Brokering learning between on- and offline environments: Social and technical practices

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Building on the idea of a knowledge broker as a key individual who translates information and ideas among and between professionals from different communities (Wenger, 1998), we consider a *learning broker* as a person who finds and curates potential learning opportunities and makes connections between those opportunities and young learners in their community (Barron, 2006). Previous work has identified informal brokering roles played by parents (Barron, Martin, Takeuchi, & Fithian, 2009) and adult mentors (Barron, Gomez, Pinkard, & Martin, 2014; Ching, Santo, Hoadley, & Peppler 2015) as important in developing youth technological fluency and identities as creators and contributors.

Recent research syntheses on how to support equitable STEM learning specifically call out the need to intentionally broker opportunities for youth to participate in learning across different settings (Penuel, Lee, & Bevan, 2014). Given the escalation of online environments for K-12 learning in both their design and adoption into formal and informal education spaces (NRC, 2009), and their potential for addressing digital divides by connecting youth in areas with fewer resources and opportunities to social and material supports for learning (Aspen Institute, 2014, US Department of Education, 2010), we are especially interested in bidirectional brokering of opportunities for learning between on and offline spaces.

While brokering has emerged as an important practice, it is often something that happens organically as opposed to being an intentional design mechanism. Perhaps as a result, recent studies suggest that brokering does not happen frequently for all youth. One study of online learning support roles showed that while all educators brokered at least once, brokering was a role played infrequently, and expectations of brokering practices were less well defined for educators than other roles (Nacu, Martin, Pinkard, & Gray, 2014). Another study identified a variety of factors that affect the presence of brokering moves within a learning community, including individual dispositions of youth, such as those who are inclined to request help and persist in doing so, and adults, such as those who are comfortable establishing personal relationships with youth that extend beyond time-bounded programming (Ching, Santo, Hoadley, & Peppler, 2015; Barron, Gomez, Pinkard, & Martin, 2014).

In this work, we look at a face-to-face learning environment linked to online opportunities and explore the questions of: (1) How can we support educators to broker learner moves between on and offline learning spaces? (2) How can multimodal social and technical supports be used?

Methods

Program and participants
The Digital Youth Divas (DYD) is a blended online and face-to-face program developed and run by the Digital Youth Network at DePaul University. The program is designed to engage middle school girls, particularly those from underserved urban communities, with activities in computational circuitry and programming through fabrication and design. DYD is comprised of interconnected components purposefully designed to impact girls' STEM-related identities, learning and knowledge outcomes, and learning community, including: (1) self-paced, hands-on,

project-based curriculum shared through a story-based narrative; (2) an online social learning network used in the face-to-face but accessible at any time, including scaffolded assignments and resources, individual portfolio spaces, and interaction around submitted work; and (3) adult mentorship on and offline.

This work took place in one instance of the DYD program during winter 2016. Girls were recruited to the free 20-week program through flyers and notifications sent to Chicago public schools, advertisements for parents on social media, and emails to parent listservs. Over 100 girls (N = 109) ranging from 4th to 8th grade participated. Approximately two thirds of girls (65%) self-reported as African-American and 20% as Latina. Ten female DYD mentors were undergraduates or recent college graduates with liberal arts backgrounds and some prior experience working with youth.

Data collection
Data was collected from the program over the first 3-months (January-March 2016) at multiple levels of analysis, including: (1) qualitative virtual ethnographies (Hine, 2008) of activity in the online platform (N = 119 participants); (2) a deeper look at one classroom cohort (N = 2 mentors and 24 girls) through field notes from the weekly classroom environment; and (3) individual perspectives from mentors (N = 10) and youth (N=5) through interviews and reflections.

Results
We first present an approach to intentionally seeding the role of brokering on and offline in formal mentor professional development developed by the lead mentor to address disconnect between the on and offline spaces, and then share evidence of related social and technical mentor practices that emerged in the program over three months.

Professional development for mentors provided rationale for brokering
Mentor professional development was developed to articulate both the unique learning affordances in online spaces and the specific role of mentors as brokers of transitions between on and offline activities. Training included clear description of the DYD online space as a connected but separate learning environment. Formal slideshow presentations, guided discussion, and short activities translated relevant theoretical ideas from the field of learning sciences into practitioner-focused materials, including concepts of blended learning (Ito et al, 2013), affinity spaces (Gee, 2005), youth interest development, and learning ecologies (Barron, 2006). These components emphasized the purpose of the online space as a place for individual youth to continue learning outside of class and to interact with peers and adults around work and ideas, and for a youth-driven community around common work and interests to thrive.

> PD trainer: So much of the experience clearly takes place in the classroom…but we also use a platform. ...All these things are meant to happen in theory both online and face-to-face. We wanted to do a quick training today covering some things relating to online mentorship. If you have an interest in this working with kids…you naturally try to do that face-to-face, but not naturally in an online space. *[field notes]*

Focused attention to the online space led to intentional discussion of mentor practices on and with the system (Nacu, Martin, Pinkard & Gray, 2014). Mentors were encouraged to use the

online space as a window into individual youth and their personal interests and expertise, views that are often difficult for educators to attain in a busy time-bounded face-to-face space. They were also introduced to the idea of brokering new opportunities for learners by connecting them to people, resources, and new activities.

One mentor reflected on her changing perspective of her role in navigating girls' learning in the online space, "It's easy to talk about how we'd be in person with them, it's more natural. But being online is not as natural of a thing, but [the training] makes this feel more human."

Mentors made connections between on and offline opportunities
After the training, mentors were observed brokering opportunities for girls to move to the Divas website instead of relying on classroom supports like mentors for help, encouraging the use of multimodal digital resources.

Nisha is reading the instructions and asks Leah (mentor), "What's a battery holder?" Leah says: "Why don't you click on the link? It's a video. You have to read this." Nisha: "All of this?" Leah: "It's not a lot. I get it is Saturday morning." Sadie says: "Or you can watch the video." Leah: "If reading is your thing read, if not then watch the video." The girls are navigating to the instructions on the tablets. *[field note]*

Armed with grounded knowledge of the online learning space and their role of brokering opportunities for learning, mentors used the online communication features of private messages and public comments to connect opportunities for girls between face-to-face and online spaces, building on their knowledge of individual girls. One example is when mentors proactively used the private messaging system to broker moves to the online environment for girls who were absent from the face-to-face program, enabling them to catch up before the next class and setting up time for one-on-one support in the physical space.

Hello Amalia! Last Saturday, we worked on our Divas Collages! Go ahead and click on your second challenge "Introducing the Digital Youth Divas", watch the video and do the activity. You can see some of the collages we made last class on your live feed, so you can have examples and get ideas! Bring your collage next Saturday (02/06/16) and I'll help you to upload it to iRemix so you can earn points and move on to next activities with the rest of the class. See you soon! Have a great weekend :) *[digital ethnography]*

In another example, a mentor used comments and tagged reactions to respond to work submitted with the title, "I did not succeed." While the mentor was not able to see this struggle in the face-to-face space, online she was able to leave a comment prompting the submitter to ask for individual help in person, "Remind me of this next week and we can work on getting it together." She also used the system "reaction" tags to reiterate this (*you are on the right track* and *let's chat about this*) (see Figure 1).
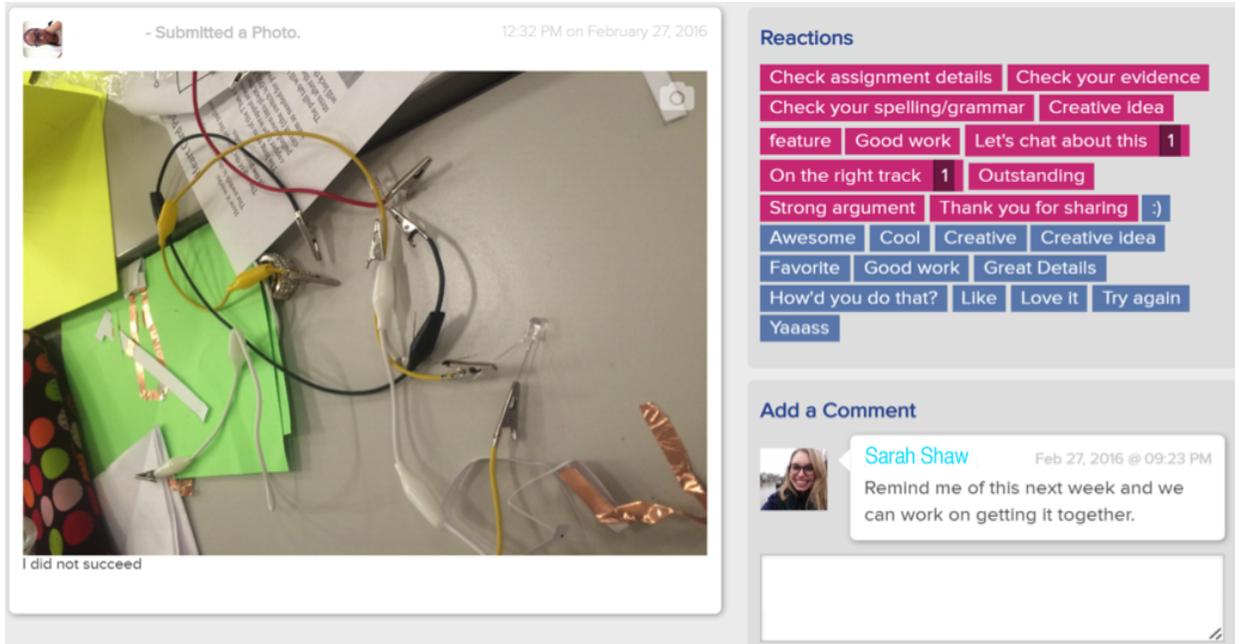
Figure 1. Screenshot of youth submitted work with the caption, "I did not succeed" and a mentor response brokering opportunity for help in the face-to-face

Continuing challenges to taking on brokering practices
While the program has been successful at building a culture of mentoring opportunities between DYD on and offline opportunities, there remained challenges of limited time and questions about competing opportunities. Mentors were responsible for managing the day-to-day flow of the classroom, making sure all girls finished program and the project-based work successfully. This was sometimes at odds with the idea of exposing kids to more learning opportunities in other places. One mentor expressed concerns about brokering online experiences beyond DYD,

> I guess I wasn't completely sure on how much freedom I've had. I know some of the girls who are really itching to code. I've been thinking of even mentioning like, 'Have you guys been to code.org or something? There's a lot of resources for you guys online to just do little projects, and sort of teach yourselves.' But sometimes it feels like, 'Okay, well, we haven't even started the Mystery Bash.' So it's just a lot… *[mentor interview]*

Discussion and future work
The emergent practices of targeted professional development for mentors and evidence of mentors engaging in brokering learning opportunities for girls across online and face-to-face spaces are encouraging, as mentors learn navigate the online space and their role in it. We are especially interested in instances when the girls were able to seek support and mentors were able to recognize interests or needs beyond busy face-to-face programming, enabling opportunities for further learning instead of dead ends even for those who may be quieter in the classroom.

Developing effective, inclusive practices for educators and students in this shifting "cyberinfrastructure" landscape is necessary in preparing young people for the lifelong learning required in the modern professional world (Task force on cyberlearning and workforce development, 2011). We believe that strategies and tools for supporting educators to broker opportunities for their young learners across theses virtual and physical spaces is a critical part of this work.

Acknowledgements

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