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Racial and gender dynamics in many learning environments present students from minoritized backgrounds with challenges that must be accounted for in defining both what makes a learning experience rigorous and how faculty can scaffold student growth.

Rigor and Support in Racialized Learning Environments: The Case of Graduate Education

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Graduate school's reputation for rigor is linked inextricably with the role professors play in the student experience. This essay expands our understanding of rigor to encompass not only academic work that requires significant cognitive complexity (Braxton & Nordvall, 1985; Nordvall & Braxton, 1996) and academic challenges that lead to learning (Campbell, 2018), but also the broader sociocultural and psychosocial context within which academic rigor is facilitated. I consider psychosocial dimensions of rigor in learning environments and develop a framework that describes the multidimensional nature of faculty support that scaffolds students' ability to meet common challenges. Although I use the case of doctoral education to develop this conceptual framework, it may have transferability to the nature of supports needed in other high-rigor teaching and learning environments, especially ones where social inequities persist.

Racial and gender inequities in many fields within doctoral education are reflected not only in who is present and absent, included and excluded. Inequities are also evident and institutionalized in racialized patterns of everyday interaction, beliefs about intelligence and belonging, and, in some fields, the prevailing intellectual paradigms (Posselt, Reyes, Slay, Kamimura, & Porter, 2017). These social realities present students from minoritized backgrounds with added and intersectional challenges that merit consideration as we reflect upon what (a) makes a learning experience or environment "rigorous" and (b) whether academic assistance should be our sole focus or merely a cornerstone in conceptualizations of support for learning. In this section, I review literature on distinctive characteristics of doctoral education relative to other sectors of postsecondary education, drawing out

the types of faculty–student engagement that they necessitate. I start with academic and cognitive dimensions of learning, before moving into a consideration of how supports on those dimensions may also be needed with respect to sociocultural and psychosocial aspects of learning.

Learning, Rigor, and Academic Support

Baker and Lattuca (2010) defined learning as “a social and cognitive process through which individuals become increasingly able to participate in the activities associated with a particular social context” (p. 812). The educational expectations placed on doctoral students distinguish graduate from undergraduate education in important ways, elevate its intrinsic rigor, and imply the need for distinctive forms of faculty support. Most fundamentally, while PhD programs vary widely in subject matter focus, they share the expectation that students will develop and demonstrate the ability to engage in original, field-specific research. Research hinges on cognitive complexity and the use of higher-order thinking skills that are central to contemporary conceptualizations of rigor (Braxton & Nordvall, 1985; Nordvall & Braxton, 1996). Without analysis and synthesis, for example, one cannot develop research questions or construct conceptual frameworks, nor design coherent methodologies, interpret data, or locate the significance of findings within the broader landscape of current knowledge.

A second expectation of doctoral education is that students will produce scholarship that advances their field of study. Certification that one has become a “master” of one’s art or science (i.e., through the MA or MS degree) is but a preliminary or qualifying characteristic. Learners optimally grow to become what the Carnegie Initiative on the Doctorate called “stewards of the discipline” who “creatively generate new knowledge, critically conserve valuable and useful ideas, and responsibly transform those understandings through writing, teaching, and application” (Golde & Walker, 2006, p. 5). To become a scholar with facility in these integrative activities similarly demands higher order thinking, and the process of learning to do so has been related to two metaphors: apprenticeship and scaffolding.

Apprenticeship, across generations and societies alike, has been a fundamental mode for transmitting knowledge required for specific forms of professional practice. Collins, Brown, and Holum (1991) proposed re-integrating key aspects of apprenticeship into systems of formal schooling, where “too little attention has been paid to the reasoning and strategies that experts employ” (p. 1) and “conceptual and problem-solving knowledge acquired in school remains largely inert” (p. 2). They name graduate education as one of a few spaces that hold greatest promise for this, and identify four practices of apprenticeship that can aid the development of capacities for self-monitoring and self-correction, as well as the integration of conceptual knowledge and skills. However, traditional apprenticeship models may fall short for student learning in leaving implicit key task-related

processes and/or failing to vary the type of situations in which students will be expected to perform a given skill. To strengthen the cognitive foundations of apprenticeship, “the teacher’s thinking must be made visible to the students, and the student’s thinking must be made visible to the teacher” (Collins et al., 1991, p. 3). Making thought visible enables students to more fully “observe, enact, and practice” complex tasks (Collins et al., 1991, p. 3).

Austin (2009) proposed an application of the cognitive apprenticeship model to doctoral programs in education given the implicit nature of student socialization that takes place in graduate programs. The value of bringing relevant cognitive and meta-cognitive processes to students’ attention cannot be underestimated because students “need to see how experts approach their thinking about how to understand and address a problem” (Austin, 2009). Austin reflects on specific ways that her practice as an instructor in a first-year doctoral course manifested the qualities of cognitive apprenticeship, enabling students to “learn the processes of acquiring, working with, and using knowledge” (Austin, 2009). She highlights both the potential that comes with cognitive apprenticeship, as well as the effort and mindfulness it requires of faculty. The demands of providing cognitive apprenticeship may help explain why, in a study of doctoral student supervision in science and engineering, Maher, Gilmore, Feldon, and Davis (2013) found more evidence for the cognitive dimensions of this model than activities associated with apprenticeship. Through profiles of eight doctoral students’ relationships with their advisors, they found a pattern of *ad hoc* supports that enabled student to meet immediate tasks at hand paired with limited feedback. And when feedback did occur, it was largely disconnected from the actual research process (Maher et al., 2013).

The absence of feedback reflects another distinguishing characteristic—indeed, a tension—of doctoral education. In developing students’ capacity for independent scholarship, faculty must provide and withdraw academic scaffolding. Scaffolding is defined in the learning sciences as “a process that enables a child or novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts” (Wood, Bruner, & Ross, 1976, p. 90). Unlike apprenticeship, which connotes close engagement in practical activities for which one is being trained, scaffolding enables students to work within the challenging space between their current and desired skills and abilities (what Vygotsky coined the zone of proximal development). As in professional education programs, doctoral students engage their subject matter with “progressive independence” (Kennedy, Regehr, Baker, & Lingard, 2005) or “graduated responsibility” (Franzone et al., 2015). Indeed, perhaps part of what makes doctoral education so notoriously challenging is the particular combination of learning expectations placed upon students: to increasingly operate in the mode of cognitive complexity that research demands, on topics that lie

at the edge of current disciplinary boundaries, while reducing reliance on familiar supports of their professors or peers.

Sociocultural Support through Faculty Mentoring

Yet it is not only the cognitively complex dynamics of subject matter learning and becoming a researcher that lend rigor to graduate education. As intimated above, graduate education interweaves subject matter learning (i.e., skills and content) and professional socialization (i.e., identity development and the adoption of professional norms, knowledge, and discourse) (Weidman, Twale, & Stein, 2001). Tensions related to faculty members' role in doctoral student socialization have bearing on the persistence and well-being of graduate students from underrepresented backgrounds, which I describe here.

Under the right conditions, faculty mentoring relationships offer perhaps the most logical site for integrating the challenge and support functions of student development (Holcomb & Nonneman, 2004; Nelson-Laird, Chen, & Kuh, 2008; Sanford, 1968). Through mentoring, professors can individualize their support for both students' subject matter learning and socialization so that unique learning needs are met. However, students and faculty may hold conflicting definitions and expectations of challenge and support, as well as of mentoring more broadly (Draeger, del Prado Hill, Hunter, & Mahler, 2013; Draeger, del Prado Hill, & Mahler, 2015; Posselt, 2016). Slay, Reyes, & Posselt (2016) found through case study research in STEM doctoral education that when aggressive efforts to recruit students of color were not followed by provision of support for their specific needs, students read their recruitment as one of "bait and switch," and they struggled to persist. Tensions in professors' conceptualizations of rigor and care may help explain such findings (Schnee, 2008). If faculty consider their role principally of providing rigor, and if they interpret discourses or practices associated with support as a compromise of that role, students may read imbalance in the scales of challenge and support that research at the undergraduate level has found to be important to student learning and persistence (Nelson-Laird et al., 2008). Faculty thus need to not only "make thought visible" with respect to scholastic tasks, but also their tacit views about mentoring and associated expectations for support and rigor. These needs for critical professional reflection, it bears pointing out, reflect the need for a broader assessment of whether the faculty role itself must evolve as the population of postsecondary students changes.

Two additional problems of socialization trace to insufficient mentoring: misalignment between graduate education and the everyday demands of work for PhDs (Austin, 2002; Cassuto, 2015; Golde & Dore, 2001), and difficulty negotiating the dissonance between one's personal values and those of the academy (Anderson & Swazey, 1998; Austin, 2002). These

problems are related. Too often, graduate students are narrowly trained to conduct independent research studies, when available positions—and even tenure track faculty roles—demand a wider range of skills that include collaborative scholarship, instruction, and management. It is this very narrow focus on the activities required for “success” in tenure-track positions in top-ranked research universities that narrows the range of values and norms in which students typically receive mentoring.

It should be no surprise, then, that high-quality mentoring appears to be especially important for graduate students from backgrounds who have been historically underrepresented in elite universities, where a narrower range of academic activities and norms are commonplace. Studies have found high-quality mentoring critical to Black doctoral students pursuing academic careers. Through the perspective introduced by mentors, Black graduate students were more readily able to reconcile conflicting values and become acquainted with professional norms (Antony, 2002; Antony & Taylor, 2001; Gopaul, 2011; Margolis & Romero, 1998). An important insight from recent research on mentoring and socialization is that these relationships need not be dyadic. Multiple mentors (including faculty, peers, staff, and family) can confer benefits of “developmental networks” (Baker & Lattuca, 2010), such as appreciation for nuances in academic norms and variations in approaches to intellectual support.

Student Impostorism, Growth Mindset, and Faculty Psychosocial Support

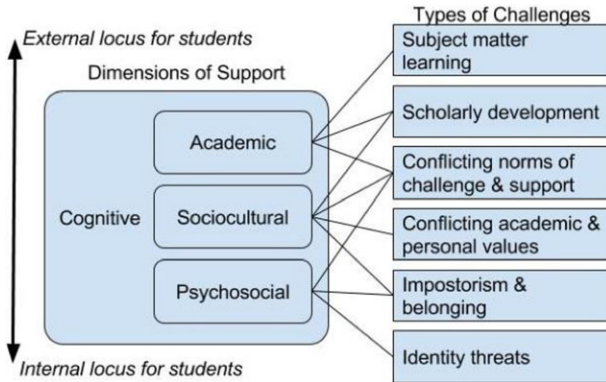
We know much more to date about professors’ role facilitating subject matter learning and professional socialization than their role in how graduate students see themselves, their abilities, and their futures. This oversight in the literature is notable given evidence about the difference that faculty can make in cultivating a growth mindset within students. That is, when educators hold and encourage in students a view of intelligence as malleable and of performance as subject to effort, rather than a view of intelligence as innate and static, students are also more inclined to view intellectual challenges as learning opportunities and to persist through those challenges (Dweck, 2006). Conversely, when students hold a fixed mindset about intelligence, they may fail to see their academic performance within a longer learning curve or trajectory; as such, they may interpret struggle or failure as a signal of inherent intelligence, and thus, become discouraged about their future prospects and/or belonging as academics (Dweck, 2000, 2006). These findings have clear implications for learning in high-rigor environments. Dweck (2006) found in one study, for example, that beliefs about the relationship of effort to performance and persistence not only signified the *presence* of a growth mindset, they also provided strategies for coping with academic challenges themselves. In short, faculty can use psychosocial support to facilitate rigor.

By framing performance in terms of progress and mastery, growth mindsets may also counteract graduate student experiences with impostor syndrome, defined as the tendency of some high-achievers to feel inadequate despite evidence of repeated success (Clance & Imes, 1978; Lake, 2000; Young, 2011). Students experiencing impostor syndrome attribute their success to luck and other external factors rather than to their belonging or competence (i.e., internal factors), a pattern of attributions that comes at significant cost for psychosocial wellbeing and professional identity development (Cohen, Kay, Youakim, & Balaicuis, 2009; Field, Duffy, & Huggins, 2013). Imposter syndrome can be prompted by isolation, insufficient support, or undue comparison with one's peers while on graduate school's steep learning curves for teaching, research, and/or professional practice, and the risks appear higher among first-generation, female, and underrepresented minority doctoral students (Ewing, Richardson, James-Myers, & Russell, 1996; Gardner & Holley, 2011; Gibson-Beverly & Schwartz, 2008). As such, insufficient support along the challenging transition to independent scholarship or professional practice may feed the difficulty some students have of gauging the adequacy of their work—and, thus, their self-evaluations as scholars and professionals. For example, Margolis and Romero's (1998) seminal study of organizational culture in doctoral education found, "While requiring a new professional identity of their students, graduate programs provide few formal mechanisms to help graduate students make the transition from being directed students to being self-directed researchers" (p. 7). Impostorism thrives amid ambiguous performance expectations, either from one's superiors or the broader intellectual milieu. In both cases, student communication with faculty who hold growth mindsets and who are sensitive to the psychosocial dynamics of graduate school may help offset the risks of impostorism. Support from faculty holding a growth mindset may thus serve as a mechanism for enhancing students' broader sense of belonging and potential in the field and, by extension, their capacity to achieve in more rigorous contexts.

Toward an Expanded Definition of Rigor and Framework for Faculty Support

A classic definition of student development is the "organization of increasing complexity" (Sanford, 1968, p. 47). As described above, graduate school offers an ideal context in which to conceptualize rigor in relation to students' development because they are expected to engage with increasing independence in tasks requiring analysis and synthesis, on the edge of their current abilities and their field's current scope of knowledge. In addition to this cognitive complexity, which is the heart of Nordvall and Braxton's (1996) conceptualization of rigor, the literature makes clear that socialization, a socioculturally complex process, is central to the experience of graduate education. Inconsistent scaffolding and/or mentoring on the learning

Figure 5.1. An expanded conceptualization of rigor and support in doctoral education



curves required to become a “steward of the discipline” (Walker, Golde, Jones, Bueschel, & Hutchings, 2008) are all too common, however, and often add a layer of psychosocial complexity to graduate learning experiences, especially for women and students of color. In coming to see oneself as a scholar, negotiating one’s sense of belonging and potential in an environment where they feel isolation and/or impostorism may even be considered forms of psychosocial rigor—that is, as challenges that produce learning (Campbell, 2018). Amid such environmental threats, experiences of academic struggle may easily be interpreted as evidence confirming self-doubts and/or negative group stereotypes (e.g., Steele, 1997; Steele & Aronson, 2005). The presence of specific, known psychosocial threats means that we must not be dismissive of psychosocial support as a form that students may need to thrive.

Figure 5.1 depicts a conceptual framework of holistic faculty scaffolding—types of support that enable students to reach specific challenges—that emerges from the preceding review of the literature. It summarizes several distinctive characteristics of graduate education (on the right) that elevate the intrinsic rigor of graduate education. The associated dimensions of rigor that we might come to think about in an expanded notion of the concept lend themselves to the potential need for associated forms of supports (on the left). No single theoretical perspective encapsulates these multiple dimensions. Rather, I argue that students need *academic* support for acquiring and advancing subject matter. They also stand to benefit from strategies for navigating *sociocultural* rules of the academy, both for their general scholarly development and to manage the dissonance created by sometimes-conflicting academic and personal values. Third, consistent with research on the value of a growth mindset for student development and mastery (Dweck, 2000, 2006), *psychosocial* support may cement students’

sense of self and belonging amid the rigors of graduate school. Finally, the recent considerations of cognitive apprenticeship in relation to doctoral education (Austin, 2009; Maher et al., 2013) suggests *cognitive* foundations to these other forms of support. In particular, the notion of “making thought visible” (Walker et al., 2008) plays a critical role by making explicit the many implicit rules and expectations of scholarly life. These dimensions of support and the associated factors vary along a spectrum of being mainly external to the student, to both external and internal, to mainly internal to the student.

In this framework, there seems to be an especially critical need for professors to maintain a focus on the educational mission of doctoral education, and to encourage a growth mindset in students. By reframing struggle as a normal part of the learning process, and by validating students’ potential, students will be less likely to confuse the difficulty of graduate school with inability to handle the material. In addition, by making space to openly discuss those aspects of graduate education and scholarly life that are raced and gendered, professors from all backgrounds can provide support for students who experience distinctly psychosocial rigors that must also be managed. Faculty support can ensure students do not misconstrue experiences of impostorism or isolation with their ability to manage the rigors of graduate school.

Implications and Conclusion

These findings carry implications for the design of future research, as well as for how faculty individually interact with students and design graduate programs. The framework proposed here, while developed to characterize scaffolding in graduate education, can also inform efforts to facilitate rigor in undergraduate education, the origin of higher education research on matters of impostorism, identity threat, and tensions between challenge and support.

Research should examine how this framework aligns with the views graduate students and faculty personally hold about the rigors of graduate school and the associated forms of support they deem most important. In such research, it would be valuable to sample students from a wide range of personal and educational backgrounds. For example, masters, doctoral, and professional students may come to different conclusions about the role or process of socialization, and women and people of color in programs that are predominantly White and male may rank psychosocial support as especially important.

There is also a need to conduct further research about cognitive apprenticeship as a mode of learning, and whether Maher et al. (2013) finding (from a small sample in one field within STEM) that apprenticeship activities were uncommon generalizes more broadly. It could be, for example, that graduate programs who admit students through a cohort-based model,

as opposed to one of individual faculty sponsorship, are less inclined to facilitate a close, dyadic apprenticeship model. Relatedly, although I have emphasized in this chapter the ways in which faculty play a critical role in supporting students through the distinctive qualities of doctoral education, we need to more deeply understand how peers and others complement or augment the support they receive from faculty. Scholars could compare the sources and forms of support that students articulate receiving from faculty and peers, and they could conceptualize these in relation to the benefits of doctoral students' developmental networks, which support professional role formation (Baker & Lattuca, 2010). Especially in STEM, where scholarly development work often occurs in the context of a lab or large research group (Burt, 2014), this avenue of research could illuminate the multifaceted nature of learning in PhD programs.

Finally, the observation that some challenges and dimensions of rigor and support are primarily internal to the student (e.g., impostorism and stereotype threat), while others exist primarily outside the student (e.g., the subject matter), and still others are a mix, point to the utility of multiple disciplinary and theoretical perspectives for the conduct of future studies. Certainly, the contextual dimensions of doctoral education led themselves well to sociological perspectives; the internal, developmental challenges call for psychological framing; and others near the middle of the spectrum might benefit from a cultural, anthropological, and/or social psychological analysis. Just as we will need a variety of methods to establish the validity and reliability of any expanded notion of rigor, a variety of theoretical and disciplinary angles on these issues present opportunity to see with fresh eyes the underlying mechanisms.

Expanding our understanding of rigor to include its psychosocial dimensions also opens the potential to more directly relate rigor to discourses and efforts surrounding equity and inclusion. Academic rigor in an idealized sense (whether defined in terms of cognitive complexity or challenge that facilitates learning) may be orthogonal or independent of racial, gender, and other systems of inequality. However, in most postsecondary learning contexts, rigor is not neutral and all learning experiences are not created equal. Faculty and student psyches and social relations bear the imprints of our country's long struggles with racism and sexism. Social psychological theory finds that simply entering a learning environment that is predominantly White, for example, can raise the stakes associated with performance for underrepresented students; the psychosocial pressure that comes with such tokenism or isolation adds to and intersects with the academic and sociocultural challenges all graduate students must face. In practice, incorporating psychosocial complexity into our understanding of rigor makes clear the need for adept scaffolding by faculty to support holistic development from student to scholar.

In conclusion, researchers for decades have tended to conceptualize professional socialization, cognitive development, and subject matter

learning as discrete processes; however, the literature suggests interconnections among these that deserve closer analysis. From a focus on the rigors of graduate school to a focus that relates those rigors to the supports we can provide, further study and application of this framework to research and faculty practice holds promise to facilitate student persistence and wellbeing in conditions that are simultaneously rigorous and diverse.

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