lives. Whether we came to the field as former participants or by some other route, we share a passion for the work of providing quality afterschool for all. As one fellow put it in her application profile, “All our children deserve to be surrounded by people who possess unshakable belief in their capacity to claim the sky.”



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Afterschool Matters is a national, peer-reviewed journal dedicated to promoting professionalism, scholarship, and consciousness in the field of afterschool education.

Published by the National Institute on Out-of-School Time with legacy support from the Robert Browne Foundation, the journal serves those involved in developing and running programs for youth during the out-of-school hours, in addition to those engaged in research and shaping policy. For information on *Afterschool Matters* and the Afterschool Matters Initiative, contact

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Equity and Inclusion

An Action Agenda for Youth Development Professionals

Jennifer Siaca Curry

Over time, afterschool and expanded learning programs have served multiple and evolving purposes: keeping children off city streets in the late 1800s, sheltering children from war in the early 1900s, filling a childcare void as more women joined the workforce in the 1970s (Halpern, 2002).

After the push of No Child Left Behind to focus on academic preparation, the field has moved to yet another phase: an expanding commitment to social and emotional learning. Fortunately, this out-of-school time (OST) trend is paralleled in formal education (CASEL, 2016). The Every Student Succeeds Act of 2015, for example, uses a broad definition of student success that includes safety, communication skills, and healthy relationships.

This new emphasis is an important one, but it cannot be fully implemented without attention to basic principles of respect and safety or to the need to value all children and youth. In recent years, American youth have witnessed a surge in racially charged violence and

discriminatory rhetoric. The OST field can and should respond with an explicit commitment to equity, inclusion, and culturally responsive practice. We must actively value and respect the identities of the young people we serve, including their race, religion, ethnicity, gender, socioeconomic status, sexual orientation, appearance, and ability. This essay proposes significant yet simple changes—grant funding *not* required—to support youth while embracing their diverse assets.

There are not enough pages in this journal to do full justice to every aspect of this sensitive topic. As one contribution, this article provides both immediate action steps and food for further thought and exploration. I offer a theory- and practice-based model for how OST

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professionals can approach their work using *critical social pedagogy*. This new pairing of existing frameworks, building on a tradition widely used in Europe, views educators as caregivers and protectors of children's rights. Framing OST professionals as critical social pedagogues, this article challenges us to take action both by attending to our own beliefs, attitudes, and behaviors and by designing programs with an antidiscrimination framework.

Toward a Theory and Practice of Critical Social Pedagogy

Cameron and Moss (2011) describe *social pedagogy* as “where education and care meet” and “as being concerned with children's upbringing” (p. 8). Educators in Greece, Hungary, and other European countries describe social pedagogy in terms that have no direct English translations but refer to concepts of “leading children” and “character development” (Bolger, 2015). Scholars in this tradition believe that education is a platform for addressing social ills. Learning contexts can either reproduce harmful social constructs or prevent them from being passed to the next generation. Social pedagogues place heavy value on empowering youth, building strong relationships, and fostering holistic lifelong learning—exactly the environment and relationships OST programs strive for. Using social pedagogy as a frame thus serves the OST field well.

In its most basic form, *critical theory* seeks not to simply understand the world, but to question the world in an effort to improve it (Bohman, 2005). A critical lens allows us to identify and change systems and power structures that restrain people from living their best lives. Scholars have argued that adults working with children must pay special attention to power: Even unintentional biases and insensitivities can wreak havoc on the young people who look up to these adults (Kirshner, 2015; Outley & Witt, 2006). In a recent analysis of culture-related incidents in youth programs, researchers described the multiple ways staff may react in these difficult situations. Reactions can range from being highly aware and taking action, to passively following rules while hoping the situation goes away, to ignoring discrimination altogether

(Gutiérrez, Larson, Raffaelli, Fernandez, & Guzman, in press). Critical social pedagogues are ready to address injustice immediately and have established practices and policies for doing so.

Applying a critical lens to social pedagogy shows the value of OST professionals' role in supporting youth to embrace their identities and to take action against discrimination. This framework does not suggest that OST professionals are responsible for teaching values or dictating feelings. However, a critical social pedagogue uses strategies that recognize youth autonomy, shift power to youth, build inclusive environments, and eliminate oppressive language and behavior. This stance is aligned with the field's emphasis on positive youth development, a prosocial approach that engages youth by recognizing their strengths and promoting opportunities for success and healthy relationships (U.S. Interagency Workgroup on Youth Programs, n.d.).

This article describes evidence-based ways critical social pedagogues in OST settings can take action to support healthy youth development. The first three recommendations rely on individual action, while the next three represent program-level efforts.

1. Build a personal understanding of our country's history of oppression
2. Adjust language to ensure inclusivity
3. Work to eliminate implicit bias
4. Use culturally responsive pedagogy
5. Address identity-based bullying
6. Recruit and develop staff who build and maintain a positive environment for all

How these strategies are applied and prioritized will vary by type of program, student population, and location—but they are not intended only for programs serving students of minority backgrounds or those in urban areas. All OST professionals across the country, whatever their setting, must collectively embrace an anti-discrimination stance by both protecting all children and promoting respect for all.

Educators in Greece, Hungary, and other European countries describe social pedagogy in terms that have no direct English translations but refer to concepts of “leading children” and “character development” (Bolger, 2015). Scholars in this tradition believe that education is a platform for addressing social ills.

Individual Professionals as Agents of Change

Before considering ways to design programs in an anti-discriminatory context, OST professionals must examine our own beliefs and practices. We must think of ourselves as agents of change. Sue and colleagues (2007) summarized the work of a number of scholars in stating that cultural competence for people in “the helping professions” (p. 271) means building an understanding both of our own identities and biases and of the worldviews of the people with whom we work.

Three strategies for OST professionals are presented below.

Explore, Understand, and Challenge Our History

The history of oppression in the United States is not adequately taught in schools. However, research suggests that a deeper understanding of that history is critical to eliminating racism (Burrell & Walsh, 2001). To be part of the solution, educators and youth developers must know about the historical practices that have hurt minority groups and that continue to have lasting effects today. Engaging with alternative texts reminds us that, although the U.S. is known for being the land of religious freedom, scratching the surface of history reveals tremendous religious persecution since the days of the earliest settlers (Davis, 2010). Reading beyond what we learn in school also uncovers continuing systemic racism, such as redlining practices that keep racial and ethnic minorities from owning property and living in thriving neighborhoods (Madrigal, 2014). I could go on, but instead I ask that you read widely and build a strong understanding of the challenges our country has faced and continues to face today.

It’s not only my opinion that suggests this knowledge is important. An extensive 2009 literature review found that teaching accurate history and acknowledging oppression are correlated with academic achievement (Hanley & Noblitt, 2009). That’s right: If your program is expected to support academic growth, using a realistic view of the world helps. Some may think it is not the job of OST professionals to teach what should be taught in school, but consider this anecdote from Marian Wright Edelman (2015): A 15-year-old Texas student recognized

that his social studies textbook ignored key elements of the slave trade because he had learned a more accurate version of history in his Children’s Defense Fund program. Not only did he explain the brutality of the slave trade to his classmates, but his protest led McGraw-Hill to issue an updated version of the text.

Check Your Language

Words matter. As a broad rule of thumb, OST professionals should subscribe to a philosophy of multiculturalism rather than color-blindness. Statements like, “I don’t see color” or “I treat everyone the same” may feel innocuous, but research and experience suggest that’s simply not true. Not recognizing individuals’ identities strips them of their experience and their sense of self. Moreover, studies have shown that people primed to have a color-blind perspective display more explicit and implicit biases than those primed with a multicultural perspective (Richeson & Nussbaum, 2004). A body of social psychology literature affirms this finding. Creating a shared, “second” intergroup identity, such as “participant in ABC Afterschool Program,” while

acknowledging each person’s primary identity as, for example, “child from neighborhood X or Y” is a better strategy for intergroup harmony than ignoring primary identities (Dovidio, Kawakami, & Gaertner, 2000; Hewstone, 1996). In OST contexts, we can use language and norms that embrace children’s multicultural and other identities *while also* creating a shared identity through routines, rituals, and activities that are unique to the program.

How can we speak to create inclusive environments for all? The Opportunity Agenda (2015) suggest five guidelines:

1. Focus on realistic policies and solutions that spur action
2. Lift up unity as a value and practice
3. Reinforce prosperity over scarcity, showing that people can share resources and be successful together
4. Be accurate and respectful when discussing identities and societal roles
5. Retire outdated language (Opportunity Agenda, 2015)

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The Opportunity Agenda has curated a list of words and phrases that impede equity and inclusion, providing replacement terms to use instead. For example, such phrases as “low man on the totem pole” or “let’s have a powwow” refer to Native American culture in inaccurate ways. There are perfectly good alternatives. *Social Justice Phrase Guide* (Opportunity Agenda, 2015) should be distributed to staff in all OST programs so they can use this positive language both internally and with students and families.

Understanding and Overcoming Implicit Bias

Implicit bias is a challenging topic, as most of us genuinely hold no ill will toward others and find the idea that we could be biased difficult to swallow. Tropp and Godsil (2015), in extensive studies, found that many people simply have an in-group bias; that is, they have a slight inherent preference for people who look like themselves or who share certain characteristics with them. Implicit biases can also be developed over time when negative images, rhetoric, or behaviors are associated with certain groups, whether accurately or inaccurately. Implicit biases are, in part, cognitive shortcuts that our brains use to make sense of the world; we use associations and categories to process information all the time. However, because we use them quickly and subconsciously, implicit biases may better predict how we will act than our explicit values do (Perception Institute, n.d.). Negative biases must therefore be dealt with explicitly.

To explore and mitigate your own implicit biases, Tropp and Godsil (2015) recommend the following strategies:

- Spend time with others who do not fit the same demographics as you; exposure alone helps reduce implicit bias.
- Pause to view the world from the perspective of others who are different from you, taking time to consider their lived experiences and world views before acting or reacting.
- Experience counter-stereotypic group members, especially when negative stereotypes are involved. Seek out people who challenge dominant assumptions about their race, gender, religion, ethnicity, age, or other characteristics.

In situations that range from assigning students to activities, to choosing who to hire, to having conversations with families, we have daily opportunities to think critically about how implicit bias affects our approach and to change how we act.

OST professionals can also minimize implicit biases by recognizing that they exist, deciding that their influence on how we perceive others is unacceptable, and consciously acting differently (Law, 2011). In situations that range from assigning students to activities, to choosing who to hire, to having conversations with families, we have daily opportunities to think critically about how implicit bias affects our approach and to change how we act.

Redesigning OST Programs with an Equity Focus

Although the OST field professes inclusivity as a core value, research has documented many instances of students feeling marginalized or unsafe in programs meant to support them (Gutiérrez et al., in press; Lin et al., 2016). The following action steps can be taken to design programs that minimize discrimination and move toward a deeper realization of inclusion.

Culturally Responsive Pedagogy in OST Programs

Gloria Ladson-Billings (1992) is the author of the seminal writings on culturally responsive pedagogy (also called culturally relevant teaching). She writes:

Culturally relevant teaching serves to empower students to the point where they will be able to examine critically educational content and process and ask what its role is in creating a truly democratic and multicultural society. It uses the students’ culture to help them create meaning and understand the world. Thus, not only academic success, but social and cultural success are emphasized by the culturally relevant teacher. (Ladson-Billings, 1992, p. 106)

Citing a number of scholars, a New York University report affirms that children learn best when their identities, cultures, and languages are reflected in the curriculum. This report also suggests that programs create space for difficult but necessary conversations because “culturally responsive classrooms can create a space where harmful images can be deconstructed and positive self and cultural affirmations portrayed” (Metropolitan Center for Urban Education Studies, 2008, p. 3).

These frameworks suggest that culturally responsive OST programming extends beyond symbols, holidays,

and token gestures. In culturally responsive programs, youth are engaged with texts, artifacts, projects, and activities that use their own cultures to teach them about themselves and the world.

Cultural responsiveness is not a one-size-fits-all solution; each community has to determine what culturally relevant practice looks like for its own students. For example, Christopher Emdin's (2016) book *For White Folks Who Teach in the Hood... and The Rest of Ya'll Too* suggests ways to teach Black students in specific urban communities, such as using elements of hip-hop culture and borrowing strategies used in predominantly Black churches. Such customization is key, and nuances within racial, ethnic, and other minority groups must also be attended to. However, there are exceptions; for example, African-

American, Latino/a, Southeast Asian, and Pacific Islander communities all use the spoken word and music to share their culture and history (Hammond, 2015). Therefore, opportunities to learn through music, theater, slam poetry, and other verbal platforms can be particularly effective for teaching diverse groups of children. OST leaders and their programs would benefit from further reading on this topic and from using a culturally responsive framework to evaluate activities and instruction.

Identity-Based Bullying and Behavior Management

Identity-based bullying includes insults, threats, or physical aggressions perpetrated because of who someone is. In a 2016 survey of over 1,000 middle and high school youth, 51 percent of respondents reported being bullied because of their appearance and 30 percent because of their race or ethnicity. Bullying based on gender, sexual orientation, and religion were each experienced by approximately 20 percent of respondents (Greytak, Kosciw, Villenas, & Giga, 2016). Ignoring identity-based bullying or treating it the same as other infractions misses a learning opportunity for all.

Jinnie Spiegler (2016) of the Anti-Defamation League offers several strategies for mitigating this type of bullying. One is to teach youth explicitly what identity-based bullying is and explain that it is caused, not by the victim's identity, but by the perpetrator's biases. Spiegler also recommends maintaining open lines of communication with students and establishing a norm of telling an adult when identity-based bullying occurs. Speaking to a staff member about an incident cannot be seen as tattling, gossiping, or betraying trust; rather, it should be viewed as an empowered decision to address behavior that will not be tolerated. Explicitly including such practices and norms in behavior management protocols communicated to youth will make the afterschool environment safer for all students.

Equity-Focused Recruitment and Professional Development for OST Staff

Most OST program leaders instinctively seek to hire staff whose characteristics reflect those of participating youth; they also expect staff to tend to the social and emotional needs of students. However, there are several additional ways to promote equity and inclusion through staffing practices. One strategy is to hire staff who are willing to engage in reflection, discussion, and action toward eliminating discrimination. Citing a long history of research, Gay and Kirkland (2003) note that, for educa-

FURTHER READING AND TOOLS FOR ACTION

PLANNING AND LEADING

- *Race Equity and Inclusion Action Guide*, Annie E. Casey Foundation
<http://www.aecf.org/resources/race-equity-and-inclusion-action-guide>
- *Racial Equity Tools*
<https://www.racialequitytools.org/home>
- "Supporting Youth with Special Needs in Out-of-School Time" by Jane Sharp, Elizabeth Rivera Rodas, and Alan R. Sadovnik, *Afterschool Matters*
www.niost.org/pdf/afterschoolmatters/asm_2012_16_fall/ASM_2012_16_fall_4.pdf
- *Social Justice Phrase Guide*, The Opportunity Agenda
https://opportunityagenda.org/files/field_file/SJPhraseGuide15_0.pdf

PEDAGOGY AND CURRICULUM

- Lesson plans aimed at reducing identity-based bullying, Anti-Defamation League
<http://www.adl.org/education-outreach/lesson-plans>
- Prevent religious bullying in the classroom, Tanenbaum Center
<https://tanenbaum.org/programs/education/>
- *Becoming Multicultural Educators: Personal Journey Toward Professional Agency*, edited by Geneva Gay, Jossey-Bass, 2013

tors, “knowing who they are as people, understanding the contexts in which they teach, and questioning their knowledge and assumptions are as important as the mastery of techniques for instructional effectiveness” (p. 181). OST leaders might shift their screening processes to assess whether candidates will engage in these individual practices. Leaders might also explicitly include these items in performance reviews, laying out expectations when staff are hired and using the review as an opportunity to hold them accountable to inclusive practices.

When it comes to professional development, Gay and Kirkland (2003) propose going beyond discussions about equity to ensure that educators “practice actually engaging in critical consciousness and personal reflection” (p. 186). Development opportunities for such practice include role playing, observation and feedback, and peer coaching. Professional development can also offer practical tools for staff to use when addressing incidents of discriminatory behavior, allowing them to feel prepared and confident.

OST program environments are almost entirely shaped by staff. It is therefore critical to hire well and to invest in in-service learning and development to build a program that values and supports all children.

An Action Agenda

These six strategies comprise an action agenda for youth development professionals in OST settings to fight discrimination and help youth value their own and others’ identities. Our field is built on the promise of social pedagogy; we are “the village” contributing to the upbringing of children in our communities. By assuming this role with a critical approach, we take responsibility for empowering youth and working against ideas and behaviors that negatively affect them. This article provides takeaways you can translate immediately into action, but I hope you will also discuss these strategies, adapt them, and question them. Together we can start an important dialogue that will change how the OST field supports children and youth.

Gay and Kirkland (2003) note that, for educators, “knowing who they are as people, understanding the contexts in which they teach, and questioning their knowledge and assumptions are as important as the mastery of techniques for instructional effectiveness” (p. 181).

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Making and Mentors

What It Takes to Make Them Better Together

Linda Kekelis, Jean J. Ryoo, and Emily McLeod

One way afterschool programs can create equitable learning opportunities in science, technology, engineering, and mathematics (STEM) is to build bridges between program participants and mentors from their local communities. To build meaningful connections that inspire and engage youth, mentors need to do more than simply come and talk about their job or lead an activity.

They need support to learn to be effective role models and facilitators with whom participants can find genuine connections. Our research-practice partnership, focused on an afterschool Making program for high school girls, reveals promising practices for supporting mentors in STEM-oriented making programs.

Why Making?

Making as an educational approach holds promise both for introducing mentors into STEM programming and for showing girls new pathways into STEM (Wittemyer & Gill, 2014). With its merger of cutting-edge technol-

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ogy and traditional arts and crafts, Making can help girls learn about electronics, robotics, metalwork, woodwork, sewing, and many other fabrication techniques. It can also attract mentors who have both technical expertise and personal interest in the creative aspects of Making.

Making's collaborative culture and cross-disciplinary approach draw girls in and sustain their engagement (Girl Scouts Research Institute, 2016). Making also enables adults to support youth in creating projects that both are personally relevant and can have a positive impact on their local communities (Liston, Peterson, & Ragan, 2008; Mosatche, Matloff-Nieves, Kekelis, & Lawner, 2013). The chance to design a low-cost wheelchair from bicycle parts or build a newborn resuscitator from a household aquarium pump can motivate girls who might not otherwise have participated in STEM programs. At its best, Making moves beyond step-by-step projects to give young people autonomy in designing projects that are driven by their interests and that include aesthetic and playful qualities (Blikstein, 2013; Martin, 2015; Petrich, Wilkinson, & Bevan, 2013).

Mentors in Afterschool and Making Programs

Mentors have been part of youth development for a long time, especially in programs for youth from low-income and underresourced communities. As afterschool programs have introduced STEM programming, they have brought in mentors as volunteers to design and lead STEM activities. Programs in which mentors help to close the STEM opportunity gap for students from lower-income families include Citizen Schools' use of AmeriCorps members and community volunteers to lead semester-long hands-on projects (Fabiano, Pearson, Reiser, & Williams, 2006). Another is US2020, in which city-based coalitions support mentors in afterschool programs for underserved and underrepresented youth (US2020, 2017).

Incorporating mentors into afterschool STEM programs has produced benefits for educators, mentors, and youth (Akiva, Povich, & Martinez, 2015; Groome & Rodri-

guez, 2014; McDaniel, Yarbrough, & Besnoy, 2015). For educators, working alongside mentors can increase their confidence in teaching STEM and using inquiry practices, increase access to ideas about innovations, and reveal the wide range of STEM career opportunities (Dolan, 2008). Mentors derive benefits that include increased confidence in their teaching skills, stronger communication skills, and opportunities to network with other scientists (Groome & Rodriguez, 2014; Science and Health Education Partnership, 2016).

But the benefits of STEM mentoring that matter most are the benefits for students. Mentors can help dispel young people's stereotypes about who can do STEM and what can result from STEM studies and careers (Dasgupta & Stout, 2014). They can support improvements in social, emotional, and behavioral domains (Karcher, 2005) and can offer academic and career guidance (Kekelis & Gomes, 2009). For youth who are first in their families to attend college or consider a career in STEM, guidance from mentors about classes, extracurricular activities, and support systems can make the difference between moving along a pathway and having to give up an aspiration (Cole & Blacknall, 2011).

The need for role models and mentors is especially important for girls. In a national study of female high school students, only 4 percent of those who were interested in pursuing STEM majors or careers had been encouraged to do so by mentors (National Research Center for College and University Admissions, 2014). For African-American and Latina girls, who often have fewer role models in STEM, the need is especially significant (Modi, Schoenberg, & Salmond, 2012). Mentors can show girls how technology and engineering can be personally meaningful and address needs in their communities (Kekelis & Joyce, 2014).

Making programs follow in a long line of STEM programs that incorporate adult mentors to support youth. We celebrate the efforts of afterschool programs that introduce STEM mentors to participants, especially girls and those born into communities where

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STEM professionals are not particularly accessible. However, it takes significant time to train afterschool mentors and support them to do the job well. Without adequate training and coaching, mentors not only will fail to inspire youth but can even discourage youth from engaging in STEM. This article's case studies illuminate promising practices that can set mentors up for successful partnerships with girls—or boys, for that matter—in afterschool Making programs.

Techbridge Girls

Techbridge Girls has a 17-year history of delivering afterschool STEM programs to girls in underserved communities and of offering professional development to other organizations. Girls participate in afterschool programs, co-led by a Techbridge Girls program coordinator and a school teacher, once a week during the school year. Role models visit programs or host field trips in which they share personal experiences working in STEM, dispel stereotypes about STEM careers, facilitate hands-on activities, and provide academic and career guidance. These role models receive one to two hours of training before their visit.

In 2013, Techbridge Girls began to incorporate Making projects into its high school programs to make them more girl-driven and less prescriptive, moving from step-by-step “recipes” toward open-ended design projects. Program coordinators and teachers initially found that the projects were technically challenging and difficult to support. Several groups would be working simultaneously on projects that differed enormously, from self-zipping jackets to electricity-generating bicycles. Such projects required a different kind of support than staff felt prepared to offer.

Techbridge Girls addressed the challenge by bringing in mentors to serve as a sounding board for girls' ideas, reinforce STEM skills and knowledge, and provide insight into practices that are valued in the workplace. Mentors, who are chosen through an application and interview process, have included graduate students, teachers, environmental engineers, and designers at toy companies. After being trained, mentors join the Mak-

ing program for a full semester, leading up to students' presentations at San Mateo's Maker Faire. Initially, Techbridge Girls was interested in mentors who could support and troubleshoot the technology of girls' projects. However, staff found that mentors who were not subject matter experts could still support technology-based learning while sharing professional skills such as how to plan a project, solve problems, and collaborate.

Mentors recruited for the high school Making program participate in a one-day professional development workshop. The first year we offered the training, it focused mostly on the technology the girls would use, introducing activities with Arduinos, an open-source electronics platform that can be programmed to control physical devices. We also spent some time on our standard role-model training content, such as how to talk to girls about work and personal experiences.

After that first year, we realized that the mentor training needed to focus less on technology and more on the practice of mentoring: how to support projects without taking them over. The second year's training focused explicitly on the expectations for Making projects and the role of a mentor. We conducted a growth-mindset activity during which mentors practiced giving feedback to girls. We also shared tips for working with youth and presented a role-play that demonstrated the sometimes challenging experience of engaging girls in conversation. Throughout, we emphasized that, although mentors can support and coach participants, the girls should always be driving the work.

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Data Collection and Analysis

The learnings in this article come from a research-practice partnership between the Exploratorium and Techbridge Girls as part of a larger project called the California Tinkering Afterschool Network (Bevan et al., 2016; Ryoo & Kekelis, 2016). To address the gap between educators and researchers, we jointly negotiated research questions and explored ways of examining and analyzing data together toward co-creating articles and resources that can be relevant to everyday practice—key activities of research-practice partnerships as described

by Coburn, Penuel, and Geil (2013). Observation field notes, video, and interview data were collected at every two-hour program meeting during two school years. Researchers also accompanied girls to San Mateo Maker Faire. The data were regularly reviewed by the researcher-practitioner team to inform both the afterschool program and the research methods. Each year of the data collection, we followed 25 girls, of whom approximately 40 percent were White, 20 percent Asian/Pacific Islander, 20 percent Latina, 8 percent African American, and 12 percent multiethnic. The program had two mentors in 2013–2014 and six mentors in 2014–2015.

Successes and Challenges in Supporting Mentors

Three cases of how mentors worked with Techbridge girls on their Making projects illustrate the challenges mentors face and how our training, particularly in the second year, helped to overcome those challenges. The first case illustrates a common mentorship challenge that the research-practice partnership worked through. The other two cases show mentors using strategies and approaches from the refined version of the mentor training in the second year. The second mentor focused on learning alongside the girls, rather than driving their projects. The third mentor built on what she learned in the training to show girls that she valued their ideas and to prioritize the girls' ideas over her own.

Case 1: Step In or Step Back?

This first case describes the struggles of a mentor in the first year who, in a well-meaning effort to help a team of girls finish their project in time for the Maker Faire, ended up taking over the project. Mentor Casey worked with a pair of girls who wanted to create an earring with a heart-rate sensor, using an Arduino. The girls didn't understand how to build the circuitry, so Casey drew a diagram showing how it worked (Figure 1).

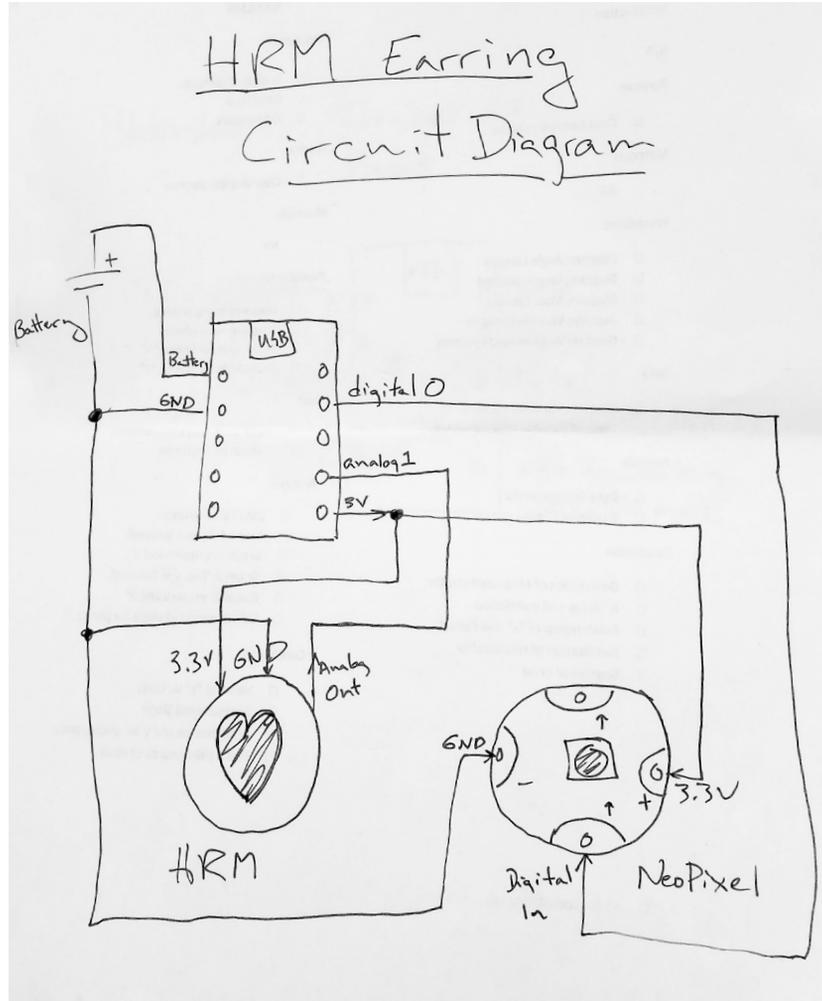


Figure 1. Circuitry diagram Casey drew for mentees

Researchers could not tell whether the girls understood the circuitry, because Casey proceeded to take the lead in both building and programming the earring. As Maker Faire approached, according to field notes, Casey became more hands-on to help the group finish in time. The week before the Maker Fair, Casey debugged the code alone, saying “We are fixing it,” though both girls stood aside, fiddling with their earring pieces.

This vignette illustrates a common challenge for mentors in afterschool programs: knowing when to step in or step back. Casey had extensive knowledge of computer science with an ability to inspire interest in the field. However, when Casey took over the project, the girls disengaged from what had originally been their idea. Casey had the best of intentions: wanting the girls to feel accomplished because they had something to show at the Faire. However, Casey's methods did not support the girls' confidence and skill development. Stepping back



Figure 2. Mentor-supported work with an Arduino

gives youth the space to take risks, make mistakes, and learn how to work through setbacks—all important steps in personal development that are more valuable in the long run than making the perfect project.

Casey's struggle with stepping in versus stepping back made us, the researchers and educators, realize that we should have stepped in ourselves to help Casey be a more effective mentor. We never want mentors, who so generously volunteer their time, to feel that their efforts are unappreciated. However, we recognized that, going forward, we needed to set up communication measures, joint reflection time, and supports for mentors so they could excel.

Case 2: Learning Alongside

Learning from our experience with Casey, the next year, we changed the training so incoming mentors would learn pedagogical practices and facilitation methods to support student learning without overstepping. Mentor training included conversations about how to support the girls in their project visions and nurture them through challenges. Roona took this professional development to heart, finding ways to approach her group as

a fellow learner, while still modeling the expert practices she had to offer from her STEM background.

One day in April 2015, two Techbridge girls, Danay and Catarina, were trying to figure out how to control a strip of LED lights with an Arduino, with the eventual goal of adding the lights to clothing. They found an example of the circuitry and code online and planned to test them out. As they began, they noticed that they were missing the wires they needed. Roona quietly left and returned with the wires. As the girls built their circuit, Roona occasionally lent a hand: straightening wires, holding the Arduino steady, and pressing on wires so they didn't fall out. When the girls were confused by the complex wiring, Roona helped them align their physical Arduino with the one in the diagram, working alongside them to understand how the pins on the board aligned with the Arduino code. (See Figure 2.) She pointed out a misplaced wire and suggested useful tactics for organizing wires based on color and purpose, but she never took over the process. When the girls realized they had connected the wires to the wrong side of the board, Danay seemed ready to quit. Roona encouraged her, saying, "It's just a quick fix! Let's do it!" Danay smiled and kept going.

Roona approached the students as a fellow learner and supportive coach. She openly shared that circuitry was new to her, though she could easily have figured out the circuit diagram based on her STEM experience. She attended to the needs of the group, both big and small. Even as she offered practical help like retrieving materials, she also subtly demonstrated practices that are important in engineering work, such as paying attention to detail, prototyping and testing, and persevering in the face of setbacks. Roona's case showed us how a beginning mentor could take up the key idea of mentor training: that the role of the mentor is to support girls, be a curious co-learner, and offer feedback.

What the previous excerpt does not describe is that Danay and Catarina worked well together only when their third partner was not around. Catarina and the third girl were friends before Danay later joined the group. Roona was not the only learning facilitator who struggled to deal with the way the first two girls failed to welcome Danay. Roona's way of finding common ground by playing the role of friendly collaborator probably worked as well as any more authoritative approach. She showed the girls that people who are not necessarily friends nevertheless can work together effectively. Her experience suggested another way we could improve mentor support: providing opportunities, in trainings or regular check-ins, to discuss group dynamics with program coordinators and learn how to support collaboration.

Case 3: Giving Space and Support

Laura's case illustrates how mentors can empower girls to pursue their own ideas, subtly shifting out of the role of adult leader. During an observation in May 2015, Christine, Leslie, and Melissa were sitting at their table with Laura, trying to figure out where to put the distance sensors on the shoes they were designing for use by people with visual impairments. The shoes were supposed to vibrate to warn the wearer when they were within 10 feet of an object. To start off, Laura reminded the group that they had decided last week to put sensors on both shoes but weren't sure they had enough time. Leslie agreed, adding, "Yeah, and didn't we think that maybe we could have it be side to side instead of only at the front?" Melis-

sa nodded, holding up a circuit board to represent a shoe and pointing to spots where sensors could be placed. But then Leslie said, "What I don't get is how it's going to help them avoid things in front." Laura stood up to physically demonstrate Melissa's point, showing how wearers might hold their shoe up and wave it side to side to address the lack of sensor at the front. She added gently, "Maybe, I don't know," as she sat down again.

The debate continued—one sensor or two? On the side or in front? When Leslie seemed confused, Laura affirmed her point and asked a follow-up question. The group finally decided to stick with one sensor—"It will be easier," noted Christine. Melissa asked, "So wait, do we need two motors? Or just one?" Laura and Leslie started to reply at the same time. Laura stopped herself. She and Leslie both tried to get the other to go first, which got the group laughing together. Laura again invited, "You go!" so then Leslie said she thought one motor attached to one sensor would be enough. Figure 3 shows the girls and their special shoes at

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the Maker Faire.

Laura served as an expert mentor who gave Tech-bridge girls the space to pursue their own ideas. While taking on the co-learner role Roona demonstrated in Case 2, Laura also engaged with the girls in subtle yet specific ways that pushed their work forward—but without taking over the process. She jumpstarted their work for the day with a reminder of what they discussed the previous week, supporting a sense of collaboration by describing previous decisions made by "the team." She demonstrated the girls' ideas about the sensors but didn't encourage them to think that her demonstration had to determine their design. When the girls shared reflections in a hesitant tone, Laura encouraged them by affirming the ideas in a way that pushed the conversation deeper.

Laura became deeply engaged as a partner in the project without being "the adult" who made the final decisions. This stance was demonstrated when Leslie and Laura started to speak at the same time, but Laura insisted that Leslie go first. This subtle move shifted power from the adult in the room to the girls. Laura gave the group the space to pursue their own ideas and solve their own problems, providing support but not instructions.



Figure 3. Girls preparing to present their shoes for the visually impaired at Maker Faire

Promising Practices to Support Mentors in Making Programs

Our analysis of observations of Techbridge Girls yielded a series of promising practices that we have been applying to our own work and that can help others interested in building mentors into their Making and STEM programs. Though these promising practices come from a girls-only Making program, they can apply to any mentoring efforts, especially in programs for youth who are underrepresented in STEM.

Set Mentors Up for Success

Casey's challenge is a common one for mentors and educators alike. Trainings in inquiry-based Making contexts should show mentors how to facilitate project work as advisers or helpers rather than doers. Programs should make the significant upfront commitment of time needed to help mentors understand the youths' needs and interests and learn the facilitation skills that support learning.

Because not all mentors have Casey's computer science background, our trainings also feature the kinds of technology, such as Arduinos, that girls are likely to use in their projects. Hands-on experience with their own

Making projects can bolster mentors' confidence and give them firsthand knowledge of the challenges girls might face and how to support them.

Make Time for Ongoing Constructive Feedback

Looking back on how Casey essentially took over his group's project, we realized that we should have stepped in to help Casey step back. Offering feedback to volunteer mentors can feel uncomfortable; educators don't want to seem unappreciative. We have found that prompts like "What can we do more of or less of to support you?" and "What did you find surprising or challenging today?" help to start conversations about areas for improvement. Making feedback an ongoing part of regular discussions can help mentors, educators, and researchers see this input as a gift intended to generate improvements rather than as a judgment. Staff need training on giving helpful feedback; they also need opportunities to talk about their reservations, to practice, and finally to debrief afterward.

Help Mentors Make Personal Connections

Though mentors can be helpful in supporting activities, they can be even more important as role models. When

they come in to guide Making projects or host hands-on experiments, make sure that they are wearing their “mentor hats” and not just facilitating STEM activities. Personal stories of their own experiences and passions can help set the stage for real connections with youth. Program educators can help by showing new mentors exemplary personal stories from previous mentors. They can invite new recruits to practice telling their stories to friends, learning to avoid jargon and to include personal interests like hobbies. Mentors can look to their past experiences to offer academic guidance about how they found and explored their interests. Then they can build on these experiences to share local resources such as a summer Making program at a public library or an online computer science course.

A particular way in which mentors can make personal connections is by sharing their struggles and personal failures. For example, one of our mentors, a successful engineer, had kept her learning disability a secret from her colleagues. However, she realized the value of sharing her challenge with Techbridge participants. Her story resonated with many of the girls, especially one who had a learning disability herself. Another mentor talked about how she enrolled in too many difficult courses in her first year at college, against the counsel of her advisor. This mentor told students to learn from her mistakes and listen to advisors. When mentors talk about how they’ve learned from challenges, and especially when they share strategies for success in the STEM pathway, they can help youth understand the hardships that may come up in the future and how to deal with them. Mentor training can include brainstorming on develop-

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mentally appropriate ways to talk about challenges and to acknowledge legitimate feelings while empowering youth to seek solutions. This sharing can help youth understand that they, like their mentors, face hardships, but that challenges do not have to constrain them.

Embrace Mentors with Diverse Knowledge and Skills

Curious learners, no matter their STEM background, are the best mentors for Making projects. A willingness to learn is especially important because Making projects often incorporate many different STEM and non-STEM skills. For example, Roona had rich STEM experience,

but not with Arduinos or Making projects. She was open with the girls about what she didn’t know and showed a desire to learn alongside them. Roona helped us see how important it is to embrace the diverse backgrounds mentors bring to the table rather than choosing mentors based on content expertise alone. We have learned to help mentors become co-learners with youth. In training, we model open curiosity so that mentors can observe and try out an inquiry-based stance. We reinforce mentors during their interactions with students for using questions and observations to empower students’ learning.

Seek Both Diversity and Shared Values

Like most programs, we recruit mentors who share ethnic, cultural, and gender backgrounds with our youth. We understand how important it is for youth to see women, people of color, individuals with disabilities, immigrants, and people from other underrepresented groups working in STEM fields. To find mentors who reflect our program demographics, we partner with professional groups like the National Society of Black

FOR MORE INFORMATION

- For details about our findings, as well as descriptions of student learning, afterschool facilitation, and professional learning in practice, read our full report at researchandpractice.org/resource/stem-making-in-afterschool/.
- Watch our three-minute video on the National Science Foundation Video Showcase of innovative work to improve science, math, engineering, and computer science education at stemforall2016.videohall.com/presentations/678.
- For information and resources on the California Tinkering Afterschool Network, visit www.exploratorium.edu/ctan.
- For more information about Techbridge Girls, visit www.techbridgegirls.org.

Engineers and Society of Hispanic Professional Engineers. Another way to introduce mentors who reflect the backgrounds of your students is to invite parents and siblings to show their Making expertise.

That said, our experience with Roona and Laura show how important it is to find mentors who believe in our educational philosophy and approach to learning. These mentors neither looked nor talked like the girls in their groups, yet they demonstrated the openness to learning and collaboration that the program needs to help the girls succeed.

Show Appreciation

It sounds simple, but thoughtful expressions of thanks can have a profound impact on mentors. Thank-you's not only validate mentors for volunteering their time, but also acknowledge the impact they have on students. Program leaders can encourage staff to express their thanks regularly in personal and meaningful ways including specific examples of how the mentor helped. For example, a thank-you note can describe how the mentor helped a student discover a new career path or an interest in a technical field of study. Staff can also point out how they themselves have learned about STEM skills and careers from mentors and how they are incorporating these insights into their teaching. In addition, staff might encourage students to write their own notes of thanks. Receiving such notes will make the mentors feel great, and writing them will teach students to express appreciation, an art that will serve them well in their academic journeys.

Looking Ahead

Making and mentoring are both at a crossroads. Both are scaling at a record pace, aspiring to reach considerably more youth and mentors than ever before. Each has potential for good; together, they can create a revolution in STEM learning.

Mentors can be especially helpful in bringing Making opportunities to groups underrepresented in STEM, including girls, youth of color, and students in under-resourced communities. Even when these young people choose *not* to pursue STEM careers, putting Making and mentors together has significant benefits. We've seen girls persevere through challenges in their design-and-build projects, learn to collaborate, and engage in critical problem solving—all with the support of mentors. These are essential educational and career skills in all fields, not just STEM.

As afterschool STEM and Making programs recruit more mentors, they need to devote adequate resources

to mentor and staff training. Being an effective mentor is complicated. So is supporting Making projects. Put together, they can be challenging to do well. Both staff and mentors need training to work together while supporting youth to drive their own Making projects. This investment will empower mentors to feel more confident and to effectively engage and inspire youth.

Acknowledgments

The California Tinkering Afterschool Network was funded by the National Science Foundation (DUE-1238253/DRL-1626365) and the S. D. Bechtel, Jr., Foundation under the Research + Practice Collaboratory.

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Using Video Game Design to Motivate Students

Michael A. Evans, Brett D. Jones, and Sehmuz Akalin

Because video games are so popular with young people, researchers have explored ways to use game play to engage students in school subjects (Peppler & Kafai, 2007; Rockwell & Kee, 2011; Small, 2011). Motivating students in science is especially important because of declines both in the number of young people who choose science careers and in the number of adults who have a sufficient grasp of science to make thoughtful decisions (Bell, Lewenstein, Shouse, & Feder, 2009).

To counter these trends, informal science educators have adopted video games and simulations as teaching tools and have called for research on how games can motivate youth to engage with science (Honey & Hilton, 2011). Video games that provide level-building capabilities

(Reiber, 2005) can be particularly useful in fostering informal science learning.

To add to the knowledge base, we studied how students used level-based video game development in an out-of-school time (OST) setting to learn science content. Building on prior efforts (Evans & Biedler, 2012; Evans, Norton, Chang, Deater-Deckard, & Balci, 2013; Evans, Pruett, Chang, & Nino, 2014), we explored how the project incorporated the video game to support learners' science motivation. This work with a commercial

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off-the-shelf video game is an example of how a learner-centered, technology-infused approach can advance the theory and practice of informal science learning (Honey & Hilton, 2011).

The Mission Evolution Project

Mission Evolution was designed as an afterschool partnership between investigators at a large research university and staff at a nearby high school in rural southwest Virginia. Students collaborated with their science teacher and university instructional and video game design experts to play *Spore Galactic Adventures*TM (SGA).

SGA, an expansion pack of the video game *Spore*,TM was selected for this project because it allows students not only to play the game but also to design their own game levels. In its simplest form, a game level, or mission, comprises a start state, an end state or goal, and obstacles presented as a series of acts that prevent players from reaching the goal. Using the level builder, players can design a mission that has up to eight acts, in which the “captain” (or protagonist) and crew members encounter challenges that may require socializing with or fighting against up to 10 species of antagonists. Antagonists can be generated by the player or downloaded from Sporepedia, an online warehouse of characters and items such as dwellings and weapons. Players can select features such as dialogue, physical appearance, atmosphere, protagonists, rewards, and music.

The purpose of using SGA in Mission Evolution was to teach students specific concepts of evolutionary biology, such as speciation (the evolutionary process that results in new species), mutation, adaptation, extinction, and natural selection. This objective aligned with the Virginia learning standards of the students’ school biology curriculum. Another objective was to teach students to use sound game design principles, such as giving players goals that are difficult yet achievable. The project thus challenged students to create games that were both scientifically accurate and fun to play. When the students had finished their games, the science teacher rated the games’ scientific aspects, and the university video game experts rated the design aspects.

Mission Evolution engaged students in a self-regulated environment. Students had creative control over their learning, estab-

lishing their own goals and monitoring their own progress with minimal, yet supportive, guidance. We anticipated that this project would motivate students to learn science and participate in science-related activities.

Motivation Frameworks

The design and study of Mission Evolution were guided by the principles of the MUSIC[®] Model of Motivation (Jones, 2009, 2015). We chose the MUSIC model because it applies current motivation research and theories to educational settings and provides a means to assess the effect of instruction on students’ motivation. The MUSIC model consists of five key components: eMpowerment, Usefulness, Success, Interest, and Caring. Research consistently demonstrates that, to engage students in learning, instructors must ensure that students:

1. Feel empowered to make decisions about some aspects of their learning
2. Understand why what they are learning is useful for their short- or long-term goals
3. Believe that they can succeed if they put forth the effort required
4. Are interested in the content and instructional activities
5. Believe that the instructor and others in the learning environment care about their learning and about them as individuals (Jones, 2009)

Each of these components has been shown to predict students’ motivation and engagement (Jones, 2009, 2015).

To examine the effects of Mission Evolution on student motivation, we also used the three *genres of participation* identified by Ito et al. (2009): hanging out, messing around, and geeking out. These categories capture the ways youth appropriate digital media and technologies, notably video games, to socialize, interact, and learn. *Hanging out* is a genre of participation in which technology serves merely as a social lubricant to bring like-minded youth together. *Messing around* characterizes youth who approach digital media with a purpose and growing shared interest. In the final phase of development, *geeking out*, youth demonstrate a degree of expertise that, though it often goes unrecognized in school settings, provides a sense of self and increased confi-

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dence, which in turn can lead to interest-driven learning. Although Ito and colleagues (2009) provide rich descriptions of hobby-based use of digital media, additional evidence of purposeful uses for school- and career-related topics would contribute to the literature.

Method

Phases of Mission Evolution

Mission Evolution was staged in three distinct phases that followed the semester schedules of the high school. In Phase 1 (spring), the video game experts conducted a series of three afterschool meetings with the students and teacher that provided a quick-and-dirty introduction to SGA. These meetings gave students the knowledge and skills they needed to succeed in the next phases; *success* is one of the components of the MUSIC model.

In Phase 2 (fall), students played the Cell and Creature stages of *Spore* in structured afterschool workshops. This practice helped students understand how evolution was treated in the game while becoming familiar with the *Spore* world, characters, and mechanics. This phase incorporated most components of the MUSIC model: It promoted *empowerment* by providing students with some choices and fostered *caring* in a supportive environment that allowed students to *succeed* at building their skills in an *interesting* activity.

Finally, in Phase 3 (the following spring), students designed, built, and tested their games. Students experienced more *empowerment* in the form of choices and decision-making ability. They *successfully* worked on an *interesting* activity in a *caring* environment. Finally, the

activity was *useful* because it helped students learn more about biology, taught them science and technology skills that could be relevant to future goals, and enabled them to help other students learn biology by playing the games Mission Evolution students had designed.

In Phase 3, eight 10th- and 11th-grade students participated in afterschool workshops in their science classroom once or twice a week for eight weeks. Workshops varied in length from 60 to 90 minutes, and participation was voluntary. In the workshops, the students designed and developed games based on a scientific concept they

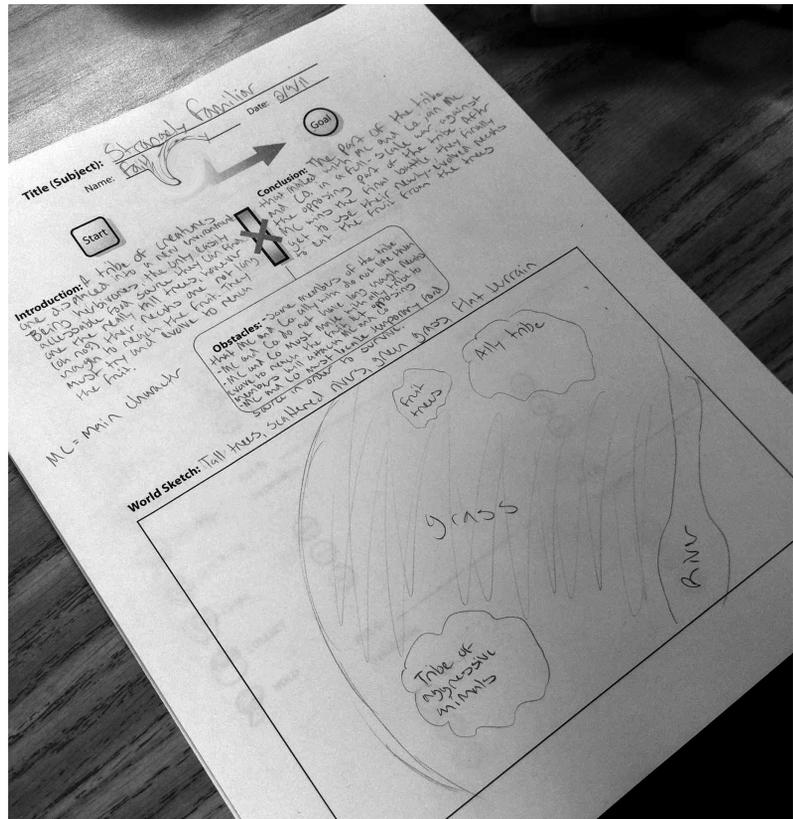


Figure 1. A student uses a storyboard template, adopted from industry practice, to sketch out her game about speciation, titled *Strangely Familiar*.

Table 1. Sample Games Produced by Students in Mission Evolution

GAME TITLE	DESCRIPTION
<i>Down the Rabbit Hole 1 and 2</i>	How DNA mutations help a species develop camouflage abilities to increase species fitness
<i>Apocalypse</i>	Survival of the fittest members of a species; how mate selection based on genetic variation can strengthen the species over time
<i>The Chita-Tánga</i>	How migration can necessitate adaptation to enable species members to survive and reproduce

Table 2. Interview Questions and MUSIC Components

MUSIC COMPONENT	INTERVIEW QUESTION
Empowerment	How much control do you have over what you're working on? What things do you have control over?
Usefulness	How useful is this activity for your goals this year or in the future? In what ways is it useful?
Success	How successful do you think that you will be at this activity? Why will you be successful?
Interest	How interested are you in working on this activity? How much do you enjoy this activity? What about it interests you? How important is this activity to you? Why is it important?
Caring (teacher)	How much does your teacher want you to succeed at this activity? How much does your teacher like to help you on this activity? How do you know? How much does your teacher care about you? How do you know?
Caring (students)	How much do other students want you to succeed at this activity? How do you know? How much do other students care about you? How do you know?

selected themselves, such as DNA mutation, adaptation, competition, and survival. Three of the games are described in Table 1. The 11 workshops were organized as follows.

- Sessions 1 and 2: Learn to complete expert logs for *Spore* analysis
- Session 3: Learn how to storyboard games, receive the rubric to be used to evaluate the games, and think about how playing *Spore* can contribute to the game design
- Sessions 4 and 5: Storyboard game designs (see Figure 1) and get feedback from the design experts
- Sessions 6, 7, and 8: Build games in SGA and get more design feedback
- Session 9: Demonstrate games to a “jury” of experts and receive feedback
- Session 10: Finalize games and receive final round of feedback
- Session 11: Celebrate with a party

During the sessions, students were supported by the school science teacher, a graduate student in computer science who helped with game design and technical issues, and a graduate student in science education who helped to verify the rigor and accuracy of the scientific concepts and their treatment in the games. This structure provided scaffolding without directing students to make specific choices as they designed, developed, and

tested their video games. It embodied the MUSIC model, providing students with *empowerment* in a *caring* and *interesting* environment that supported their *success* in an endeavor that at least some students found *useful*.

Research Design and Data Collection

Following a design-based research approach (Brown, 1992; Edelson, 2002; Lamberg & Middleton, 2009), we incorporated participant-observer techniques and periodic semi-structured interviews to investigate how the students, supported by their teacher, applied concepts in evolutionary biology to build their video games. We treated this project as a co-design activity involving the science teacher, her students, and researchers and graduate students from the nearby university.

To examine students' levels of motivation, we interviewed them at three intervals: during sessions 4 and 5, during sessions 7 and 8, and at the end of the project. The interview questions we developed (Table 2) assessed students' perceptions of the components of the MUSIC model. We recorded the interviews and then transcribed and analyzed the text. We also recorded field notes of our observations of project sessions and interviewed the science teacher at the end of the project. We then used all these data to identify themes.

Case Studies of Three Students

We selected three students as case studies to illustrate how students approached Mission Evolution with differing agenda, how the project affected students' motivation and interests, and how students' engagement varied by their genre of participation (Ito et al., 2009). Each student's perceptions are presented in the order of the MUSIC model components: empowerment, usefulness, success, interest, and caring.

Jack

Jack was a 17-year-old White male in 11th grade. When asked about his *empowerment* in the project, Jack reported that he had a lot of control: "We are pretty much doing whatever we want along the guidelines and get to control every aspect we can." He added that he had control over "the look of the game, the actual objects in the game, and how the game works."

Jack found the project *useful* for his future goals, particularly because he was interested in game design as a career. He also talked about how what he learned would be "really useful for figuring out what I would do in a similar situation like a work environment."

He reported that he was *successful* in this project: "We have a tangible product because we actually have a game that is playable." The game provided concrete feedback that allowed him to judge for himself whether he was successful. The project also appears to have provided a reasonable level of challenge for him. He said it was "challenging, but not too difficult." "The only real difficulty is trying to figure out how to do what you envision with the technology provided. The technology is good, but it has constraints such as every [software] program would. Other than that, it's not hard."

When asked how *interested* he was in the project, he said, "My favorite thing to do is design." He added, "Trying to incorporate a learning environment into game design is a really good idea. Really fun to execute, 'cause it's always fun to create stuff." These comments reflect Jack's interest in participating in the design aspects of this project; it also indicated his longer-term interest in design. In fact, Jack ordered his own copy of the software so he could work on it on his own time. After noting that "sometimes I don't even do my schoolwork on my own time," Jack said that he stayed up until 2:00 a.m. working on his SGA project. "I've put in a reasonable amount of effort," he added, "which is sometimes unusual for me."

Jack seemed to feel that the environment was relatively *caring*. He noted that the teacher was helpful, that she wanted him to succeed, and that she made sure

that everything was going smoothly. He also reported that she cared about students enough to ask about their well-being. When asked whether other students cared about his success in the project, he said that he believed that they wanted him to succeed. He did not give the impression that he worked closely with any other students, but he did say that students "bounced ideas off each other."

Mia

Mia was a 15-year-old White and Native American female in the 10th grade. Mia's interview responses indicated that she felt *empowered* in the project: "I have complete control. I have control over what aspects of science I put into it, what the plot line is, and the characters." Mia also found the project *useful* for her goals: "It's going to be a big deal in the future when I try to go for college and medical school."

She said that she had been *successful*: "I'm ... very satisfied with my game I have designed and the work I have put into the whole project." She said that the most challenging aspect of the project was time management.

Mia was *interested* in the project because it incorporated "both gaming and science, which are two things I'm very interested in." Her interest extended beyond the designated project time, perhaps indicating that she had begun to develop longer-term interest. She said that the project had been "really important to me. It's the only thing I do outside of school." She felt that she put a great deal of effort into the project: "I've been to every meeting and I've gone extra times during lunch. I skip lunch to work on this project."

Mia said that the teacher *cared* "quite a bit" about the students, adding that the teacher was always there to help if something went wrong or if students needed something. Mia said that, though there was some competition among students, "I'm sure they don't want me to fail, or anyone else to fail." She mentioned that students would share praise when something went well, such as "Whoa, that's pretty good!"

Walter

Walter was a 15-year-old African-American male in 10th grade. Walter said that he was somewhat *empowered* during the project. When asked how much control he had, he responded, "I guess a fair amount.... There may be some things you may not be able to do, but things you can work around to get your desired goal."

The project was *useful* to him: "I did want to learn a bit more of biology this year.... As a project, it did help; it taught me a few side things along the way. In the fu-

ture, I'll probably be able to incorporate what I learned in different situations and future education."

Walter said he felt *successful* in the project: "We did finally each create a game.... That was our priority and our goal." His success seemed to be tied to his ability to meet the challenges of the project, which also led to increased *interest*: "I wasn't too interested in the beginning. I wasn't really sure exactly what we would be doing. As we progressed, it was more and more challenging. Yeah, I was more interested in it." Although Walter did not find the project to be very important to him, he could see how it could be important to other people: "It was slightly important because we had set a goal and we planned to reach it.... It teaches people and still incorporates gaming, which is important to some people." Walter missed several sessions in February because the workshops conflicted with training for his sports team. Though he would stop by the Mission Evolution room before practice to say hello to students and staff, he did not seem to be invested enough to allow the project to interfere with an activity he apparently found more enjoyable.

Walter felt a special appreciation for his teacher's *caring*: "I think she's very dedicated to [the project]. It was on her time, not the school's.... She does care a lot." Walter also felt a strong sense of community in the classroom: "I think [my classmates] want everyone else to succeed. We're moving toward the same goal. We're just trying to push each other and help each other to get there faster and more effectively."

Observations of Students' Participation

Our program observations suggest that Jack, Mia, and Walter approached this project with varying agenda. Jack, an adept 11th-grader who had participated in earlier workshops, used his graphic arts skills and knowledge of video games to develop a sophisticated product that balanced science knowledge with game mechanics. In an example of the genre of participation Ito et al. (2009) call *geeking out*, Jack used his time during the workshops to help others overcome obstacles to make their storyboards work in the game medium.

Mia, by contrast, was quiet and reserved, yet artistically talented; she dedicated most of her workshop time to game design and development. Her preferred mode of work was to sit at the edge of the long workbench, headphones in place, focusing intensely on her game. We see this behavior not as isolation, but as a quest for excellence on the part of an intensely engaged student. In a sense, Mia struck a balance between *messing around* and *geeking out* (Ito et al., 2009).

Finally, Walter approached the project mostly as a social gathering, spending equal amounts of time working on his game design and chatting with classmates. His demeanor indicated that he did not take the experience very seriously. Despite missing several sessions in the spring, Walter completed his game, a technically and artistically sophisticated treatment that dealt with the science in a rigorous way. In terms of the genres of participation, Walter seemed to slide effortlessly from *hanging out* to *messing around* and occasionally to *geeking out*.

Students' Motivation and Engagement

These case studies show how students can participate in the same project but engage with it at different levels depending upon their abilities, personalities, and goals.

All three students reported that the project *empowered* them by giving them choices. Two specific aspects of Mission Evolution were designed to encourage this sense of empowerment. First, the structure of the informal learning setting allowed students to choose a concept from the high school evolutionary biology curriculum and decide how to implement it in their game designs, supported by the science teacher and the university video game experts. Second, the way the game technology was implemented provided choices, but with some structured guidance. For example, students began by playing the Cell and Creature stages of SGA, whose concepts related to concepts from their biology class. Then they worked with SGA tools and tutorials that were intuitive enough to use with minimal support. Before students started their own game designs, the experts provided a worked example to show how the concept of divergence could be illustrated in game play.

Although all three students reported that the project was *useful*, it appeared to be more useful to Jack and Mia than to Walter. Jack and Mia both suggested that their learning could be helpful in their careers. This perceived usefulness probably motivated them to engage in the project. For Walter, the project was somewhat useful for learning biology, but he did not relate this new knowledge to his personal goals. This lack of connection to future usefulness may be one reason he seemed less engaged in the project than Jack and Mia were.

All three students said that they were challenged by the project in a way they enjoyed because, ultimately, they *succeeded* in meeting the challenges. Facing and overcoming obstacles seemed to be a motivating experience for all of them. This finding suggests that the project presented an appropriate level of difficulty—neither so easy that they were bored nor so hard that they gave up

before they could succeed. All participants were familiar with basic game interfaces and mechanics, but even playing the Cell and Creature stages of *SGA* presented a challenge because there wasn't enough time to both learn the game and complete the stages during workshops. The experts helped with this challenge by introducing the stages in a way that gave students a running start. Once students moved from game play to learning *SGA* game mechanics so they could implement their own designs, they encountered more challenges. Again, the experts were there to help; some students, like Jack and Mia, had enough invested in overcoming the challenges to spend their own time on the project.

The project *interested* all three students, but in different ways. Jack was interested in the design aspects, Mia in the gaming and science aspects, and Walter in the challenges and the final product. One strength of the project is that its multiple facets could draw in students with diverse interests. An important finding is that Walter became more interested over time. His interest in overcoming the challenges of game design was key to his engagement, given that he did not believe the project would be useful to his future. The work that Jack and Mia put into the project outside of the workshops shows that they were more interested and found more value in the project. This interest and value is important because researchers (Hidi & Renninger, 2006; Jones, Ruff, & Osborne, 2015) contend that, when students value activities, they are more likely to engage in similar activities in the future.

In terms of *caring*, students said the learning environment was a friendly one in which students got along and helped each other when they could. All three students said that they felt strongly supported and cared for by the science teacher. This support, coupled with the congenial peer environment, may have contributed to students' motivation.

Recommendations and Conclusions

Findings from our project design, observations, and case studies lead us to recommendations to help program leaders who want to use students' interest in video games to build science motivation and engagement.

Our first recommendation is to select a game and try it yourself. (See the box on the next page to get started.) Assess what students can learn from the game and how difficult it is. A game that is too difficult or too easy will not fully engage students. Consider whether the objectives are appropriate and are correlated with the objectives of the school curriculum, if such alignment is important to your program.

Second, think about the five components of the MUSIC model as you select a motivating and engaging game. Does the game give students control over level design? Can the content and design process be useful toward students' personal goals? Will game design provide an appropriate level of challenge while allowing students to succeed? Is the process interesting and enjoyable? Does the game allow for some type of caring relationships with others?

Of course, you must determine whether your program can supply the software and hardware needed for the game. You must also think about the skills required—both content knowledge and technical skills. Have the students learned the subject matter in school? Will you need to teach or review the content to ensure that all students have the knowledge needed to play the game? What about technical skills? A good way to assess both the content and technology skills needed is to have a couple of students play the game and report any problems. If students are going to need technology help, do the program staff have the capability to support them? If not, you can invite partners to join the project: teachers, parents, university students, community members—even more knowledgeable students. Anticipate the problems that students or staff might encounter and prepare to address them as best you can.

To help students move from *game play* to *game design*, a first step is to choose a game with a level editor. We selected *SGA* for our project because the expansion pack added a level editor to the *Spore* game. Level editors give students a development environment in which to design their games. Perhaps more importantly, we also provided instruction on what constitutes “a game,” using materials provided by the game producer, as well as templates derived from game design resources. One of the

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VIDEO GAMES THAT INCLUDE DESIGN ASPECTS

Here are some games, as of May 2017, that both have educational value and allow users to design new levels or missions.

- *Civilization*: <https://www.civilization.com>
- *Gamestar Mechanic*: <https://gamestarmechanic.com/teachers>
- *LittleBigPlanet*: <http://littlebigplanet.com>
- *Minecraft Education Edition*: <https://education.minecraft.net>
- *Roblox*: <https://www.roblox.com>

You can find more options by searching online. Try adding the phrase “user-generated content” to ensure that the games include design capabilities.

most approachable resources we used was Jesse Schell's (2014) *The Art of Game Design: A Book of Lenses*.

To increase students' engagement, you may want to design sessions to allow students to hang out, mess around, and geek out. Like our case study participants, students may seek different ways to participate in game design. The genres of participation allowed us to appreciate these differences. Although the OST program did need to abide by the school's timeline restrictions, students were free to hang out, mess around, or geek out during certain portions of each session. We saw hanging out as a legitimate genre of participation that provided value to the experience, rather than being off-task behavior. Each genre has a function that contributes to learning under the right circumstances.

As with any learning activity, identifying specific goals is crucial. It may be fine to let students simply play around and learn whatever they learn. If you have specific learning objectives, you should articulate these objectives to students and develop assessments that provide feedback about their progress. For example, students can share their work with facilitators or peers at certain milestones or can meet with facilitators on a regular basis. Regular feedback, provided in a caring environment, will keep students focused on their goals—whether playing around or meeting specific curriculum objectives.

Students' experiences in *Mission Evolution* suggest that commercial video games, particularly those that provide level-building capabilities, can help OST programs

motivate students to engage in science content. Viewing the project through the lens of the MUSIC model and genres of participation helped us to understand some of the factors that affected students' motivation and engagement. We hope other OST projects will explore the use of video games, not only in science but also in other content areas.

Acknowledgement

This research was supported by MacArthur Foundation Award 2010-2453 granted to Michael A. Evans.

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Fostering Arts Education Through a University-Afterschool Partnership

Alison E. Leonard, David S. Fleming, Melanie Lewis, and Sheliah Durham

The arts, long a staple part of afterschool programming, continue to offer an engaging way to enrich curriculum, impart content, and develop skills in K–12 students. Arts experiences can positively affect young people’s developmental, behavioral, social, and intellectual capabilities (Afterschool Alliance, 2012; Montgomery, Rogovin, & Persaud, 2013; Stiegelbauer, 2008).

The broad range of afterschool arts activities can be divided into two basic types. In the first, visual and performing arts education, children explore the techniques of specific forms, such as sculpture or dance. The second, arts integration, uses the arts as a strategy for engaging children with content from other academic disciplines (Stiegelbauer, 2008).

Regardless of the type of arts activity, the importance of the arts in afterschool programs cannot be over-

estimated. As the arts are increasingly marginalized in public school systems, afterschool arts education can be an alternative way to integrate the arts into children’s academic experiences or build on their in-school arts experiences (Briggs & McHenry, 2013; Charmaraman & Hall, 2011; Eckhoff, Hallenbeck, & Spearman, 2011; Stiegelbauer, 2008). Enhancing young people’s exposure to and engagement with the arts has therefore become a priority for many afterschool programs.

However, logistical and resource constraints challenge afterschool programs looking to provide and maintain quality arts education (Montgomery et al., 2013). The success of content delivery generally rests

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with afterschool staff, whose training and educational background may be limited (Fleming & Felak, 2012). Many programs rely on arts and crafts activities that do not connect to state and national arts standards. Professional artists may be brought in as teaching artists (Anderson & Risner, 2012), but afterschool staff are not likely to be arts educators. Our experience suggests that professional development for afterschool educators is often centered on core subject areas, leaving staff charged with arts integration to find resources and curriculum ideas on their own. In addition, high turnover among afterschool program staff complicates the delivery of quality enrichment experiences (Asher, 2012).

One solution to the challenge afterschool programs face in providing high-quality arts education is to partner with a university. In the model featured in this article, a university teacher education arts course brings its students into elementary afterschool programs at local Title I schools. These students participate in arts-oriented field experiences that both enhance their own education and provide quality arts activities in the afterschool programs. This ongoing university-afterschool partnership, now in its fifth year, is presented as a model partnership for enhancing arts education after school, one that presents unique opportunities and challenges and that suggests best practices in such partnerships.

University-Afterschool Program Model Partnership

The GoalPOST (Goal-Oriented Performance in Out-of-School Time) program is a unique partnership between Clemson University and three local school districts. The collaboration offers limitless possibilities, enabling university students to engage in real-life educational experiences while children benefit from academically sound and research-based instruction.

The GoalPOST program is staffed by certified teachers, noncertified staff (generally support staff from the school), university students, and volunteers. The schools provide the certified teachers, who serve as afterschool staff. The school district supplies program space in the schools. The district interacts with the university to discuss teacher schedules, budgets, curriculum, supplies, programming details, and so on through Clemson's proj-

ect directors, who serve as program coordinators of all nine programs.

Clemson supplies university students who serve as noncertified afterschool teachers. Although most are preservice teachers in Clemson's College of Education, GoalPOST has also hired students from other majors, such as engineering, psychology, nursing, conservation biology, and parks and recreation management. In addition to these afterschool teachers, the university provides teacher education students who facilitate arts lessons, supported by their arts education instructor.

The university administration works with schools and local site coordinators to set up trips to the university and on-site experiences for the art lessons. It works with the arts education instructor to develop a schedule that suits the needs of both the teacher education students and the afterschool programs. Arts education lessons are conducted either at program sites or at Clemson's Arts & Creativity Lab (AC Lab), a dedicated lab classroom designed for educational exploration in the visual and performing arts. (See <https://www.clemson.edu/education/arts-creativity-lab>.) The university administration serves as fiscal agent for the partnership.

All GoalPOST employees receive specific, targeted staff training that addresses topics such as classroom management, professionalism, and lesson plan development in various content areas including arts, physical activity, and STEM (science, technology, engineering, and mathematics).

The GoalPOST afterschool program enrolls more than 450 children at nine school-based sites every week-

day afternoon from September to April. The program components include quality afterschool programming based on state academic standards, including homework assistance, academic enrichment, and recreation. For the academic enrichment component, university students or teachers design 30–45-minute activities that explore content the program participants are learning during the school day or that provide enriching experiences they might not receive in school. For example, one

year university students taught classes in American Sign Language.

In addition to these regularly scheduled enrichment activities, during a three-week period every semester,

The collaboration offers limitless possibilities, enabling university students to engage in real-life educational experiences while children benefit from academically sound and research-based instruction.

teacher education students teach arts lessons to GoalPOST participants.

The Arts-in-Education Course and Its Field Component

In Clemson's teacher education program, students majoring in early childhood, elementary, and special education take an arts-in-education class as one of their required methods courses during their sophomore or junior year and prior to their student teaching. These teacher education students will not be certified to teach arts classes. However, classroom teachers who have not been fully trained to teach the arts can share an important role, along with arts specialists and community arts organizations, in providing quality arts education (Americans for the Arts, 2014; Gibas, 2012; Jeffers, 1993; Leonard & Odutola, 2016; UNESCO, 2006). Such arts-in-education courses, which are offered or required in most teacher education programs, can therefore provide a sustainable resource for afterschool arts education.

Clemson's arts-in-education course focuses on the arts disciplines as modes of inquiry, exploration, and assessment. It encourages teacher education students to use the arts to explore curriculum content, making connections across disciplines. One of the major projects for the course requires students to design and implement either an arts lesson or an integrated arts lesson for children in grades 2–6 in the GoalPOST afterschool program. Arts lessons focus on dance, drama, music, visual arts, or some combination of these; integrated arts lessons involve arts disciplines and another discipline, such as math, science, social studies, or English language arts.

Arts Lessons Delivered by University Students

For this arts-in-education project, groups of three or four elementary or special education majors design an arts lesson to deliver to a class in the GoalPOST afterschool program. Most classes include only one grade level, but some have two. The lesson plan, its objectives, and its formal and



Figure 1. Guided by Clemson teacher education students, GoalPOST students use visual art and math skills to scale their self-portraits into giants.

Such arts-in-education courses, which are offered or required in most teacher education programs, can therefore provide a sustainable resource for afterschool arts education.

informal assessment must be based on South Carolina academic standards in the visual or performing arts. If the lesson integrates another discipline, the lesson plan must also include the relevant standards of that discipline. Taking children's artistic development into consideration, students include in their lessons visuals, presentations, teacher samples, and other resources. Lessons culminate in an actual art-making experience or performing arts activity.

Throughout the arts-in-education course, student groups research, design, draft, receive feedback, and revise their lessons. Prior to teaching in the GoalPOST program, the students practice teaching their lessons in class to their peers.

Finally, the teacher education students teach their 45-minute lesson to children in the afterschool program. The afterschool staff learn alongside the children. All lessons provide an arts framework and additional learning ideas that program staff can use in future activities, whether or not they have arts or education training. During the lesson, the teacher education students are observed by both their arts education professor and a small group of peers, who provide feedback following the lesson. The students conclude the project by writing a critical reflection on the experience and making a

presentation to their arts-in-education class including an overview of the lesson, their assessment of how it went, and a brief reflection.

The varied lesson topics and activities are chosen by the teacher education students with guidance from their arts-in-education professor. For example, a lesson for fourth graders used dance to explore the solar system. In a lesson based on math standards, children in fifth and sixth grades scaled their own measurements to paint “giant” versions of themselves (Figure 1). Other examples include a lesson uniting history and arts in which children wove paper baskets based on a local artistic tradition, a lesson in creative movement and drama that taught children a relaxation technique to help them deal with anger and stress, and a performing arts lesson in which children explored Civil War history by creating props for a dramatic scene.

One group’s project, titled “Messy Mono-Printing,” illustrates an integrated visual arts and English language arts (ELA) lesson for third graders. The lesson encouraged creative thinking using the parts of speech and abstract art with printmaking.

To begin the lesson, the teacher education students reviewed parts of speech, particularly the term *adjective*. They wrote children’s definitions of adjectives on the board. Then they passed around “mystery bags” containing various textured objects. Children brainstormed adjectives describing the textures they felt in the mystery bags; the teachers then gathered the texture adjectives into a master adjective word bank on the board. Each child was asked to choose at least four adjectives from the master bank as the inspiration for his or her artistic creation.

A large piece of plastic wrap was placed at each desk. Children painted an expression of their first texture adjective onto the plastic, using not only brushes but also feathers, forks, and other objects. While the paint was wet, they pressed their piece of paper onto the plastic, transferring the paint to the paper to make a print (Figure 2). They followed the same procedure for all four of



Figure 2. Afterschool participants created “messy mono-prints” in a lesson that integrated visual art and ELA.

their adjectives, transferring all four designs to the same paper in whatever way felt pleasing to them.

The teacher education students conducted informal assessment during the lesson by monitoring children’s participation in the adjective discussion and their completion of the prints. A more formal assessment involved having participants analyze one another’s prints to create a poem. In responding to their partner’s print, the children filled in a seven-line poem template that asked them to demonstrate their knowledge of the parts of speech by using adjectives, nouns, and verbs.

This lesson integrated the following South Carolina Department of Education standards for the visual and performing arts (South Carolina Department of Education, 2017):

- Use of the student’s own ideas in creating a work of visual art

- Safe and responsible use of materials and tools
- Identification of connections between the visual arts and another curriculum subject

The lesson also integrated ELA standards, particularly one about explaining the functions of the parts of speech, along with the creation of a written poem.

Opportunities

Partnership between an afterschool program and a local teacher education program offers unique benefits for both. The afterschool program provides the university with field education opportunities for its students. The university students, for their part, provide standards-based arts activities for afterschool participants, in the process sparking new ideas and demonstrating new processes for the afterschool staff. Ultimately, the goals of this field experience requirement in the arts-in-education course are to help both the teacher education students and afterschool program staff build their lesson planning skills and, more importantly, to bolster their confidence in engaging children with the arts.

Benefits for the University

The most obvious benefit of the university-afterschool partnership for the teacher education program is that it provides field education experiences beyond the basic requirements. Research has suggested that the frequency and depth of field experiences make a difference in preparing novice teachers for the classroom (Zeichner, 2005). For Clemson undergraduates, the arts lesson they prepare for the GoalPOST program is often their first lesson planning experience.

The afterschool context gives these teacher education students opportunities to engage with children in ways that are not possible in their future practicum and student teaching experiences. Having field experiences after school hours is typically more convenient for them than during the school day, which often conflicts with their own university classes. More importantly, the students often get more opportunities to work with individual children or small groups in the afterschool program than they could during school-day field experiences. They learn more about individual participants and gain experience with personal and focused interactions. Furthermore, the teacher education students don't have

Few university students are aware of the field of youth development or the job opportunities it offers. This field experience provides that exposure.

access to the individualized education programs of GoalPOST children who have special needs. They therefore have to observe how afterschool participants are learning or struggling and then adapt their lessons by, for example, repeating instructions, physically demonstrating, or providing one-on-one support. These afterschool field experiences enrich these soon-to-be teachers' apprentice perspectives to give them a broader picture of children's lives, both in and out of school, than they get from their later in-school only placements.

Another benefit to the teacher education students is also a benefit to the field of afterschool education. Few university students are aware of the field of youth development or the job opportunities it offers. This field experience provides that exposure. Many students who prepare arts lessons for the GoalPOST program apply to work in the program after the course is over. Some have even joined the staff as employees. Those teacher education students who end up working for GoalPOST then enter their future field placements and student teaching having had an abundance of experiences working with elementary school children.

Benefits for the Afterschool Program

The benefits of the university partnership for the afterschool program go well beyond the opportunity to provide high-quality arts instruction.

A big benefit for program participants is the opportunity to interact with university students and visit a college campus. The GoalPOST program capitalizes on the reciprocal relationship between the schools and the university by alternating sites. During one semester, the teacher education students travel to the schools to teach their arts lessons; the next semester, children are bused to the AC Lab at the university. During these visits, they also tour the campus and can use resources outside the AC Lab. For example, afterschool participants have been allowed to use the university's digital media lab to compose their own music or print their creations on a digital printer. In the past, the university has scheduled a panel discussion with current students in which afterschool participants can learn what college is like and what pathways the students followed to get there. As many GoalPOST participants have never experienced a university environment before, these visits can dispel some of the mystique associated with college and

enable the children to envision themselves as future college students.

Another set of benefits accrues to the afterschool staff and volunteers. GoalPOST participants are accompanied to the arts lesson by their afterschool teachers, both university students and certified teachers. Observing and assisting with the university students' arts lessons serves as a form of on-the-job professional development. As the teacher education students develop their arts education skills by preparing and teaching the lessons, the afterschool staff are developing their own skills alongside them. The arts lessons become an exchange of ideas not only between the university students teaching the lessons and GoalPOST participants but between the university students and certified teachers working for GoalPOST. Sometimes afterschool staffers who are also school teachers replicate the university students' lessons in their own classrooms. For example, one teacher adapted an integrated arts lesson in which children reviewed the geography and characteristics of South Carolina by piecing together puzzle pieces of the state's distinct regions and making collages on each piece to represent that region's landscape, agricultural products, and industries. Given the challenges of scheduling professional development that works not only for staff members who teach during the school day but also for others with different work schedules, opportunities for staff development *within* program time are invaluable.

The final benefit of this university-afterschool partnership is financial sustainability. Many afterschool programs rely on external grants from school districts, state agencies, or national programs such as 21st Century Community Learning Centers. These funding sources often provide time-limited seed money with the expectation that programs will develop other funding for ongoing sustainability. University courses that require a field experience constitute a renewable low-cost resource for instruction in specialized program areas such as the arts.

Challenges

Although the model university-afterschool partnership has been quite successful, it is not without challenges.

One set of challenges involves logistics. Schedule changes in the afterschool program due to such variations as snow days, field trips, or schoolwide events can wreak havoc with the schedule of arts lessons—on which the teacher education students are being evaluated for their arts-in-education course grade and toward their licensure. To be effective in their delivery of arts instruction, the novice teachers need consistency in the afterschool schedule, facility, supplies and equipment, and participants. For example, a GoalPOST class with 20 fourth-graders may have only half of its participants present on the day of an arts lesson. If classes end up being too small, two grade levels may be combined. The teacher education students often need to make quick adjustments to their lesson plans to accommodate the number of children present.

Transportation is also likely to be a challenge. GoalPOST sites are anywhere from four to 31 miles from the Clemson campus. When the university students travel to the schools, their lecture and lab sessions need to be extended. When the children come to the campus, much of their program time can be spent on transportation. On rare occasions, the buses have returned to schools late, inconveniencing the participants' families. To allow enough time for the arts lessons, early dismissal has been utilized—sparingly and with the full support of the school administration and district transportation services.

Another issue the GoalPOST program has encountered is that afterschool staff may conflate the teacher education students with program volunteers, especially when the volunteers include other college students. Community volunteers in afterschool programs improve adult-child ratios while serving as caring mentors. They are also often asked to fill in wherever staffing is short, from taking over a class to making photocopies or cleaning up after snacks. Teacher education students are also volunteers in that they are not paid, but their role in the afterschool program is prescribed by their academic requirements. Their role should be protected so that they can observe and teach as mandated by their arts-in-education course.

Given the challenges of scheduling professional development that works not only for staff members who teach during the school day but also for others with different work schedules, opportunities for staff development within program time are invaluable.

Best Practices for University-Afterschool Partnerships

Our experience with GoalPOST suggests best practices for partnerships between universities and afterschool programs to foster arts education. Thorough planning and consistent communication are key.

The planning process should involve the afterschool program director and, for multi-site programs, the site coordinators. For GoalPOST, the project directors who serve as program coordinators are affiliated with the university, but in other settings they are likely to be employed by the school or afterschool provider. The school administrator, and perhaps members of the afterschool program staff, should also be included in planning. On the university side, the instructor of the arts-in-education or similar course is a key player. Afterschool program leaders interested in exploring a university arts partnership can initiate this relationship by contacting faculty members directly.

All stakeholders must be on the same page regarding the objectives of the field arts experience. The ability of the university students to meet their academic requirements must not be compromised for the sake of the afterschool program. For example, if lessons need to be cancelled due to weather, then a make-up class time should be agreed upon. Meanwhile, the arts experiences of the afterschool participants should not be compromised for the sake of university requirements. Though the teacher education students design and teach the arts lessons as a learning experience for themselves, the lessons need to be carefully planned with age-appropriate activities for the learning and enjoyment of afterschool participants. The afterschool program and the university can specify solutions to possible pitfalls in the collaboration by agreeing on a memorandum of understanding (MOU). The MOU must specify, among other stipulations, who pays for what. In our partnership, university arts course fees pay for arts materials, and the afterschool program pays for buses during the semester when the afterschool sites travel to the university.

Once understandings are codified in an MOU, constant communication becomes the key to maintaining a successful relationship. Communication between the afterschool site coordinators and the university instructor is key. For example, if their arts lesson involves a dance

routine with music, the teacher education students must tell their arts education instructor that they need a music player in a suitable location so that the instructor can inform the site coordinator. The education students need to be focused on teaching a quality class rather than searching for equipment in an unfamiliar facility. Since each lesson is unique, several such requests are likely to arise each semester, such as smocks for work with paint or a particular configuration of desks to make space for dancing. If the arts lessons take place in a university lab

like Clemson's, the teacher education students can deal with their own space and equipment needs; however, for classes in schools, the arts instructor serves as the single point of contact to streamline communication.

A Partnership with Mutual Benefits

Many afterschool programs are staffed by certified teachers and volunteers who may have little or no experience with facilitating

learning in specialized areas such as the arts. However, afterschool programming is often more flexible than school curricula, allowing time for enriching experiences in such specialized areas—if only appropriate staff can be found. Meanwhile, students in teacher education programs are learning to teach in these specialized areas. They need field experience to develop their pedagogical skills (McDonnough & Matkins, 2010), become socialized into their vocations (Bullough, 2005), and learn to bridge theory and practice (Ohana, 2004).

Partnerships between university teacher education programs and afterschool programs, like the one presented in this paper, can meet both needs. In the GoalPOST program, afterschool participants receive high-quality arts instruction that would not otherwise be provided by their program. Meanwhile, teacher education students gain pedagogical experience supported by feedback and supervision. University-afterschool partnerships thus can be of mutual benefit to both parties.

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An Unexpected Outcome

Afterschool STEM Enrichment Empowers Facilitators, Too!

Michelle Masarik

One of the goals of afterschool programming is to empower students by increasing their sense of autonomy and giving them room to chart their own course of discovery.

Long before STEM (science, technology, engineering, and math) became part of the educational vernacular, afterschool practitioners were using science content and scientific practices as tools for youth empowerment. For that empowerment to happen, the youth themselves have to connect to the content and experience self-actualization.

During my time as an outdoor program specialist and camp director for the Girl Scouts, I designed and taught programs that exposed girls to science. I quickly discovered my own personal enthusiasm for the STEM experiences that are abundant in everyday life, along with a willingness to share my enthusiasm. But I was a mom with two daughters and no college degree. I didn't think of what I was doing as a real contribution to STEM education or to girls' empowerment. However, as I continued to design programs to encourage girls in STEM, I

discovered that I was also being encouraged. As I taught girls to reach for more, I also became something more.

Using that background and my increasing self-efficacy, I continued to work in afterschool STEM enrichment. In my work with middle-school-aged youth in a 21st Century Community Learning Centers program, I've found that robust STEM experiences can empower not only program participants but also their facilitators.

Empowerment, defined as the capacity for self-determination, is important to every person's well-being; the term is often used in discussions of program design and education. Self-determination includes the need for autonomy, the competence to express individual talent and skills, and the ability to overcome the fear of failure (Ryan & Deci, 2000).

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STEM enrichment gives young people the means to acquire knowledge, realize their abilities, and practice their skills in a consequence-free environment. These activities in turn enhance development of metacognitive skills—the ability to be aware of one’s own mental process. For example, middle school students begin to use strategies for learning and knowing when it is appropriate to apply them (Broderick & Blewitt, 2010). In practicing and developing these skills, students can experience increased empowerment in at least three areas: identity, communication, and critical thinking.

In addition, STEM enrichment uses inquiry and scientific method to develop self-efficacy—both in learners and in educators. To successfully facilitate STEM learning, educators need to learn the content and, more importantly, the methods that increase learners’ interest and excitement (Ejiwale, 2012). As educators work to increase their skills and knowledge to present the best experience for their students, an unexpected outcome can be an increase in their own self-efficacy and STEM identity.

Empowering Identity

Middle school students are poised to leave behind the identities their families and social institutions have conferred upon them so they can construct their own personae (Broderick & Blewitt, 2010). If you ask middle school youth what they want to be when they grow up, their answers will change regularly. Erikson (1968) noted that adolescent identity is not something that is attained; it is constantly reassessed and reframed according to realized abilities and personal goals. The child who lives, eats, and breathes dinosaurs today could have a bedroom decorated with planets and astronauts just a year later. Early adolescents need to feel that they can explore their interests—and change their minds daily if they want. STEM programming gives young people the chance to explore new ideas, new skills, and new selves through elements that help adolescent identity development such as small-group activities, supportive adults, and lesson plans that value experimentation and critical thinking (Elkind, 1984).

Exposure to STEM activities can help develop adolescent identity in at least two ways. First, STEM gives students the opportunity to “try on new hats.” They can, for example, experience how engineers work by designing and building a structure from toothpicks and marshmallows or see for themselves what it’s like to be a computer programmer by learning to code. When I teach coding to fourth-graders in my afterschool program, I remind them that they are now computer programmers. They have learned Boolean logic, conditional statements, and other

concepts that I didn’t learn until my college computer class. For some students, exploration of topics in this way can lead to development of committed STEM identities. Whatever career identity middle schoolers choose is likely to change! But at least STEM has been part of their ongoing exploration, facilitated by hands-on experiences that are better aligned with actual careers than whatever they might learn from textbooks or movies.

Second, STEM activities can also help some students who struggle in other areas to develop identities as competent learners. One of my fourth-graders, whom I’ll call Liam, was classified as high-functioning autistic. During our computer coding course, he had the chance to interact with his classmates in new ways. It helped that the informal environment was accepting of Liam’s need to move around and his tendency to shout out answers. However, the shifts in dynamics in the group were what made this program special. Liam proved to be adroit at conditional statements like “If raining, bring umbrella = TRUE.” He therefore could take on the role of helper with his peers. During the school day, other students helped Liam with his social skills, reminding him, for example, not to talk out of turn. Now Liam was able to help his peers with their coding skills.

Empowering Communication

Young people involved in STEM enrichment learn to speak STEM language. Many aspects of STEM language, including math notation and technology terms like *laser* and *microchip*, are nearly universal; they are the same in all languages. Students bond over STEM learning as they learn a language that transcends geographical borders and cultural differences.

In order to capitalize on STEM language, my program has chosen to label some of our STEM enrichment programs “clubs.” Being part of a science or engineering “club” adds a level of ownership because students have chosen this enrichment activity. The club also shares the language of its topic. I have overheard students proudly discussing the various types of gulls perched on the school roof or the names and needs of the new plants their gardening club installed. Students use their new language both in talking to other club members and in explaining what they do to other students.

The low-income communities in which most of my out-of-school time work takes place have seen an influx of immigration. Many of the students come from homes where the adults speak little or no English. These students may struggle with literary-based subjects, but they can shine in hands-on STEM activities. When they grow

plants, solve equations, create video games, or mix chemicals, the results are the same no matter what language they speak at home or where their family is from. They can also share these hands-on experiences and concrete results with their parents in their own languages more easily than they can share more abstract learning.

I've found that my immigrant students are less likely to complain about math than children in monolingual households. During homework help time, I noticed that some students routinely left a few math problems blank. When I asked if they needed help, they replied that they had left these problems blank so that they could do them in front of their parents to show how well they are doing. Math is one area immigrant students can share easily with their parents.

Empowering Critical Thinking

Critical thinking is the foundation of STEM programming. Afterschool STEM facilitators develop learners' critical thinking skills by helping them use the scientific method and showing them basic research methods. They set up challenges and then quietly guide learners through the process of problem solving: identifying the problem, deciding how to resolve the problem, setting and testing a hypothesis, observing the results, and beginning the process again as needed. STEM activities teach young people to break challenges into smaller chunks rather than being overwhelmed.

In my own STEM facilitation, I put fourth graders into teams to investigate problems. For example, one project is to create a bird nest that protects eggs from predators. I let the teams work on their own but keep track of their progress by visiting each team in turn. As I do, I ask open-ended questions: "Why did you choose this material to build your nest?" "Could the entrance be changed to protect the eggs?" This practice allows the learners to be the experts. I will ask students to stop, put down their materials, and come together to discuss what they are doing. "Is your nest working the way you think it should? No? What do you think is happening?" Questions spur team members to dissect their design to discover any flaws. Though there is a challenge to be met, *how* the students arrive at the solution is more important than finding the answer. The critical thinking process they learn will carry on to other programs and future activities.

Many aspects of STEM language, including math notation and technology terms like *laser* and *microchip*, are nearly universal; they are the same in all languages. Students bond over STEM learning as they learn a language that transcends geographical borders and cultural differences.

Empowerment Through Self-Efficacy

In addition to helping young people develop their identity, their ability to communicate, and their critical thinking skills, STEM activities can empower young people by helping them develop self-efficacy. Self-efficacy is the belief that one has the ability to succeed, whether at a current task or in broader societal settings (Bandura, 2012). High-quality STEM programming is designed to empower self-efficacy as scaffolded activities build on one another, using skills mastered at one level to launch the next. As learners complete each task and meet each challenge, they build self-efficacy.

One of my favorite examples of a program that scaffolds learning to build self-efficacy is the Design It! series offered by 4-H and Rutgers University. I use the program to introduce incoming fourth-graders to the mindset that STEM does not consist of "one and done" activities. Each module has five to seven activities that build on skills mastered in sequence. One of my students' favorite modules is Tracks and Balls, in which learners use insulation tubing, marbles, and copious amounts of tape to build structures that simulate rollercoasters. In the first week's assignment, building a ski jump, teams learn how to adjust height, angle, and momentum to make a marble jump the longest distance. The skills and teamwork they learn in this activity help them tackle more complex challenges in the weeks to come, such as hills and valleys where the students are challenged to see how long their marble stays on the track. In the first weeks, I give teams a fair amount of guidance, prompting them, for example, to stop and observe what is happening and to fix one issue at a time; I repeat the ever-popular mantra, "Test before you tape." As the weeks go on, however, the learners take over this role. They begin to guide themselves and each other with reminders to slow down, test, observe, and reassess.

In programs like Design It!, students learn STEM terms and content; more importantly, their self-efficacy increases as they work together to solve problems. My task is to make sure that every voice is heard and that no student is left out of the problem-solving process. With guidance, students begin to understand that the process itself makes them scientists. That belief curbs frustration, increases perseverance, and raises self-efficacy, which in turn empowers students to be an active part of the afterschool community.

I have seen the attitude of our students evolve from our first year to now. At first, when we asked participants what courses they would like added to the program, they could not imagine what to say. Now, they look forward to their next enrichment choices; many are eager to join the student council in order to present new ideas for classes. This self-efficacy is, for me, the largest accomplishment of our afterschool STEM enrichment program

An Unexpected Outcome

Afterschool practitioners often say that they get just as much out of facilitating activities as the learners get out of participating. Working with a STEM agenda brings new life to the phrase. Beyond enjoying the activities, practitioners also gain valuable, marketable skills by facilitating STEM programming. Certainly that was my experience.

Though some afterschool STEM instructors are industry professionals or school-day STEM teachers, many are like me—people from outside the field who enjoy a challenge and are willing to learn something new in order to improve young people's experiences. My experience shows that the only things such instructors need are a positive attitude, enthusiasm, and the desire to gain knowledge and acquire new skills. STEM training is available for those who want it. No academic credentials are required to take, for example, workshops on computer programming from coding.org, on engineering from Design It!, or on robotics from Lego or Vexx.

As I became more adept at facilitating STEM programming, I began to believe that I was all the things that I was asking my students to believe they could be. Together, we were all becoming scientists, engineers, and computer programmers. Both my students and I had a voice, a point of view, and a place at the proverbial table.

I have now been providing afterschool STEM enrichment for more than six years. After being offered training, I found myself included in decision making and exposed to industry leaders and state policy makers. I was not just facilitating afterschool programming; I was involved in a movement.

But my personal identity was out of alignment with how others were viewing me. The first time another instructor asked if I was a science teacher, I was a little shocked. Didn't she see the large sign on my forehead, "Mom without a degree"? I cared deeply about STEM and about the students, but I did not look beyond my self-appointed role as a support person. However, with each successful program, each person who asked for help with STEM programming, my identity evolved. An afterschool STEM trainer asked for my help with a project, saying that

I was an expert in my field. A local foundation asked me to serve as its STEM advisor. Clearly the people I worked with saw something in me that I did not see in myself.

Finally, I was asked to apply for an open position in a 21st Century Community Learning Centers program. I was flattered, but I didn't have the educational credentials to apply. The self-efficacy I had developed in the course of running, researching, and developing STEM programs came to the rescue. It gave me faith in myself so that I completed my BS and earned an MS degree in less than two and a half years. I felt empowered to finish my education because I had become part of the STEM afterschool enrichment movement. All the time I had been using STEM activities to encourage self-efficacy and empowerment in students, I had also developed my own self-efficacy and empowered myself to reach for my dreams with courage and conviction.

I am not unique. As I visit other afterschool sites to run programs or to train or collaborate with colleagues, I interact with many afterschool practitioners who have similar backgrounds. They may be retired teachers who miss interacting with students, young adults who are trying to decide their next step, or women whose children are now in school and are not sure where they have a place. Working in STEM enrichment changed how I see myself and empowered me to make the changes necessary to become that person. Now it is time to pay it forward, reaching out to others so they can realize their own self-efficacy and identify themselves as the experts they are.

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Afterschool Matters

Call for Papers

Afterschool Matters is a peer-reviewed journal dedicated to promoting professionalism, scholarship, and consciousness in afterschool education. Published by the National Institute on Out-of-School Time with legacy support from the Robert Bowne Foundation, *Afterschool Matters* serves practitioners who work with youth in out-of-school time (OST) programs, as well as researchers and policymakers in youth development.

We are seeking articles for future issues of the journal, beginning with Fall 2018. Scholarly or practice-based work on all aspects of OST programming for children and youth, from a variety of disciplines and academic perspectives, will be considered. We welcome submissions that explore practical ideas for working with young people in OST programs. Personal or inspirational narratives and essays are appropriate for our section “Voices from the Field.”

All articles, whether scholarly or practice-based, should connect theory to practice and should be broadly applicable across the field. Articles must be relevant and accessible to both practitioners and academic researchers.

We invite you to discuss possible topics in advance with us. A broad variety of topics will be considered, including the following:

- Innovative program approaches
- OST programs and civic engagement, social and emotional development, arts development, or academic improvement
- Research or best-practice syntheses
- OST program environments and spaces
- Key aspects of program leadership and administration
- OST system-building, such as cross-city and statewide initiatives
- Expanded or extended learning time and the OST hours
- School-community partnerships that support OST programming
- Physical activity and healthy eating
- STEM (science, technology, engineering, and math) program delivery or STEM staff professional development
- Special needs youth, immigrant and refugee youth, or other vulnerable populations in OST
- Youth-centered participatory action research projects
- Gender-focused research and policy initiatives related to OST

Submission Guidelines

- For consideration for the Fall 2018 issue, submit your article no later than January 10, 2018, to ASMsubmission@wellesley.edu.
- Submissions should not exceed 5,000 words.
- Submit your article electronically in Microsoft Word or rich text format. Use 12-point Times New Roman font, double-spaced, with one-inch margins on all sides. Leave the right-hand margin ragged (unjustified), and number pages starting with the first page of text (not the title page, which should be a separate document).
- Include a separate cover sheet with the manuscript title, authors' names and affiliations, and the lead author's phone number and e-mail address.
- The names of the authors should not appear in the text, as submissions are reviewed anonymously by peers.
- Follow the *Publication Manual of the American Psychological Association, 6th Edition (2009)*, for reference style guidelines. Present important information in the text and do not use extensive footnotes.

We welcome inquiries about possible article topics. To discuss your ideas, please contact:

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