

Exploring Women of Color's Conceptualizations of Studying Undergraduate Biology: A Cultural Analysis

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Abstract: As a means to address the underrepresentation of Women of Color (WOC) in STEM, this study seeks to illuminate cultural and social factors that may contribute to positive student outcomes. Related literature associates deep learning approaches with high academic achievement. However, the adoption of deep approaches to learning are influenced by overlapping social and academic factors. This study examines factors of race/ethnicity, gender, and science identity for WOC as a means of exploring diverse conceptualizations of how undergraduates study biology.

Problem statement

Despite steady growth in national diversity, WOC continue to struggle in accessing higher education and persisting to graduation in STEM fields, leading to representation of women in STEM fields disproportionate to the U. S. population (National Academy of Sciences, 2007a). Recent shifts in the national narrative from a deficit-based approach towards a strength-based approach to understanding WOC in academic settings illuminate cultural and social factors that may contribute to positive student outcomes (Banks & Dohy, 2019; Brown et al., 2016). With this goal, studies have examined factors that contribute to the successful navigation of WOC through the science pipeline (Brown et al., 2016). Such studies illuminated how successful WOC author new identities, balanced competing identities, and continually developed their science identities amidst the sometimes hostile terrain of science (Allen & Eisenhart, 2016; Johnson et al., 2011). Although such studies are informative at a macroscopic level, there is a need for microscopic examinations of how cultural and social factors (e.g. identity) affect WOC's day-to-day academic decisions, such as the approaches they draw on to study for their science classes, that have a direct impact on academic achievement (Watters & Watters, 2007). Such studies are essential to understand how women of color successfully navigate through the STEM pipeline and can possibly illuminate more practical aspects of the path for WOC that follow.

Deep, versatile approaches to learning are related to high academic achievement (Watters & Watters, 2007). However, the adoption of deep approaches to learning are strongly influenced by overlapping factors within social and academic environments (Laird et al., 2008). WOC rest at the intersection of such personal and social factors associated with gender and race/ethnicity; factors that were historically unexamined in women of STEM scholarship (Allen & Eisenhart, 2016). Through the lens of intersectionality (Collins, 2000a), this study examines the cultural factors of race/ethnicity, gender, and science identity for women of color and how these factors impact their approaches to learning biology.

Theoretical framework

Spencer-Oatey (2008) defines culture as “a fuzzy set of basic assumptions and values, orientations to life, beliefs, policies, procedures and behavioral conventions that are shared by a group of people, and that influence (but do not determine) each member's behavior and his/her interpretations of the ‘meaning’ of other people's behavior.” (Spencer-Oatey 2008, p. 3). Students enter college with pre-established cultural identities that influence their behaviors within the academic context. Such cultural identities include race, ethnicity, and gender. Collins (2000a) argued that these identities are mutually constructed and should not be studied in isolation; intersectionality is a lens to examine gender, sexuality, race, class, and nation as mutually constructed identity. Carlone and Johnson (2007) have conceptualized science identity through the lens of intersectionality. They articulated that how one recognizes themselves and is recognized by others within the science community formulates their science identity, which is filtered through other cultural identities. Intersectionality is a helpful lens to use when trying to understand some of the complexities of students' personal factors. This study also draws on theory explaining how the interactions between environmental factors (e.g. social supports/barriers, social norms, access to

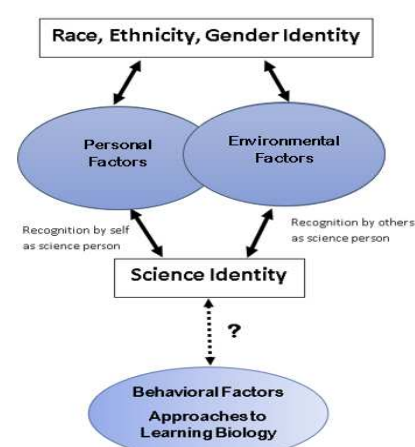


Figure 1. Visual Representation of Theoretical Framework.

community, and influence of others) and personal factors (e.g. identity, perceptions, expectation, and attitudes) influence behavioral factors (e.g. learning strategies and practices) (Bandura, 1986). Figure 1 illustrates how these theoretical lenses allow us to examine the complexities of intersecting identities through the interaction of social and personal factors, and the influence on how students approach learning.

Research question

1. How does the intersectionality of race, gender, and science identity influence how women of color conceptualize and approach learning biology?

Methodological approaches

To study both social and cultural factors that influence biology students' approaches to learning, I use the participant-selection variant of the explanatory sequential mixed methods research design (Creswell & Clark, 2017). Participants consisted of WOC (African-American, Asian, Hispanic/Latino, and Middle Eastern) who held contrasting approaches to learning biology (N=10). I conducted two semi-structured interviews per participant lasting an hour each. Protocol questions explored participants' science identity (e.g. Do you see yourself as a science person/scientist? Why/why not?) and cultural identity (e.g. Do you consider yourself a woman of color? Why/ why not?). An analytic framework established from Brown et al., (2016) application of selected theories to the STEM pipeline was used to integrate social and cultural factors revealed.

Major findings, conclusions, and implications

During interviews participants have shared their study experiences in introductory biology, how they learned such study strategies, how they define studying, and the extent to which their cultural backgrounds have played a role in how they approach learning biology. Quantitative survey results will be compared to qualitative interview data for an extensive comparative analysis of all participants. Detailed results will be shared at the International Conference of the Learning Sciences. The findings from this analysis will have implications for enhancing the student learning experiences and the promotion of academic success in STEM. This work is in its early stages which allows for the opportunity for rich and productive discussion between conference participants at the poster session to provide feedback on the application of the theoretical and analytical frameworks to the interpretation of the interview data.

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