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Whose meanings belong?: Marginality and the role of microexclusions in middle school inquiry science

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ABSTRACT

Recent research emphasizing disciplinary identities in the classroom indicates the importance of social interaction and inclusion in the classroom, yet only limited work focuses on how peer-initiated exclusion impacts learners. This study addresses that gap by examining the role of microexclusions, or affronts to sense of belonging and competence, in collaborative groups in 7th grade inquiry science classrooms. The qualitative analyses here involved videorecorded observations for 5 small groups of students participating in a semester-long series of inquiry life science units. A total of 19 observations were analyzed across the 5 groups. Five themes were identified across the groups: individualization or splitting of the group, adversarial interactions within the group, uneven access to regulatory roles within the group, lagging group members, and using diffuse status characteristics to redirect group activity. Results indicate that microexclusions redirect learners' behavior toward managing participation dynamics inside the group at the cost of inclusion and group functioning. Implications for equity and science education reform are provided considering findings.

1. Introduction

With the growing emphasis on learning disciplinary practices in science education, there is an increasing need to understand what happens to learners doing science in collaborative learning contexts. Engagement in scientific practices is expected to promote learners' development of scientific identities and to deepen their conceptual knowledge (NRC, 2007). However, collaborative learning contexts are known to often involve adverse social dynamics, such as inequitable participation and reliance on existing social hierarchies (Cohen & Lotan, 1997). Importantly, learners can be excluded from engagement in scientific practices and thereby be positioned as “not a scientist” or incapable of scientific thought, reproducing the inequities science education reforms seek to dissolve. Exclusion from opportunities to be a legitimate meaning maker may lead to long-term disengagement, marginality, and group dysfunction. Greater attention needs to be being given to how status-laden identities in science are constructed, defined, and reified through social interaction. Yet there is only limited work addressing how learners' peer interactions *inside* collaborative groups inform inclusion and exclusion in reform-oriented science learning environments, as much of the existing research emphasizes the role of teachers and traditional curricula as sources of exclusion instead. In an example of work attending to how these positions are negotiated at the peer level in science, Engle, Langer-Osuna, and McKinney de Royston (2014) offered a framework for understanding authority in collaborative learning contexts; they highlighted how group members negotiate influence in group activity. More research is needed to understand how peer interactions affect learners' participation in scientific practice.

For researchers and practitioners concerned with educational equity, practice-oriented frameworks for understanding learning

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bring with them questions about opportunity, access, and whose meaning-making processes are valued in disciplinary practice (for examples, see [Esmonde, Takeuchi, & Radakovic, 2011](#); [Nasir, Snyder, Shah, & Ross, 2012](#)). The present study aimed to take a similar approach to equity-oriented studies, but with an increased emphasis on the social side of being a collaborator in a science learning context. The present study examines the role of *microexclusions* in peer interactions within a collaboration-intensive and argumentation-driven inquiry science context. Microexclusions are moment-to-moment affronts to learners' belonging and competence in groups organized around the activity of disciplinary practice. The social relationship focus in these analyses offers insight into the mechanisms underlying learners' disengagement on the moment-to-moment level and provide some clarity about how broader social hierarchies manifest themselves at the local level (i.e. the classroom in a work group). Further, the present study engages the larger question of whose meaning making and participation is considered legitimate once inquiry science curricula have been introduced. The problem is addressed using qualitative analysis of video recorded observations to describe the acts that send learners to either membership in or to the margins of collaborative group activity; the ways that microexclusions impact group functioning beyond the individual receiving the microexclusion are also discussed. To conduct this examination, I use a sociocultural perspective inspired by [Wenger's \(1998\)](#) marginal non-participation concept.

By understanding peer interactions in reform-oriented science contexts, we gain insights into how teachers can best facilitate learning in small groups. A great deal of evidence has accumulated that demonstrates the role of social interactions in creating equitable or inequitable opportunities to learn and identify with disciplines generally ([Bianchini, 1997](#); [Boaler, 2008](#); [Carlone, Scott, & Lowder, 2014](#); [Leander, 2002a, 2002b](#)). Discourse and social interactions serve as spaces in which sources of motivation, such as the need for a sense of competence and the need for a sense of belonging, can be shaped; in social interactions, affiliation with the discipline can either be deepened or eroded by positioning learners as competent or incompetent, with implications for learners' understandings of who belongs in the discipline ([Gresalfi, Martin, Hand, & Greeno, 2009](#)). While teachers and the curriculum itself are key players, group members' interactions with one another can be understood as an ongoing storyline of sorts in which individual learners are positioned as different kinds of contributors by virtue of their past and present interactions; interactions over the course of time constitute a social history for the group ([Esmonde et al., 2011](#)). Reform-oriented classrooms emphasizing disciplinary practice are indeed built around "learners-acting-as-scientists", not simply "doing science" in a straightforwardly logical or value-free vacuum; the role of peer social life is unavoidable, as are the broader social structures that inform peer interactions in school. Thus, it is crucial to explore how groups' social histories inform ability to identify with the discipline.

When power is redistributed from teachers to students in reform-oriented classrooms, peers can support or obstruct participation in scientific practices and thus mediate one's ability to identify with the discipline. In reform-oriented science contexts, collaboration and argumentation are key features. Yet, after accounting for the benefits of argumentation and collaboration, these same features still intersect with the problem of equity in a potentially adverse fashion. While access to opportunities to participate and become a legitimate meaning maker in these contexts is informed by the scientific practice of using evidence to justify one's reasoning, there are more explicitly subjective criteria, such as authority that are now known to inform how learners navigate argument. [Engle et al.'s \(2014\)](#) work has provided some insights into how learners make these judgments inside of a group: group member perceptions influence argumentation through the negotiation of authority, access to the speaking floor, and physical location in the workspace. Other work supports this view by demonstrating how competence can be conceptualized as socially constructed, with its definition and implications being created in social interaction ([Gresalfi et al., 2009](#); [Nolen, 2007](#)). Moreover, individual learners' agendas are also informed by group members' motivational histories that are embodied in actions during groupwork, so issues of competence and belonging can lead to learners withdrawing participation or pushing their group toward dysfunction and exclusion ([Barron, 2000, 2003](#); [Nolen, 2007](#); [Rogat & Adams-Wiggins, 2015](#)). Learners in collaboration become legitimate meaning makers in reform-oriented contexts by appropriating the practices of real-world scientists at the guidance of teachers and peers, but seemingly unrelated additional criteria are still used to regulate whose meaning making is considered legitimate in small-group learning. Compounding the issue, in newer inquiry science learning contexts learners can struggle with understanding the goals of argumentation and regulating group-level activity ([Berland, 2011](#); [Berland & Lee, 2012](#); [Berland & Reiser, 2011](#); [Chinn & Clark, 2013](#); [Rogat & Linnenbrink-Garcia, 2011](#)).

2. Present study: microexclusions & legitimate meaning-making in inquiry science

When group interactions become moment-to-moment challenges to group members' sense of competence and belonging, we can speak of microexclusions. Microexclusions gradually push a group member toward the margins of group activity by communicating implicitly or explicitly that a group member does not belong 1) as a valued actor in a social group of peers and/or 2) as a learner capable of doing science and thinking scientifically. In the case of inquiry science education contexts, being seen as a valued actor and being seen as a competent doer of science are intertwined, so microexclusions are likely to be comprised of affronts to both belonging and competence simultaneously. The consequences of microexclusions are expected to be cumulative and vary by severity of each microexclusionary act (i.e. as a product of both how it was objectively enacted as well as how it was interpreted by the recipient). Microexclusions are conceptualized as interfering with learners' identification with science as a discipline by detracting from group's relational climate. The marginality produced through microexclusions relates to [Wenger's \(1998\)](#) concepts of identity in practice and marginal non-participation. In Wenger's model, being excluded from participation means being excluded from the practices of a given community and the corresponding opportunities to construct an identity as a member of the community. In a reform-oriented science education context, learners can be understood as participating in a community organized around appropriating the practices of scientists, although learners themselves are not necessarily joining a community of scientists in the broader world. Further, in this theoretical framework, learning itself has four facets: learning as belonging (community), learning as doing (practice), learning as

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