

# Mentors in the Making: A Case Study of Heterogeneity in Meaning Making at a Public Library Makerspace

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The rise of public makerspaces in the US is seen as a way to democratize access to STEM fields, but many questions remain about how the maker movement can reach a diversity of youth in sustained ways. Adult mentors are a potential pivot: the expansiveness or narrowness of their conceptions of making and makers may shape the democratizing potential of makerspaces. This poster studies adult mentors at an award-winning public library makerspace working with racially and socioeconomically diverse teens. It asks *How do these mentors conceptualize their practice and the relationship between mentors, making, and (teen) makers?* Our findings contribute to broader efforts to establish makerspaces at public institutions that truly democratize access to powerful ideas and practices.

Data were generated over three months in 2017, in a study including participant observations, semi-structured interviews with mentors and makerspace leadership, and interviews with focal students. Here we focus on mentor interviews, exploring how they, as institutional agents and artists with expertise in varying domains (e.g., textile crafts, robotics, music production), conceptualize the relationship between mentors, makers, and making. We use Chevallard's (1985) didactical model to frame accounts of their conceptions (see Fig 1a). This model was originally proposed to analyze general elements of a mathematics learning environment - namely, teacher, student, and knowledge taught (Ben-Peretz, Moon & Brown, 2004); for our study this translates as a system with vertices for mentor, maker, and making, respectively. Chevallard's model is deceptively simple because the surrounding *context*, though not explicitly depicted, is as important as the elements themselves. That is, Chevallard argued that institutional and societal contexts matter significantly for how relationships between teacher, student, and content unfold, although scholars adopting the framework often neglect its dynamic aspects (see Schoenfeld, 2012). A sociocultural perspective on the didactical system highlights how mentors' conceptions are shaped by personal histories and by social, historical, and political contexts of schooling, the library, and the broader maker movement.



Figure 1a. The didactic triangle (Chevallard, 1985), left; and Figure 1b. our analytic refiguring, right

## Findings

As Figure 1b suggests, we found that mentors engaged thoughtfully **about how heterogeneity was built into the design and enactment of the makerspace** in ways that indicated achievements along the mentor and making vertices. For our interviewees, **the “mentor” vertex** should be imagined as “exploded” to reflect the array of expertise that various mentors embodied. The makerspace's targeted hiring of artists strengthened its goal of heterogeneity in making while also allowing teens to experience the space as having a purpose apart from career readiness or technical training. Mentors represented an expansive definition of making, one that counters a dominant narrative in the US Maker Movement in which accomplished making practices often map to *technology-centered entrepreneurship*. In particular, the deliberate inclusion of spoken word and music artists indicates the makerspace's vital connections to a city actively reviving Black heritage music in the South. Images of making embodied in the mentors' expertise were also decoupled from the pursuit of economic return in the lives of minoritized teens. **The “making” vertex** of the didactic system should also be “exploded” into an array of vertices, reflecting the plurality of ways that “making” was defined in this setting - 3D printing, 3Doodlers, virtual reality play, music production, textile art and animation, to name a few. This plurality (greater than “making as robotics” but less than “making as all cultural practice”), resonated with the diversity of material resources in the setting and of expertise among the mentors. Teen makers could regularly choose among a range of activities on entering the space.

In counterpoint with these successes, **at the “maker” vertex**, many mentors expressed uncertainty or conflict. Some mentors seemed unsure about the importance of drawing new makers into the space. Relatedly,

mentors' perspectives differed on whether making was *a priori* a necessary good for all teens. These challenges both point to questions about the nature and flexibility of relationships with teen makers that mentors sought to promote. While mentors generally understood their work intrinsically to involve building relationships with teens, they described this in two ways. Some described maker-mentor relationships as grounded in shared histories and experiences, or social affinity (e.g., racial or linguistic similarities), mentioning the need for teens to see themselves physically represented among the mentors. Such affinity-based perspectives implicitly recognize the expansiveness of making as a cultural form for all racial, economic, and social communities. And while this runs productively counter to the Maker Movement as a cloistered space of straight, white, upper middle-class masculinity (see, e.g., Beuchley, 2013; Dawkins, 2011; Vossoughi, Hooper, & Escudé, 2016), our data suggest caution in relying on representational approaches to enact structural change: to refigure making in light of such broad participation means also creating the conditions for mentoring as an anti-bias practice. A second way mentors spoke of building mentor-maker relationships was *through* making. In the terms of the didactic model, rather than follow a direct connection of maker to mentor, this approach had mentors *meeting makers at the making vertex*, when shared social histories or affinities were elusive. However, a challenge naturally emerged here in conceptualizing teens who are not yet connecting with a making practice. Non-participation in the space or activities often led mentors to hypothesize about *kinds of teens*, in ways that revealed challenges they faced to bridge social distance. The need to support mentors in an ongoing project of developing and sustaining a sociopolitically and ideologically informed reflective practice (Philip, Gupta, Elby & Turpen, 2017; Zeichner & Liston, 2013) thus emerged as integral to the makerspace's larger efforts at broadening and sustaining participation in making among a diversity of makers.

## Conclusion

The U.S. has seen a rapid rise in making and digital fabrication in education. The diffuse nature of where, how and when making occurs suggests limitless possibilities for it as a form of social creativity and innovation, and for who might identify as a maker. However, equitably institutionalizing such human activity is a nontrivial challenge (Halverson & Sheridan, 2014), and makers would benefit from the body of research on how to promote ambitious and equity-oriented practices. This includes continuing to expand epistemic heterogeneity in making, by promoting mentors who embody (professionally and personally) the expansiveness of making as a cultural form. Further still, supporting and organizing mentors' learning in relation to the sociopolitical context of their work (past and present) as a reflective practice (cf., Zeichner & Liston, 2013) may empower them to identify deficit ideologies of race, poverty or gender, which we know infiltrate science and engineering learning contexts (e.g., Philip, Gupta, Elby & Turpen, 2017), from subverting the otherwise democratizing power of the work they do. This emerging field of action, we argue, offers a consequential foothold for the learning sciences to "count" and to contribute to ways of rethinking learning in the digital age.

## References

- Buechley, L. (2013, October). Closing address. FabLearn Conference, Stanford University, Palo Alto, CA. Retrieved from <http://edstream.stanford.edu/Video/Play/883b61dd951d4d3f90abeec65eead2911d>
- Ben-Peretz, M., Brown, S., & Moon, B. (Eds.). (2004). *Routledge international companion to education*. Routledge.
- Chevallard, Y. (1985). *La transposition didactique—Du savoir savant au savoir enseigné*. Grenoble: La Pensée Sauvage.
- Dawkins, N. (2011). Do-it-yourself: The precarious work and postfeminist politics of handmaking (in) Detroit. *Utopian Studies*, 22(2), 261-284.
- Halverson, E. R., & Sheridan, K. (2014). The maker movement in education. *Harvard Educational Review*, 84(4), 495-504.
- Philip, T. M., Gupta, A., Elby, A., & Turpen, C. (2017). Why Ideology Matters for Learning: A Case of Ideological Convergence in an Engineering Ethics Classroom Discussion on Drone Warfare. *Journal of the Learning Sciences*, 1-41..
- Schoenfeld, A. H. (2012). Problematizing the didactic triangle. *ZDM*, 44(5), 587-599.
- Vossoughi, S., Hooper, P. K., & Escudé, M. (2016). Making through the lens of culture and power: Toward transformative visions for educational equity. *Harvard Educational Review*, 86(2), 206-232,307-309.
- Zeichner, K. M., & Liston, D. P. (2013). *Reflective teaching: An introduction*. Routledge.

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