

Community Science Identity: Becoming Community Scientists in a Museum-based Genetics of Taste Program

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Abstract: A museum genetics lab, following an apprenticeship model, scaffolds volunteers' participation in laboratory activities through interactions with other lab members. As volunteers interact and complete activities in the lab they connect prior memories and experiences to present and imagined future experiences. Using a sociocultural analytic framework for trajectories of identification, we examined (1) how volunteers were scaffolded in lab participation and (2) how participation directly affects trajectories of identification by analyzing prolepsis, positioning, and agency.

Keywords: Community Science, Citizen Science, Informal Learning, Identity

Research problem

Community science, or Public Participation in Science Research (PPSR) (Bonney, et al., 2009), is an exciting and growing avenue whereby members of the general public contribute meaningfully to the scientific enterprise, while simultaneously learning science. While community science offers opportunities for PPSR, how those opportunities are scaffolded and received by the scientific community, and how those opportunities are successfully and unsuccessfully accessed remains unclear. The purpose of this paper is to describe how trajectories of identification emerge for community scientists as they participate in different ways in a volunteer museum-based genetics lab program, and how age, gender, prior experience in science, and elements of participation affect identity and future participation in science. This will ultimately be used to understand barriers and constraints to continued participation as a community scientist.

Theoretical and methodological approach

We theorize that volunteer participants in community science hold projected identities, or *trajectories of identification*, which direct how they participate in the lab and thus in science. In this study, we examined (1) how volunteers are scaffolded in their participation and (2) how their participation directly affects identity and *trajectories of identification* by analyzing *prolepsis*, *positioning*, and *agency* of participants, as they occur in real time and in narrative. Using the *trajectories of identification* framework (Polman & Miller, 2010), we theorize participation and identity as dynamic and co-constructed through social interactions and activities.

To further analyze *trajectories of identification*, we looked at the following elements of participation: prolepsis, positioning, scene, and agency. The distance measuring the individual's actual identity to a future possible identity imagined by self and others is represented by the Zone of Proximal Identity Development (ZoPID; Polman, 2010). Using the ZoPID—similar to Vygotsky's Zone of Proximal Development (ZPD)—we view identity development as tied to the participant's past positioning and positioning by self and others during social activities. The ZoPID for each community scientist includes trajectories of identifications (from self and others) which “impact their participation in the learning environment on a moment-to-moment basis, and which lead to their longer term development of identity” (Polman, 2010, p.129). We focus on three different planes of sociocultural activity—community/institutional, interpersonal, and personal—for developmental analysis of participants involved in sociocultural activities and practices. Rogoff (1995) refers to the interpersonal process as *guided participation*, whereby “people manage their own and others' roles, and structure situations (whether by facilitating or limiting access) in which they observe and participate in cultural activities” (pp. 147-148). As participants move through this functioning apprenticeship they are guided in their participation and appropriate skills and knowledge to participate in the community as a more knowledgeable peer. Thus, our analytic approach “requires considering how individuals, groups, and communities transform... together” (Rogoff, 1995, p.161).

Methods and data sources

This study was conducted in a museum-based genetics of taste lab, and all community scientists were invited to participate in the study. 35 participants consented. All participants were given pseudonyms. Using an ethnographic approach, we completed participant observations and observations of the community science program in the genetics lab beginning in July 2016 until December 2017. Observations consisted of recorded actions and

interactions occurring in real time. Participant observations were conducted once a week for six months prior to observations. Each participant observation was 4.5 hours, the length of one volunteer shift. After six months, researchers transitioned to roles as observers of community scientists as they participated in lab activities and during social and public interactions in the lab; ethnographic observations of lab shifts continued for ten months. Formal and informal interviews were also conducted, as well as exit interviews when community scientists left the program due to career and life transitions. Lastly, informal events such as symposiums, workshops, outreach events, and appreciation dinners, offered by the museum to volunteers, were observed to understand more fully the types of interactions and forms of participation occurring for community scientists outside the lab.

We deductively coded and thematically analyzed (Erickson, 1986) all field notes and interviews. Using the ZoPID (Polman, 2010) and trajectories of identification framework (Polman & Miller, 2010), we looked at elements of participation and identification to build individual case studies describing trajectories of identification, based on types of participation in the lab, career and life stages, and association to social categories. Career and life stage were divided into pre-professional, early/mid-career, or late-career/retired. Pre-professional career volunteers are in high school or college, while those in their early to middle career stages are either working, obtaining a higher degree, or in transition. The late-career/retired volunteers are those who are fully or semi-retired. In addition, we coded thematically for motivation/satisfaction for volunteering, lab and scientific practices, science content, and for characteristics of the community/social environment.

Major findings

Lab volunteers are trained during volunteer shifts by the lab staff and other volunteers, oftentimes using lab protocols and procedures from lab binders; thus functioning as an apprenticeship (Lave & Wenger, 1991; Rogoff, 1995). Upon entering the lab, all community scientists are positioned as novices to the lab, yet are expected to successfully contribute to scientific research. Our overall analysis has revealed primary categories of positioning used by community scientists about themselves and other sub-categories which have emerged during laboratory moments and interactions. Many of these have predictable relations to career and life stages, and position community scientists in different lab roles. We found that volunteers in the lab fall under “retiree” (or self-described “geezer”), “resume builders”, and “more knowledgeable peer (MKP)” categories, and those identities are related to more sophisticated levels of scientific participation. We also found that unique communities formed across the different shifts.

Conclusion and further implications

Evidence from this study contributes to our understanding of how identifications associated with life stages and aspirations contribute to the experiences of community scientists. Thus prolepsis, agency, and positioning (by self and others) directly contributes to the level and type of participation exerted by the volunteer and contributes to social categories emerging from laboratory interactions that further reflect life stage and volunteer task preference.

References

- Bonney, R., Ballard, H., Jordan, R., McCallie, E., Phillips, T., Shirk, J., & Wilderman, C. C. (2009). Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education. A CAISE Inquiry Group Report. Available: <https://eric.ed.gov/?id=ED519688>
- Erickson, F. (1986). Qualitative Methods in Research on Teaching. In *Handbook of Research on Teaching* [3rd edition] (pp. 119–161).
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.
- Polman, J. L. (2010). The zone of proximal identity development in apprenticeship learning. *Revista de Educación*, 353 (Sep-Dec), 129-155. http://www.revistaeducacion.educacion.es/re353_05.html
- Polman, J. L., and †Miller, D. (2010). Changing stories: Trajectories of identification among African American youth in a science outreach apprenticeship. *American Educational Research Journal*, 47(4), 879-918.
- Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. In Wertsch, J. V., del Rio, P., & Alvarez, A., *Sociocultural Studies of Mind* (pp. 139–164). New York: Cambridge University Press.

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