

# Reel Science: Identity Development through Filmmaking

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**Abstract:** This study explores how four urban middle school girls co-constructed a science documentary film in an after-school science club. By examining the ways the girls engaged in “core” practices of science and a variety of science, film, and artistic tools and multimodal resources, this study seeks to understand how filmmaking provided unique opportunities for girls to develop positive identities with respect to science.

Researchers have begun to document and explore how youth-produced films provide opportunities for learning and engaging in positive identity development, particularly for youth who often struggle in school settings (Calabrese Barton & Tan, 2010; Halverson, 2010). Increasingly, researchers are attending to the wider range of multimodal resources and practices involved in constructing youth-produced films and the complex ways that identities materialize in and through multimodal texts and create new possibilities for meaning-making (Halverson, 2013; Phal, 2011). This study seeks to understand how four middle school girls participating in an after-school science club co-constructed a science documentary film about bisphenyl A (1) (BPA) in their bodies. By examining the multimodal construction of the film *BPA and Our Bodies*, this study explores how film production provided important opportunities for girls to engage in “core” scientific practices and how these opportunities were taken-up or “lived” through multimodal resources. In addition, this study will provide insight into how girls’ identities shape, and are shaped by, participation in culturally relevant science.

## Research Focus

The data for this study are taken from a longitudinal ethnographic study of urban middle and high school girls’ identity development in an after-school science club intentionally designed to combat notions of science and “norms” of participation typically perpetuated in school-based science classes. The focus of this research examines the ways that a team of four girls engaged in the construction of a science documentary film over the course of 14 weeks. The core curriculum of the science club focused specifically on scaffolding girls’ authoring of a science story that was informed by engaging in four types of scientific practices: conducting an empirical investigation, critically analyzing published scientific research studies, developing physical models of complex scientific concepts with artistic materials, and interviewing local expert scientists. These four scaffolded science practices were designed to provide opportunities for girls to engage in both practices specific to the culture of science as well as provide a framework on which to build a film. This study explores the ways the team of girls took up and modified these four science practices and engaged with a variety of science, film, and artistic tools and resources in order to represent what they learned about the impact of BPA on the female body. Primary data sources for this study include participant-constructed artifacts, including the final film, participant journals, and visual inquiry investigation maps and filmmaking storyboards. Additional data sources include participant observation fieldnotes and memos, video and audio recordings of girls engaging in the construction of the film, and semi-structured interviews and a focus group with all four participants.

## Theoretical and Methodological Frameworks

This study adopts a cultural production theory lens on culture and learning as identity development. Cultural production theory shifts attention to how individuals engage in science in specific contexts with an eye towards the ways that culture is co-constructed and continuously unfolding in the moment (Eisenhart, 2001). Noblit (2013) writes that when culture is conceptualized as a verb, it becomes about actions; it “denotes a sense of becoming” or processes that are not just about sets of beliefs and practices but about the “reproduction and production by people in specific contexts” (p. 244). Cultural production theory provides unique affordances for accounting for the “complex interplay” between individual agency (micro) and societal structures (macro) in the shaping of identities and how these tensions unfold over time (Carlone & Johnson, 2007, p. 1188). Cultural production theory provides a lens through which to examine how girls engage in science in specific contexts while also recognizing the role that broader discourses (i.e. of school, science, gender) play in shaping that engagement.

In addition, this study draws on a social semiotic approach to multimodality that posits that all forms of representation and communication are multimodal and that multimodality implies a theory of learning because learning always entails meaning-making (Kress, 2010; Kress & Van Leeuwen, 2001, 2006). Kress (2010) argues that a social semiotic approach understands identity as connected to the semiotic and conceptual resources that individuals use to engage in communicating within their social and cultural worlds; although these social and cultural worlds are always shifting and changing, multimodality allows us access to understanding how in

particular times and spaces, individuals make meaning by engaging through culturally relevant semiotic resources. “Doing” science and making films requires that individuals to engage in concrete material “stuff” (e.g. chemicals, lab equipment, cameras, editing programs) that are specific to science and film; both rely on visual and embodied modes of communication. The visual and embodied nature of scientific work (observing, representing) through different materials, or modes of communication and representation (i.e. graphs, tables, concept maps) are central to understanding the semiotics of multimodal communication in science (Kress, Jewitt, Ogborn and Tsatsarelis, 2001). As an analytic framework, multimodality provides a lens for understanding the ways that girls engaged with material and conceptual resources in service of authoring a science story through film. As a text, the film provides evidence of how the girls produce their own representations of science, as well as what those representations tell us about the unique identities of those girls. By studying the various semiotic resources (e.g. images, music, printed words, gesture) the girls foregrounded in the production of the film and how the girls took-up the scaffolded science resources and practices (highlighted above) during the construction of the film, this study provides us with a deeper understanding of how this team of girls enacted in a culture of science unique to this materially resource-rich environment.

## Potential significance

Learning science by engaging in core practices specific to the culture of science and constructing visual representations of these practices through artistic mediums for the production of a film requires unique demands of the learner. Analyzing and understanding how the construction of these multimodal representations supports positive identity development provides important insights into how filmmaking provides opportunities to learn science through the media that youth create, particularly for girls who lack opportunities to explore positive understandings of themselves in school science classrooms. In addition, findings from this study deepen our understandings of how historically marginalized girls become participants in science when provided with learning spaces that actively combat traditional notions participation in science.

## Endnotes

- (1) BPA is a chemical produced primarily in the production of polycarbonate plastics and resins and can be found in food and drink packaging. A synthetic hormone that mimics estrogen in the body, BPA has been shown to exhibit hormone-like properties in high doses and has been banned in numerous countries outside of the United States.

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