

# **Sustaining Community and Relationships with Black and Latina Girls in an Out-of-School STEAM Learning Program during a Global Crisis**

Naomi Thompson, Northwestern University, [naomi.thompson@northwestern.edu](mailto:naomi.thompson@northwestern.edu)

Bo Ju, DePaul University, [bjul@depaul.edu](mailto:bjul@depaul.edu)

Sheena Erete, DePaul University, [serete@cdm.depaul.edu](mailto:serete@cdm.depaul.edu)

Denise Nacu, DePaul University, [dnacu@cdm.depaul.edu](mailto:dnacu@cdm.depaul.edu)

Nichole Pinkard, Northwestern University, [nichole.pinkard@northwestern.edu](mailto:nichole.pinkard@northwestern.edu)

**Abstract:** Despite widespread and concerted efforts, women and people of color are still dramatically underrepresented in STEM fields. Research in this area suggests the oppressive cultures surrounding STEM are one reason for the disparities in STEM participation across social categories. Cultivating counterspaces in STEM for girls and Black and LatinX learners continues to be critical, especially in the current moment when the vast majority of learning activities have shifted online. In this study, we examine an out-of-school time STEAM learning program designed for Black and Latina middle school girls to better understand how community and relationships can persist as the learning landscape shifts from in-person to online due to a global pandemic. We argue that counterspaces are critical to understanding why supportive community is necessary for Black and Latina girls particularly.

## **Introduction**

Despite widespread and concerted efforts, women and people of color are still dramatically underrepresented in science, technology, engineering, and mathematics (STEM) careers (Corbett & Hill, 2015). Overall, much of the research in this area suggests that differences in STEM participation across social categories are likely due to the nature of the cultures surrounding STEM (Ong, Smith, & Ko, 2017). Cultivating communities and cultures in STEM that value diverse voices and that are open to shift and change along with members' needs is critical (e.g., Margolis, et al., 2008). Even in the midst of a public health pandemic (i.e., COVID-19) that has shifted the global and educational landscape, it is still vital to engage in both community-building and creating inclusive counterspaces. As program designers of a STEAM program for girls, we, like many others, had to quickly shift our in-person efforts to build culture and community in STEM to the virtual space, requiring us to redesign our activities, social practices, and expectations for interaction. However, as the landscape of in-person and remote learning is still shifting, it is not yet known how these two spaces interact and how the changes impact community and cultures in STEM learning.

Thus, we explore the following research question: How can community and relationships for middle school girls in an out-of-school-time (OST) STEAM learning program persist during a sudden shift to online learning? In this study, we describe our efforts to continue Digital Youth Divas (DYD), an OST program that aims to engage middle school girls, especially those who identify as Black and Latina, in design-based STEAM and computing activities (Pinkard et al., 2017). Our findings have implications for educators, researchers, and program designers as they seek to understand the importance of community and relationship building and develop interventions or strategies to build community in both online and in-person learning programs.

## **Background and theory**

Our work takes a sociocultural perspective of learning (e.g., Lave & Wenger, 1991), understanding that learning happens through participation in communities. We also view learning as taking place dynamically across contexts such as home, school, and community through interactions with peers and adults (Barron, 2006). Studying an OST STEAM program like DYD, we acknowledge the importance of and intentionally aim to engage two groups in girls' learning ecosystems: parents and mentors. Prior research suggests family involvement in OST settings benefits academic performance and program retention (Deschenes et al., 2010). Furthermore, parents' interests, knowledge, and values influence youth's computing and technology learning and expertise (Barron et al., 2009).

In oppressive STEM climates, girls' lack of sense of belonging and a shortage of mentoring appear to be instrumental in women's decisions to leave STEM (Fabert, et al., 2011), particularly those who face gendered racism (Thomas et al., 2018). Mentoring programs, especially those engaging near-peer mentors have helped students develop an interest in STEM, positive STEM identities, a sense of belonging in the community, and the will to persist in academic STEM journeys (Zaniewski & Reinholz, 2016). Further, same-gender peer mentoring increased mentees' confidence, motivation, sense of belonging, and retention (Dennehy & Dasgupta, 2017).

In addition to parent and mentor support, a crucial factor impacting Black and Latina girls' participation in STEM is the underlying culture of STEM itself. STEM cultures and communities are often built on practices typically associated with stereotypical white and hypermasculine ways of being (Simon, Wagner, & Killion, 2016). As such, learners who do not identify with these ways of being may feel that their full, authentic selves are unwelcome or must be changed in order to participate in STEM (Thomas et. al, 2018). Thus, it is necessary to create counterspaces, or safe spaces where Black and Latina learners can grow, learn, and be in community with others (Ong et al., 2017). These counterspaces can form in different ways and do work to alleviate negative impacts from oppressive structures and cultures created by negative stereotypes and deficit narratives (Ong et al., 2017). In the current study, we seek to create a counterspace by providing inclusive, welcoming spaces for Black and Latina girls and their families to engage in STEM learning.

## Methods

### Program description

DYD is a program created to engage Black and Latina middle school girls in design-based STEAM and computing projects that are introduced by narrative stories (Pinkard et al., 2017). Since its inception in 2013, DYD has had over 500 girls participate and trained over 40 high school, undergraduate, and graduate students to be near-peer mentors. Led by the near-peer mentors, each session involves hands-on learning experiences designed to make connections between STEM and girls' own interests, such as art, fashion, or music. To build community in and beyond the DYD, the girls' parents and caring adults participate in workshops and social events designed to support family engagement in STEAM called Caring Adult Network (CAN).

### Participants

During the program year 2019-2020, a total of 47 girls between ages 10 and 12 in a mid-sized racially and socioeconomically diverse community joined in the 16-week program. Parents of the girls were racially diverse, where approximately 30% identified as African American, 26.42% Latino/a/x or Hispanic, 11.32% Caribbean Islander, 11.32% White (non-Hispanic), 9.43% Asian American, and 11.32% other (Biracial, Jewish, Asian Latino, Native American, American Indian, or Alaskan Native). Household incomes were also diverse, with 27.66% between \$20k - \$50k, 21.28% between \$60k - \$100k, 27.66% between \$100k - \$150k, and 19.15% making \$150k or more.

### Data sources and analysis

We distributed a post-program survey among youth participants to understand their experience in and beyond DYD, asking questions such as *How much do you feel supported by your mentors?* Activities were facilitated through an online learning platform; through this, we were able to collect attendance and participation data even while engaging in remote learning. We also distributed a post-program survey among parents to collect feedback on their experience in DYD and CAN as well as the impact of COVID-19 on their families. We observed and recorded the final program showcase event with a focus on the experience and relationship between the mentors and the girls. In this paper, we present preliminary results that describe the ways families, mentors, and girls built counterspaces and a supportive community in-person and virtually.

### Preliminary results

We provide preliminary results from this work by briefly describing changes we made to accommodate the shift to online programming, sharing the extensive impact of COVID-19 on the families, and sharing reflections on the program from parents and youth participants.

### Programmatic shifts

When faced with a required lockdown due to the COVID-19 pandemic, we made use of the online video platform Zoom, in lieu of our in-person sessions, workshops, and events for both girls and parents and caring adults in CAN. The scheduling of DYD sessions remained on the same day and time to encourage girls to stay engaged and connected as the pandemic began. We used breakout rooms, online quiz and game websites, virtual whiteboards, and other online resources to create fun and interactive learning experiences during the Zoom sessions. We also invited girls to connect with their peers and program mentors via weekly social Zoom sessions to chat about their DYD projects and life in general. We scheduled two CAN events for parents during this time; one was an online chat to discuss supporting families, and the other was a final showcase. We also communicated with families more often, incorporating SMS and phone calls in addition to emails (Coleman et al., 2021).

## Impact of the pandemic on families

Participation in DYD in the year 2019-2020 could not be fully understood without accounting for the impact the COVID-19 pandemic had on families. Parents and caring adults reported a significantly negative impact on their daily lives due to the COVID-19 pandemic, indicating that bandwidth was stretched incredibly thin for families during this time. In the post-survey, we asked parents, “What impact did the COVID-19 pandemic have on you and your family?” All respondents reported at least one negative impact of COVID-19. Of the 26 respondents, 18 reported difficulty transitioning to remote learning for DYD, 16 reported difficulty transitioning to remote learning for school or work, and 10 reported an immediate negative economic impact due to COVID-19. This clearly indicates that DYD families were deeply impacted by the pandemic and reminds educators and researchers the importance of moving forward with open understanding.

## Responses to the program

The programmatic shifts, in addition to the larger pandemic context, impacted attendance for both DYD workshops and CAN events. The average attendance at youth sessions and CAN events did drop significantly after the shift to virtual programming. However, the impact of the programming and the quality of participation remained high. Evidence from the workshops, parent, and youth surveys indicates that DYD was overall an important part of the families’ lives and continued to play a positive role in learning and socialization. For example, in an open-response question that asked parents to comment on the program and the impact of the pandemic, one parent responded, “*Thank you for doing the program, I would not be able on my own to expose my child to the STEM topics and activities in addition to the role models.*” Another parent described that their child looked forward to every Zoom session, missed seeing her friends in person, and attended every event possible. This parent concluded, “*Doing the online meetings on Saturday brought a sense of normalcy to this chaotic situation.*” Similarly, in the post-program youth survey, the majority of girls indicated that they felt like they belonged in the DYD community. Together, these responses suggest that DYD remained a safe space and a positive influence for the girls and families who were able to continue participating.

Importantly, the care and effort put forth by the mentors to create a safe and supportive space for the girls can be seen in the way they structured the final showcase event of the program year. Mentors made personalized videos for each of the girls who attended the final showcase, congratulating them on a year of growth and learning, and taking time to point out things they appreciated about each one. The mentors publicly shared personal sentiments such as “*I loved your positivity and your kindness.*”; “*I really enjoyed how quick you were to adapt.*”; and “*...I really liked your enthusiasm...*” These affirmations demonstrate that building community throughout DYD meant focusing on personal growth, social and emotional support, and individual connections. In the post-program survey, the girls generally indicated that they felt supported by their mentors. This demonstrates that even remotely, a community can be built and sustained for Black and Latina girls by focusing not only on STEAM learning but also on validating girls’ emotions and experiences and explicitly praising their efforts and persistence.

## Reflections and implications

Our study examined the implementation of DYD as learning activities shifted to virtual spaces due to COVID-19 and how culture and community could be built and sustained around STEM for Black and Latina girls in particular. While we cannot know the impact the pandemic had on program participation of other demographics as compared to our participants and their families without comparative study, we acknowledge that large-scale crises tend to make more visible existing structural inequities that impact Black and Brown communities (Sequist, 2020). While we needed to make decisions quickly about how to organize our program in response to the pandemic, we could not know all the ways the crisis would impact families’ ability to participate. Even now, much is still unknown about the constraints and opportunities faced by our diverse population of families.

These initial findings provide lessons to build on as we continue establishing online community connections for 2020-2021. First, a supportive community must be willing to adapt and shift to members’ needs, while also not placing blame or fault on families for situations beyond anyone’s control. While at first glance the downward trend in attendance may seem disappointing, it serves as a reminder that families may have competing demands on time and energy, resource constraints, or other concerns that may impact their ability to prioritize OST STEM learning. Strategies such as more frequent contact with families through multiple communication modes should be designed to meet girls’ and their families’ needs and preferences. Next, much like the DYD mentors gave the girls words of praise and encouragement in the final showcase, a mentoring relationship that provides a STEM counterspace must highlight and celebrate the full, authentic selves of the learners and validate both their STEM interests and other aspects of their identities. Last, we acknowledge that community and counterspace building takes intentional work and time, and may be even more challenging online. Understanding

what families have gone through during the pandemic helps us design a better experience for all families while remaining mindful of our program mission. Educators should adopt an ethic of care now and always and continue to commit to providing counterspaces for learners who are too often subjected to gendered racism in STEM and computing. Future work should also further examine the role of race, ethnicity, class, and other factors on families' abilities to thrive and learn during crises.

## References

- Coleman, M., Garcia, I., Hill, J., Ju, B., Lawler, B., Osorio, M., Thompson, N., Standberry-Wallace, M., Nacu, D., Erete, S., & Pinkard, N. (2021, March). Navigating a pandemic: Evaluating communication with parents in a STEM program for Black and Latina girls. In A. Decker (Chair), *Special interest group computer science education*. [Proceedings in press]. Online.
- Pinkard, N., Erete, S., Martin, C. K., & McKinney de Royston, M. (2017). Digital youth divas: Exploring narrative-driven curriculum to spark middle school girls' interest in computational activities. *Journal of the Learning Sciences*, 26(3), 477-516.
- Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecologies perspective. *Human Development* 49:193-224.
- Barron, B., Martin, C. K., Takeuchi, L., & Fithian, R. (2009). Parents as learning partners in the development of technological fluency. *International Journal of Learning and Media*, 1(2), 55-77.
- Corbett, C., & Hill, C. (2015). Solving the Equation: *The Variables for Women's Success in Engineering and Computing*. American Association of University Women. 1111 Sixteenth Street NW, Washington, DC 20036.
- Dennehy, T. C., & Dasgupta, N. (2017). Female peer mentors early in college increase women's positive academic experiences and retention in engineering. *Proceedings of the National Academy of Sciences*, 114(23), 5964- 5969.
- Deschenes, S. N., Arbreton, A., Little, P. L., Herrera, C., Grossman, J. B., & Weiss, H. B. (with Lee, D.). (2010). *Engaging older youth: Program and city-level strategies to support sustained participation in out-of-school time*. Cambridge, MA: Harvard Family Research Project.
- Fabert, N., Cabay, M., Rivers, M., Smith, M. L., & Bernstein, B. L. (2011). Exaggerating the typical and stereotyping the differences: Isolation experienced by women in STEM doctoral programs. *Proceedings of the American Society for Engineering Education* (AC 2011-704).
- Lave, J. W., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Margolis, J., Estrella, R., Goode, J., Holme, J. J., & Nao, K. (2008). *Stuck in the shallow end: Education, race, & computing*. MIT Press.
- Ong, M., Smith, J. M., & Ko, L. T. (2017). Counterspaces for women of color in STEM higher education: Marginal and central spaces for persistence and success. *Journal of Research in Science Teaching*, 55(2), 206-245.
- Sequist, T. D. (2020). The disproportionate impact of COVID-19 on communities of color. *NEJM Catalyst Innovations in Care Delivery*, 1(4).
- Simon, R. M., Wagner, A., & Killion, B. (2016). Gender and choosing a STEM major in college: Femininity, masculinity, chilly climate, and occupational values. *Journal of Research in Science Teaching*, 54(3), 299-323.
- Thomas, J. O., Joseph, N., Williams, A., & Burge, J. (2018, February). Speaking truth to power: Exploring the intersectional experiences of Black women in computing. In *2018 Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT)* (pp. 1-8). IEEE.
- Zaniewski, A. M., & Reinholz, D. (2016). Increasing STEM success: A near-peer mentoring program in the physical sciences. *International Journal of STEM Education*, 3(1).

## Acknowledgments

This study is based on work supported by the National Science Foundation (#1850505 and #1850543). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. We are especially grateful to the DYD learners, their parents and caring adults, DYD mentors and other staff, and the research and implementation teams across Northwestern and DePaul Universities for their contributions.