

Developmental networks and learning: toward an interdisciplinary perspective on identity development during doctoral study

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The authors draw on two families of theories – developmental networks and sociocultural perspectives on learning – to develop an interdisciplinary approach to the study of doctoral education as a path to the professoriate. This approach seeks to elucidate the connection between doctoral students' developmental networks, what they learn during their graduate experience (including their learning about the faculty role) and how they develop a professional identity. The authors first discuss the key tenets of the developmental networks and sociocultural perspectives, before exploring their alignments and explaining how the combination might remedy the limitations inherent in each approach. Finally, they offer some research propositions and directions for further study of the preparation of doctoral students for academic careers.

Keywords: doctoral education; academic careers; developmental networks; learning; identity development

For decades, the doctoral degree has been regarded as the route to an academic career. Although the numbers of individuals seeking doctoral degrees have increased in recent decades, and the degree is now viewed as preparation for a variety of careers in addition to university teaching and research, the PhD is still required for most academic posts (a notable exception is the for-profit higher education sector). While the purposes of doctoral education are widely debated, the need to better understand how doctoral programs shape teachers and researchers remains a key concern. Research shows that graduate programs do not always prepare students well for the realities they face once they earn faculty appointments (Austin 2002; Nyquist and Wulff 2003). In the United States, concerns about the effectiveness of doctoral programs in meeting students' needs spurred several high-profile initiatives aimed at improving graduate education, including the Carnegie Project on the Education Doctorate (supported by the Carnegie Foundation for the Advancement of Teaching), the PhD Completion Project (sponsored by the Council of Graduate Schools), and the Preparing Future Faculty Program (supported by the Council of Graduate Schools and the Association of American Colleges and Universities).

In the UK, the Roberts Review (2002) similarly questioned the adequacy of training of doctoral students for posts as university teachers. Huisman, de Weert, and Bartelse (2002) broadened the target, arguing that 'European countries must carefully scrutinize the pre- and early career stages of potential faculty members and make

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important changes or their universities will face severe faculty shortages' (142). The European Council for Doctoral Candidates and Young Researchers (EURODOC) has called for the development of a defined career structure for developing researchers. Clearly, much work is needed to better understand the development and learning that occurs during doctoral training, and who aids in that process. Our specific focus is on the preparation of graduate students for academic careers, and in particular, how they develop an academic professional identity.

Graduate education as preparation for academic careers

Much of the scholarship on doctoral study focuses on the socialization of students and the roles that a variety of relationships, particularly advising or mentoring relationships, play in this process (Boud and Lee 2005; Golde 2000; Green 1991; Paglis, Green, and Bauer 2006; Tenenbaum, Crosby, and Gliner 2001). Over the past 15 years, research has revealed, however, that, in addition to faculty–student relationships, participation in and connection to institutional, programmatic and social activities, departmental and disciplinary cultures, funding to support the duration of study, and peer and cohort interactions are critical factors for student success (Bair 1999; Bair, Haworth, and Sandfort 2004; Golde 1996; Lovitts 2001).

These findings suggest a view of graduate education as a socialization experience that engages 'prospective faculty in thinking about the roles and responsibilities they will assume, and the traditions in which they will participate' (Austin and McDaniels 2006, 415). The fundamental outcomes of this process include: (a) knowledge acquisition; (b) investment (the giving of one's time, energy and esteem to the organization and the field); and (c) involvement (role identification and commitment to the tasks of research, teaching and service) (Austin and McDaniels 2006; Weidman, Twale, and Stein 2001). This view aligns with that expressed by the Carnegie Initiative on the Doctorate and the corresponding book, *The formation of scholars*, which claims that doctoral education is where the process of scholarly formation begins.

Surprisingly, most studies of doctoral education pay less attention to how doctoral students build expertise in their field than to their socialization into the professoriate. Moreover, the process of learning has often been separated, theoretically as well as empirically, from the process of socialization. Bess (1978) distinguished the two, defining professionalization as a process through which students learn a profession's skills, values and norms, and socialization as a process of adopting those values, norms and social roles that guide (and constrain) behavior in a given occupational settings. Antony (2002) noted that the distinction between 'merely learning' the skills, values, and norms of a profession and 'adoption' of those elements is both common in the literature on doctoral education and defensible:

Professionalization should be viewed as the transmission of content knowledge; the informing about professional norms, ethics, and values; and the teaching of technical skills. Socialization distinguishes itself . . . by requiring the *internalization or adoption* of the profession's norms, values and ethics to the point of defining the neophyte's own professional identity and self-image. (369, original emphasis)

The advantage of separating learning and adoption (or socialization), Antony (2002) argued, is that it avoids the assumption that successful graduate education requires students to replace their own norms and values with that of the field to which they aspire. Graduate students can, he argued, develop a personal awareness of a field's

content, values and norms, as well as learn how to work within those frameworks, without having to internalize – ‘or accept as one’s own’ – those norms, values and standards. In research on African American doctoral students in education, Antony and Taylor (2001) suggested that those who learned, often with the help of a mentor, to navigate the normative expectations of the field without abandoning their own values successfully pursued an academic career. Taylor’s (2007) study of graduate students in professional doctoral programs in the UK, however, suggested that intellectual and personal change are intimately tied to one another and to the nature of students’ learning experiences. Deep reflection on what was being learned appeared to influence changes in personal identity.

With some exceptions noted above, most studies appear to view the intellectual, behavioral, personal and emotional impacts of doctoral study as separate (albeit simultaneous) processes and outcomes. Socialization theories attempt to repair this split by separating professionalization and socialization by divorcing different processes and outcomes, those of learning and adoption (or internalization). One problem arising from this dualism is the presumption that the knowledge associated with a field of study is separable from the values, norms, standards and expectations of that field. If we view the knowledge of a field as the product of ongoing scholarly discourse among individuals within a community, the difficulty of separating knowledge from values, norms and standards becomes clear. Questions of what to study and how to study it entail epistemic judgments and choices.

In this article, we use sociocultural perspectives on learning and network theories to examine the assumption that the development of scholarly expertise (knowledge) and scholarly identity can be separated theoretically and empirically. We suggest, instead, that learning and identity development go hand in hand – it is through participation in the intellectual community in the field and the home institution that doctoral students build the knowledge and skills required for scholarship in their field of study, and make choices about the roles and values associated with a career in the academy. In this sense, students’ judgments of their knowledge and skills become self-assessments as a scholarly identity emerges during the PhD experience.

The conceptual marriage of sociocultural perspectives and network theories that we will propose assumes individual agency, as it also recognizes the variations within discourse communities such as academic fields and departments. Thus, it accounts theoretically for the empirical finding that individuals can succeed within a community without completely adopting its norms, values and conventions (Antony and Taylor 2001; Carter 2006; Stacy 2006). Recent research suggests that the process of identity development is influenced both by one’s self-assessments of intellectual and professional development *and* by the perceptions of others who influence one’s understandings of new identities (Baker Sweitzer 2008; Gee 2000–01; Lee and Boud 2003; Wortham 2004, 2006). Thus, Hall and Burns (2009) argue, in their exploration of identity development and mentoring in doctoral education, that identity is not solely the result of self-definition; nor is it solely the result of how individuals are positioned and defined by the people around them.

A sociocultural perspective on identity development focuses researchers’ attention on the social contexts and interactions that shape doctoral students’ ideas about which identities are valued in a given community, which are available to them, and which are to be avoided. Still, studies of doctoral education tend to focus on the relationship between the doctoral student and his or her faculty advisor or mentor. Some recent studies have moved beyond this dyadic relationship, revealing how doctoral students’

personal communities affect their development and/or persistence (e.g. Baker Sweitzer 2007, 2008; Lee and Boud 2003; Weidman, Twale, and Stein 2001). These studies expand our understanding of the influence of a variety of social relationships on doctoral student development, but additional research and theory-building is needed to understand how a variety of social interactions and relationships shape doctoral students' learning and scholarly identity development.

In this article, we seek to forge theoretical linkages between two families of theories – developmental networks and sociocultural perspectives on learning – that appear to have the potential to expand our understanding of learning and identity development during doctoral study. Together these theories provide a valuable framework for understanding how doctoral students' participation in multiple, varied and overlapping social contexts and networks influences their learning *and* sense of identity.

To accomplish this, we first provide an overview of developmental network theory, exploring its roots in social network theory. We then describe the concepts of learning and identity development as they are conceptualized from a sociocultural perspective. Our discussion of the alignments between these two sets of theories leads us to propose directions for research on the processes and outcomes of doctoral education as a pathway to the professoriate.

Developmental network theory

Studies of doctoral education have often examined the role of mentoring in doctoral student socialization. A mentoring relationship is typically defined as a 'relationship between a young adult and an older, more experienced adult that helps the younger individual learn to navigate the adult world and the world of work' (Kram 1985, 3). Recent research, however, has shown that experience, not age, is a critical component of effective mentoring relationships. Although mentoring occurs between senior and junior organizational members, it can also occur laterally among peers (Dansky 1996; Kram and Isabella 1985). Mentors and mentoring relationships provide *career support* (sponsorship, exposure and visibility, coaching, protection and challenging assignments) and *psychosocial support* (sense of competence, identity and work-role effectiveness).

Social network theorists study the influence of social networks, defined as sets of relationships between two or more individuals (Kadushin 2004), seeking to explain how individuals establish and maintain connections within a given context, and how these connections facilitate outcomes such as professional advancement, information acquisition and identity development (Kadushin 2004; Higgins and Kram 2001; Ibarra 1999). An important outcome of interactions within social networks is learning. Social network researchers hold that learning happens through personal interactions in the practice setting (Kilduff and Tsai 2003). According to Ibarra, Kilduff, and Tsai (2005), 'learning a new line of work is a social learning process in which people become active in the practices of a social community' (363).

Mentoring and social network theories are complementary in that they provide a framework for exploring the role of multiple relationships. These theories are also an appropriate response to research findings suggesting that an exclusive focus on dyadic relationships is limited. Social network theory does not replace theories of mentoring, but rather acknowledges that individuals rely on multiple mentors, or a 'network' of mentoring relationships, to navigate their personal and professional lives. Studies that

have explored the influence of multiple mentoring relationships or social networks have revealed positive associations with long-term outcomes, such as organizational retention, career advancement and professional identity development (Dobrow and Higgins 2005; Higgins 2000; Higgins and Thomas 2001; Baker Sweitzer 2008), short-term outcomes such as increased work satisfaction (Baugh and Scandura 1999; Higgins 2000; Higgins and Thomas 2001; van Emmerik 2004), and greater intentions to remain in the organization (Higgins and Thomas 2001). In the context of doctoral education, these long-term and short-term outcomes are critically important, as attrition is costly to the institution and to the individual who chooses to depart.

In an effort to bridge the notion of multiple mentoring relationships and mentoring and social network theories, Higgins and Kram (2001) proposed the notion of a developmental network, which is defined as the 'set of people a protégé names as taking an active interest in and action to advance the protégé's career by providing developmental assistance' (268). This definition builds on Kram's (1985) conceptualization of the relationship constellation, which includes a variety of people, not just a single individual, who provide support to a focal individual. The individuals within one's relationship constellation are likely to include members from within the organizational context, such as co-workers and supervisors, but also friends and family from outside of the organizational context. To reflect this expanded view, Higgins and Kram created a new term, 'developer', meant to enlarge the concept of the traditional mentor relationship by acknowledging that developmental relationships may provide support beyond just career and/or psychosocial support, to include knowledge development and information sharing. Important to a developmental network approach is the idea of diversity, which is defined as the number of different social systems from which an individual's various connections originate. An individual with a diverse set of ties (e.g. relationships) is likely to draw support from individuals in their school, work setting and community. The developmental network approach is particularly salient in the study of doctoral education, and of doctoral students, because of the variety of relationships they are likely to have and the different kinds of support those relationships provide.

The theoretical lens of developmental networks appears well suited to studies of doctoral education. First, this approach moves the study of relationships, and their influence on a variety of outcomes, beyond the dyadic focus. Research has shown that individuals rely on a variety of relationships to help navigate the world of work. Some argue that the choice of relationships is more important than sheer number: 'It is not enough just to increase the size of the mentoring network; it is important to conduct a careful analysis of what competencies you wish to build and find the best resources for development' (de Janasz, Sullivan, and Whiting 2003, 86). This notion, particularly in the context of doctoral education, is supported by researchers in a variety of national contexts. For example, Leonard and Becker's (2009) study of doctoral education in the UK suggested that helping doctoral students create peer support groups and to develop academic networks is critical to ensuring success and support beyond the academic advisor or supervisor. Austin and McDaniels (2006) make the same point in their review of the research on doctoral education for the professoriate in the USA.

Social and developmental networks researchers are interested in understanding the connection between social interactions, on the one hand, and learning and identity development, on the other (Dobrow and Higgins 2005; Ibarra, Kilduff, and Tsai 2005). They have not yet, however, conceptualized learning in a way that is entirely consistent with their theoretical stance. For example, social and developmental

network research tends to focus on learning as knowledge acquisition (which suggests an individualistic process of cognitive gains), even though the concept of role learning, which undergirds these theories, suggests that learning is both a social and cognitive process in which newcomers actively engage in community *practices* – not simply content acquisition – as they seek community acceptance and identity. Some have begun to frame learning as a process in which key network partners mediate the learning of their protégés. Ibarra, Kilduff, and Tsai (2005), for example, conceptualized entry into a work setting as a social learning process that requires individuals to become familiar with and appropriate the practices of a given social community.

Sociocultural perspectives on learning

Doctoral students preparing for academic careers are typically expected to develop competence in three fundamental roles: student, researcher and teacher. Through interactions with and observations of faculty members and other graduate students, they learn the technical knowledge and skills required for a faculty appointment, as well as norms and behaviors associated with the faculty role (Baker Sweitzer 2008; Boud and Lee 2005; Lee and Boud 2003). In a university, social networks within the academic department and larger units, such as colleges and schools, serve to socialize aspiring members, regulate inclusion and convey expectations about roles (Podolny and Baron 1997). Researchers note that these relationships and networks affect not only the well-being of individuals, ‘but also their very identities’ (Kilduff and Tsai 2003, 2). Ibarra and Deshpande (2004) contend that social identities in work settings are ‘co-created’ through such relationships in the local setting. In other words, identities emerge through network processes. They are ascribed to individuals who appear to be exemplars of a given role by the members of that role set (Ashforth 2001; Goffman 1961).

Sociocultural theories of learning contend that learning and identity development in educational settings, such as schools and universities, are inseparable. They define learning as a social and cognitive process through which individuals become increasingly able to participate in the activities associated with a particular social context. Wortham (2006), for example, argued that while educational institutions are sites of rational, cognitive processes (e.g. classroom learning), they are also venues for ‘apparently non-academic processes’ that involve the assignment and development of social identities. Importantly, these ‘non-academic’ processes are not easily disentangled from academic ones (Leander 2002; Lemke 1990; Wortham 1994). Packer and Giocoechea (2000) similarly suggested that academic learning changes not only what we know, but who we are. Learning, in their view, has both epistemological and ontological consequences. Wortham (2006) concurred: ‘We are constantly and inevitably changing, even if in small ways, becoming different types of people as we learn new things ... knowledge is an integral part of the general process of ontological change’ (25).

The link between academic learning and identity development seems clear in the case of doctoral study. Through participation in an academic community, doctoral students learn the concepts and principles associated with a field, its methods of inquiry and its criteria for assessing and validating knowledge. This knowledge provides entrée into a community: without this base, the doctoral student cannot become a member of that community. Both sociocultural and network approaches suggest that a scholarly identity – for example, that of mathematician or sociologist – is conferred upon

those individuals who prove themselves to be skilled and knowledgeable practitioners in the field. Important to this conferral of identity are interactions with *and* messages communicated both formally and informally by respected individuals in the academic community, at the home institution (e.g. within the department) and in the larger disciplinary community (e.g. other institutions, professional organizations). When a respected member of the community conveys key messages or engages in particular behaviors (e.g. priority of research versus teaching), this is likely to influence identity development. Gilbert (2009) refers to this as an example of a 'hidden curriculum'; that is, 'the knowledge, beliefs, values, or practices which are implicit in the practice or culture' (56).

Until recently, studies of doctoral education often failed to make explicit this critical link between content and skill learning, on the one hand, and professional identity development on the other. Most studies imply that students must learn to be researchers and teachers – and that these roles require specific knowledge and skills – but fewer accorded analytical attention to the activity of learning and its role in identity development. In their review of research on the doctorate in the UK, for example, Leonard and Becker (2009) noted that the limited research available consists primarily of reflective, conceptual or philosophical articles and reports; empirical studies are much less common and even fewer explore doctoral study from the student perspective. In the literature based on US contexts, researchers seem to assume that the term 'learning' is self-evident, rather than carefully defining it. Educational theorists and researchers, however, define learning differently (see Greeno, Collins, and Resnick [1996] and Sfard [1998] for discussions) and these different definitions have consequences for what and how researchers investigate.

The social nature of learning is manifested in the sociocultural conceptualization of learning as increasingly skilled participation in the practices of a social group. Participation refers to both the process of learning and its outcome. Rather than an individual cognitive process in which the person acquires knowledge or skill, learning results from interactions with cultural artifacts (such as texts) and with more skilled individuals in a given social context. The concept of a 'community of practice' reflects this assumption that learning involves participation in the social practices of a given group (see Lave and Wenger 1991). The term refers to the particular social contexts in which people learn, but tends to be somewhat amorphous. Theorists (such as Lave and Wenger 1991) suggest that the community of practice is always evolving as novices enter the community, master its practices, and thus move from peripheral to more central positions in the community. Ethnographic studies of the development of researcher identities reveal how individuals reposition themselves as they learn more about practices such as academic publishing (Lee and Boud 2003). As Lee and Green (1997) have suggested, academic development is a continuous process of the making and remaking of academic identities. Identity is a product of personal desire and activity, but also of interactions with members of local academic communities. A network perspective suggests how researchers might define and operationalize the concept of academic community, and study its impact on the development of knowledge, skills and identity.

Intersection of developmental network and sociocultural learning theories

Developmental networks and sociocultural learning approaches are complementary in a number of ways (see Table 1 for a comparison of key components). Both

Table 1. Comparison of key components of developmental networks and sociocultural perspectives.

	Developmental networks	Sociocultural perspectives
Definition	A developmental network is a set of people a protégé names as taking an active interest in and action to advance the protégé's career by providing developmental assistance. (Higgins and Kram 2001, 268)	Learning is a social and cognitive process through which individuals become increasingly able to participate in the activities associated with a particular social context. Participation refers to both the process of learning and its outcome
Unit of analysis	Relationship constellation to aid protégé in succeeding in a given context	Individuals-in-context
Key actor(s)	Focal individual; self-identified developers	Focal individual and/or community members
How learning is conceptualized	Learning occurs as a result of social interactions within one's developmental network	Learning is the result of social interactions with members of a given social group
Outcome(s) of learning	Identities emerge through network processes	Epistemological change (what one knows – knowledge) and ontological (identity) change
Weaknesses	Tends to define learning in purely cognitive terms. Researchers rarely offer clear definition of learning. Thus provides little guidance to researchers regarding what to examine when studying identity development; no specified connection between learning and identity development	Boundaries of the relevant community are unclear; little detailed discussion or examination of how interactions with subgroups and individuals who occupy different positions in the community (centrality/periphery) influence learning and identity development
Advantages	Can reveal how variations in networks can influence participation in the activities associated with a particular setting as well as the learning that occurs in that context	Broader understanding of learning links learning and identity development in a given context (community)

acknowledge the situated nature of activity. The network approach focuses on the network 'partners' of a given individual seeking particular kinds of professional advancement. Each individual has a 'constellation' of relationships to assist with their development in a given setting and its associated activities. The constellation of individuals assisting a particular doctoral student, for example, typically includes a number of people – advisors, instructors, peers, family members and friends – who are focused on helping them negotiate a particular academic community and a set of academic tasks. Sociocultural perspectives focus primarily on the social interactions within a particular context and the individuals associated with activity in that context, while acknowledging that any individual is a member of multiple communities and contexts. Students' activities and identities outside an educational context are understood as important influences on their experiences in those educational contexts.

Both the network and sociocultural perspectives focus on the mediating role that more skilled individuals play in learning and development of newcomers to a community. These more experienced members provide information, formal or informal instruction and guidance with the intention of enhancing the participation of novice members of the community. Social and developmental network researchers focus on experience and information as characteristics that distinguish the novice members of a community from their mentors. Sociocultural theorists make a similar distinction when they acknowledge that individuals in a given social group occupy different positions in that group based on their competence as practicing members of the group. Lave and Wenger (1991), for example, contend that, in any community of practice, some members will be more central than others; newcomers or novices occupy more peripheral – although legitimate – positions in the community because they have not yet mastered the practices of the community. In the case of doctoral education, faculty members, as highly skilled practitioners of the field, typically occupy a central place in an academic community, shaping the practices and norms of their local department and school (and potentially those of the academic field itself). In comparison, doctoral students are less central because they are still developing the skills and knowledge required for full membership.

Although both the network and sociocultural perspectives view learning as an outcome of social interaction, the networks perspective reminds us that, within any given community, individuals as well as groups of individuals (relationship constellations) may enable newcomers to move from legitimate, but peripheral, to more central forms of participation in a community. By studying the developmental networks identified by novices or protégés, researchers examine the activities of those individuals in a community who will potentially have the greatest influence on learning and identity development.

Developmental network theory suggests why it is important to study the locations of individuals in the group, and to identify important relationships among newcomers and established members: different network linkages will provide individuals with different information about the practices of a group. For doctoral students, interactions with senior faculty members provide, either through instruction or observation, knowledge of commonly accepted practices. Faculty members, however, can hold different opinions about concepts in the field or about acceptable methods of inquiry. Thus, doctoral students who interact with different individuals – and with different networks – may develop different understandings of why some concepts or research practices are accepted or called into question. In addition, interactions with one's peers in the field might influence understanding of why such disagreements exist and how important they are to success in the academic program and the field at large. As Hall and Burns (2009) note, mentors of doctoral students do not necessarily share a common vision of what it means to be a researcher or what counts as good research. Bieber and Worley (2006) found that some students viewed the researcher's role as a flexible one that could accommodate other personal and professional commitments, while Austin (2002) reported that students viewed the researcher role as much more rigid and stressful. Both developmental network theory and sociocultural conceptions of learning point to the critical influence of social interactions in creating such perspectives, positing that variations in a student's social interactions and relationships will be associated with variations in what is learned, valued and accepted.

Learning in doctoral programs: interactions among the institutional, departmental, and interpersonal contexts

To illustrate the usefulness of a combined theoretical perspective, we explore how several overlapping contexts for social interactions may influence doctoral students' construction of knowledge and personal identities. These examples also allow us to demonstrate the link between knowledge and identity development, and to suggest how identities may be co-constructed and reconstructed during the doctoral experience.

Institutional contexts

Most doctoral students in the USA are trained in universities that are composed of multiple schools or colleges, while many doctoral students in Europe are trained in more departmental structures. Regardless of structure, the requirements, events, rituals and artifacts of these colleges all communicate important information about the values, norms and expectations of its members. For new doctoral students, college requirements and events constitute a program of anticipatory socialization (Weidman, Twale, and Stein 2001) into the academic experience and to life as a doctoral student in that particular college.

College-wide orientations are typically conducted early in the students' experience to help provide information about logistical details such as where to get a student identification card or how to create an email account. Other information, such as a generic timeline of completion, are shared, and details about availability of resources and their location, such as the library and financial aid, are reviewed. Research has suggested that orientation is an important first impression (Lovitts 2001), and a student's first introduction to the college or school with which they are enrolled and to the overall expectations for doctoral students.

Given that school-wide orientation is likely to be a student's first introduction to life as a doctoral student, the messages communicated to students serve as a preview of what is valued and rewarded in that particular environment. These messages sent to students may be clear or ambiguous signals about the identities valued by faculty. One study of doctoral education (Baker Sweitzer 2007), for example, found that faculty and administrators in a top-rated doctoral program emphasized the importance of research, but made few if any mentions of teaching in their interactions with new doctoral students. Students received a clear message that research, and the learning that occurred as a result of engaging in research, was more important than the learning that occurred in the role of teacher or teaching assistant.

Departmental and program contexts

A college establishes general requirements for timely degree completion and graduation, but it is the academic department that is responsible for establishing specific program milestones throughout the doctoral experience. In the United States, for example, these milestones usually include the successful completion of core or disciplinary courses and electives, comprehensive or qualifying examinations, candidacy, committee member selection, dissertation proposal development and writing, and dissertation defense. The UK and Australia place less emphasis on coursework when compared to the United States. Rather, students are encouraged to specialize in a

subject area much earlier in the experience and work in an apprenticeship type model (Park 2007). The majority of programs domestically and abroad, however, require students to develop and pursue original research and contributions in their chosen fields. As Walker et al. (2008) noted, 'At their best, these milestones and the requirements behind them allow students to develop the knowledge, skills, and dispositions to thrive as scholars in their chosen field' (10). While these generic milestones can be found across academic departments in one form or another, each academic department assigns a different value to them. The priority placed on these milestones contributes to students' understandings of the faculty career and thus the development of an academic professional identity.

Of course, the messages communicated by faculty and administrators within a given academic program or department are not always consistent. Faculty and administrators in the same department may disagree about the overall goals of their program, the appropriate educational experiences for doctoral students, the standards for scholarly work and the importance of particular roles. They may, as a result, communicate different messages to students. Furthermore, messages at the departmental level may or may not support the messages communicated at the college level. Leonard and Becker (2009) contend that attention to the role of the department/faculty/school, and even the graduate school and wider institution, is needed as the workloads of academic supervisors increase, as do the numbers of graduate students they supervise. Many supervisors find they must direct multiple research projects simultaneously; this may compromise the attention that they are able to give to individual doctoral students. It is also important to consider that students' interpretations of – and receptiveness to – the messages they receive from those in their local academic community may be influenced not only by their relationships with members of that community, but by those outside it.

Interpersonal networks as contexts

For those doctoral students aspiring to the professoriate, their networks are likely to include individuals who are not members of the academic community to which they hope to gain entrance. Family members, friends inside and outside the educational sphere, colleagues from current or prior work settings, and other significant individuals influence a student's understanding of the doctoral experience and the possible identities associated with faculty work (Baker Sweitzer 2007). In some instances, the messages communicated to students by the members of their personal network will support those communicated by members of the college and department. When messages are not consistent, confusion may result. Students may feel conflicted about the time spent in doctoral study when spouses and children require their attention and care. Family members may have little understanding of the time and personal commitment needed to succeed in graduate study and, ultimately, to find a faculty position. Friends, even those in the same graduate program, may give bad advice about how to succeed as a graduate teaching instructor or researcher.

Marrying the concept of a developmental network with that of participation (in the sociocultural sense of the term) draws our attention to a broad set of interactions that influence learning. Rather than focusing on the advisor–student dyad, researchers who take a sociocultural and/or developmental network view will explore a graduate student's interactions with many individuals, both in personal networks and in the educational community. They may examine, for instance, interactions among peers in

the cohort, in the academic department, with faculty in courses and outside formal educational settings, and even with family and friends who are outside of the academic discourse community but who are important to the individual. A sociocultural perspective, however, also strongly emphasizes how historical, cultural, and social contexts can enlarge and limit one's ways of thinking and acting. While social structures are implicated in a developmental network approach, they are not as broadly defined.

In this section, we have discussed the multiple and varied contexts and social interactions that influence doctoral students' learning and identity development. Doctoral students are members of a college unit, an academic department and a doctoral cohort. They are also members of professional networks, such as research teams, at the same time that they remain connected to networks outside the university. In addition, they are members of families, of neighborhoods, of religious and community organizations, and so on. Any of these social networks 'is likely to contain members whose membership in other networks or groups may create identities that either reinforce or impede various forms of participation' (Stryker and Burke 2000, 291). Developmental network theory and sociocultural tenets contribute to our understanding of how the interplay of this array of social contexts influences learning and identity development. Each context, or community, places expectations on doctoral students, requires them to master particular roles to earn legitimacy, and engages them in associated activities. Messages about desirable roles, values and expectations can be consistent or inconsistent (and variously influential) across these contexts.

While these insights are not new or surprising, they have received little attention from researchers who study doctoral education, who tend to treat context monolithically, focusing either on the doctoral student–advisor dyad (the interpersonal context) or the department as a cultural or socialization context. Only a few studies explore other potential influences on socialization and learning (see, for example, Gardner 2007; Golde 2004; McAlpine and Amundsen 2007). The nested framework model (McAlpine and Norton 2006; McAlpine and Amundsen 2007) views the academic department, institution and society as nested contexts. This view is well aligned with a sociocultural perspective on learning, which emphasizes the importance of local contexts in shaping learning, but also acknowledges the powerful influence of socio-historical contexts on educational practices. The developmental networks approach is well suited to a sociocultural perspective, urging researchers to examine social interactions in local academic communities (departments, schools, institutions), as well as to consider how these developmental networks operate within and between communities inside and outside the university.

Learning and identity development in doctoral study

Austin and McDaniels (2006) view role identification and commitment to the fundamental tasks of research, teaching and service as desired outcomes of doctoral socialization. In social psychology, roles are viewed as external to the individual while identity 'consist[s] of internalized meanings and expectations associated with a role' (Stryker and Burke 2000, 289). Packer and Gioechea (2000) point out that this focus on the internalization of norms and values tries to explain behaviors through reference to an 'ideal'. Sociocultural perspectives, they noted, argue for the opposite. The task is 'to explain how people become able to play a role successfully and appropriately – to live an ideal – in and with their concrete behavior' (235).

Identities, then, must be both internalized and externalized. For an identity to be conferred, the individual seeking that identity must be an active participant in the community, not only exhibiting the knowledge and behaviors associated with a given role in the community. They must also begin to accept at least some of the meanings and expectations of the anticipated role. Participation as a phenomenon, too, is also internalized and externalized. As a doctoral student comes to accept the norms and behaviors associated with the roles of a college or university faculty member, they demonstrate that acceptance as they engage in particular research or teaching practices. In essence, they approximate the behaviors associated with desired roles. Ibarra's (1999) concept of 'provisional selves' captures the experimental nature of these activities or 'trials' (765), in which individuals compare these provisional selves against both their internal standards and external feedback. For example, one doctoral student may accept the roles of researcher and teacher, but may place a different priority on them in comparison to faculty in their academic program; another may decide that applied research is better aligned with their personal values and commitments than basic research. Hockey and Allen-Collinson's (2005) study of doctoral students enrolled in innovative practice-based research degrees in arts and design in the UK provides a vivid example of this trial period. Most of these doctoral students initially felt that their program's focus on analytical documentation of their creative work threatened their identities as artists or designers. The majority of the 50 students interviewed passed through one or more phases of immersing themselves in their creative work while evading, either completely or nearly so, the requirement that they analyze, document and theorize their work. In time, most achieved a 'workable equilibrium between their analytic and aesthetic activities' (88), redefining theoretical and conceptual ideas that were once perceived as challenges as resources for inspiration.

Role prioritization has implications for identity because it may either be reinforced or questioned by the community and associated members (Baker Sweitzer 2007). When a student's role prioritization matches that of the community, the student is likely to be willing to internalize those roles (and corresponding priorities), thus influencing their identity development. Doctoral students may also perceive that they need to shed past identities (e.g. practitioner, artist, activist) that appear to conflict with the adoption of new identities (e.g. researcher, teacher). Stryker and Burke (2000) refer to the latter situation, in which multiple roles and identities conflict, as identity competition.

Discussions of role competition tend to focus on professional and personal values rather than on knowledge. Earlier we noted other examples of the tendency to treat the development of academic expertise (knowledge) separately from the development of a professional and personal identity – and the sociocultural perspective's view of these processes as intertwined. A doctoral student cannot take on the role of researcher, for example, if they do not have the knowledge needed to 'do' research. Lee and Boud (2003) provided empirical support for this connection, identifying how novice researchers' questions of identity were resolved as the process of publication in academic journals was demystified and their skills – and confidence in their 'know-how' – improved. Although they focused on early career faculty rather than doctoral students, Lee and Boud's findings suggest how the development of a knowledge base contributes to changes in professional identity.

The sociocultural perspective suggests the importance of studying the interplay of content and role knowledge in studies of doctoral students' learning and identity development. We note, however, that the assumption that learning and identity are

inseparable challenges the underlying assumptions of some of the sociological theories of identity development that social network theories rest upon. Many of these theories rest on the foundation of symbolic interactionism, which assumes that identities produce behaviors that express that identity (Stets and Burke 2000). A sociocultural perspective does not assume that identity is a precursor behavior, but rather that participation in the activities associated with an identity engages individuals in the process of identity development. As Lee and Boud's research on writing groups suggests, individuals assess their capacity to enact the behaviors associated with a role before taking on the identity associated with that role. Knowing what a professor of educational psychology does, and doing what professors in this field do, changes what students know and that in turn changes the student, generating a new sense of self. As doctoral students become increasingly capable of the skilled performances associated with research or teaching, they may also describe an evolving sense of self.

Toward an interdisciplinary framework for studying doctoral education

Social relationships are fundamental to both developmental network theory and sociocultural perspectives. Each argues that the interactions that occur within and among those in relationships, as well as the social contexts within which these relationships are embedded, are critical influences on learning. Both approaches, however, are needed to understand how graduate students develop during doctoral study. Developmental network researchers believe that social networks are likely conduits of identity development, yet this connection is under-explored (Ibarra, Kilduff, and Tsai 2005). The sociocultural perspective, as we have shown, focuses explicitly on how social interactions produce learning and identity, and also enlarges our understanding of context in educational experiences by acknowledging the social, cultural and temporal contexts that shape local communities. In turn, the developmental network approach helps us understand 'how individual actors create, maintain, exploit, and are constrained by social contexts at several levels of analysis, including the group, department, and the organization' (Kilduff and Tsai 2003, 66).

Given that learning is a social process, interactions that students have with peers, faculty, administrators and others while they are in graduate school can either support or hinder learning and identity development. Learning about the roles of student, teacher and researcher would presumably be facilitated when doctoral students receive clear and consistent messages about the importance of the roles and practices associated with the faculty role from members of their networks and from key members of the academic community (those in central positions in the community). Yet, recent discussions and research on the experiences of under-represented students in doctoral programs suggests that inconsistency in messages does not necessarily impede academic success. Antony and Taylor's (2001) study of successful African American graduate students suggested that the concept of network diversity (or, in sociocultural terms, overlapping communities of practice) can affect persistence, as well as the development of scholarly identities and academic careers. Diversity in one's personal networks, as Tierney (1997) and Antony (2002) suggested, makes the socialization process unique and individualistic, influenced, as Weidman, Twale, and Stein (2001) posit, by personal and professional communities, as well as the characteristics of the student and their university experiences.

The complexity of the outcomes equation suggests that researchers study the impact of conflicting network goals, values and norms on doctoral students. It is likely

that, when local contexts and network partners do not value the learning associated with particular roles, such as that of teacher, doctoral students will learn to devalue not only the role, but the learning necessary to undertake the role. As a result of diminished opportunities for learning and unacknowledged learning outcomes, they will not develop a strong identification with the devalued role. Longitudinal research is needed to determine if this devaluation results in dis-identification with a particular role permanently (e.g. after graduation, during faculty career) or temporarily in order to successfully navigate the academic program.

Researchers might also explore the interaction of smaller networks and larger local communities. For example, students' network partners may define academic and personal success differently than those in the community as a whole, but the larger community may trump the developmental network when it comes to conferring identity. The question focuses attention on the power associated with particular positions or locations in the community. One study of the doctoral student experience focused on an academic community that sought to 'train researchers who aspire to earn placement at other top-rated business programs' (Baker Sweitzer 2007). Some faculty in this community were particularly adept at helping students navigate the rigors of this highly focused program, but others were less adroit and helpful, and misdirected students who sought guidance about the kinds of messages to which they should attend. This finding and the theoretical insights lead us to the following propositions that should be explored by researchers: (1) members of students' personal and professional networks provide information about and perspectives on the academic community and expected roles, and students gauge their success in learning to enact these roles by seeking and/or receiving validation from network partners; and (2) if network partners fail to provide information about the community and expected roles, and/or fail to provide validation to doctoral students, the learning and identity development of those students will be hindered.

The interplay between the larger academic community and the developmental network, and the conferral of identity, must also be explored. Previous research and analysis (Baker Sweitzer 2008; Hall and Burns 2009) suggests that membership in one network may facilitate or interfere not only with membership in the community, but with content learning and identity development. To become an accepted member of an academic community, a graduate student must have the capacity to learn to do the work valued by members of the community. Importantly, central members of the community must acknowledge that capacity. The need to persuade prominent others of one's capacity highlights the role of power in doctoral education: the quality of students' learning, and thus the claim to the identity of scholar, is determined by the most central members of the community. One challenge for researchers is to determine which individuals and developmental networks are the most central and powerful and why.

Learning and identity development in doctoral study are iterative. Learning, both in and out of the classroom, expands a student's knowledge base (e.g. content knowledge, specialized vocabulary, methodological skills). This expanded knowledge base allows a student to participate at a higher level in the practices of the community. For example, a student in their first year of study may have little, if any, experience of writing for academic journals. As they progress through their program, their knowledge of a particular academic domain, coupled with their ability to use the conventions and discourse of writing in their field, enhances their skill. This increased capacity to participate in the scholarly activities of the field promotes identity development.

Furthermore, increases in content knowledge and academic identity should motivate the student to continue to learn, which again affects the quality of participation and, ultimately, the strength of the developing faculty identity.

Although successful participation in the practices of a community can be a catalyst for ontological change, identity change is not inevitable. Provisional selves, to use Ibarra's term, do not necessarily become actual selves. Baker Sweitzer (2007) interviewed doctoral students who were not sure that the values they were being asked to adopt were in line with their personal values. These same students were also aware that publicly voicing this difference could result in loss of one's supervisor's – and financial – support. Accordingly, many students noted the need to 'play the game', at least while enrolled in the program. Others have also noted similar issues related to identity conflict and development when there is a mismatch between program or faculty goals and that of the student (Hall and Burns 2009).

Kilduff and Tsai (2003) hypothesized that demographic characteristics can complicate the task of identity development if facets of the new identity challenge assumptions associated with an existing identity. Individuals from traditionally marginalized groups, such as women and racial or sexual minorities, may judge that certain expectations of the faculty role do not reflect their personal and cultural values or identities (Hall and Burns 2009; Jackson 2007). Cultural roles and expectations may interfere with the wholehearted adoption of new ideas, practices and new identities if these epistemological and ontological changes separate (in actuality or perception) the doctoral student from other valued social groups.

This discussion returns us to our previous suggestion that successful participation does not inevitably lead to identity change and the agency of the individual to accept or reject particular identities. While identity may be conferred, the acceptance of a conferred identity is a personal choice. Both the sociocultural and social networks frameworks acknowledge such agency. It is, of course, also the case that characteristics like gender and ethnicity may limit access to important social networks within the communities to which one aspires. This kind of exclusion, in turn, reduces opportunities for learning and for identity development. From a sociocultural perspective, however, it is not demographic characteristics that are important, but how these are interpreted within a particular sociohistorical context. The categories of gender and ethnicity are assigned different social meanings in different cultures, social locations and time periods. These social meanings, rather than simply the physical characteristics of an individual, influence how that individual is viewed and treated (as well as the personal beliefs and biases she or her develops), and how these result in inclusion or exclusion from particular communities.

Academic fields and program structure as critical contexts

The variety of academic fields, and associated doctoral programs, complicates the study of learning and identity development during doctoral study. For example, doctoral programs in professional schools, such as education or business, differ from doctoral programs in fields that are not associated with professional practice communities. Many students in the humanities, sciences and social sciences enroll in graduate study directly from undergraduate studies. In contrast to older and part-time doctoral students, and those in professional doctoral programs, these students do not enter graduate study with a 'professional identity' that must be negotiated when they enter graduate study. Researchers should thus explore identity development in doctoral

students who enter PhD programs directly from undergraduate studies, as well as those who do not intend to seek faculty roles. Studies might also ask whether and how identity changes as working conditions shift (for example, as governments focus on greater accountability or research productivity).

Because the academic field itself is a variable of considerable interest and impact in studies of doctoral education, researchers must consider whether the process of identity development is qualitatively different in applied and non-applied fields of study. In such studies, researchers might investigate whether the process of assuming a new professional identity varies by field. Delamont, Atkinson, and Parry (2000), for example, note the differences in the educational experiences of students in science and non-science fields. As interdisciplinary graduate programs become more common, research on how variations in disciplinary cultures and the multiple supervisory relationships expand and complicate students' networks, and thus affect their learning and identity development, are also warranted.

In the case of those seeking professional doctorates, studies might explore if, when and how professional identity changes with advanced graduate study. Students in professional doctoral programs are embedded in different learning and research cultures – that of the university, the profession and their workplace – that must be negotiated (Malfroy and Yates 2003). Taylor's (2007) exploratory study found that these complex environments influenced how students in professional doctoral programs made sense of 'being betwixt and between the university and the workplace', and also how they made sense of their own professional development and change processes.

For those shifting from existing careers to academic careers via doctoral study, adopting and developing a scholarly identity is likely to happen in parallel with the process of shedding a prior identity; an accountant who enrolls in a graduate program with the intention of eventually landing a faculty position, for example, will have to think of themselves as someone who *does research* on accounting rather than someone who *does accounting*. Ebaugh (1988) describes this process as 'becoming an ex'. In addition, doctoral programs in the USA typically require more coursework and emphasize independent research on a specific line of research from the beginning of the doctoral experience. The process of learning and identity development in different educational systems may reflect such differences in emphases. Clearly, variations in students' experiences and goals will influence the learning and identity development processes, but further theorizing and research are needed to determine if the key propositions we offer hold across academic fields, types of doctoral programs and national systems.

Continuing the dialogue on doctoral education: some final thoughts on theory and research

Doctoral education and training is a global concern. Doctoral education is undergoing massive transition and is likely to continue to change in the next decade and beyond (Boud and Lee 2009). This transition has resulted in an increase in students pursuing non-academic careers, as well as an increase of professional doctorates, particularly in European countries (Huisman, de Weert, and Bartelse 2002; Park 2007). Miller and Brimicombe (2004) and Taylor (2007) noted that students pursuing professional doctorates are influenced by experiences and values different from those shared by students in conventional doctoral programs. For this reason, we recommend that

researchers test the relevance of our framework for those enrolled in professional doctoral programs.

Green (2009) observed a historical reluctance of those who have studied doctoral education to engage with the field of educational research. He suggests that a dialogue among researchers in these areas could prove fertile, noting in particular the potentially important relationship between knowledge and identity. Like Green, we view attempts to understand the link between knowledge and identity as a question of both pragmatic and fundamental interest. Understanding why and how professional identities, such as those of scholar or researcher, develop (or do not) may help improve doctoral education, but also may provide insights into the nature of human experience and the meanings individuals ascribe to those experiences.

The theoretical framework we offer for consideration seeks to address concerns of scholars like Ibarra, Kilduff, and Tsai (2005), who argued that the dynamics of changing professional identities are not well explained by existing theories. By combining theoretical insights from network theory and sociocultural views of learning, we have tried to articulate the interplay of academic learning and identity development in doctoral students seeking academic appointments. Our focus has been on the influence of these students' relationships, inside and outside academe, on the scholarly formation process. We have discussed how these relationships are shaped by larger social contexts (universities, departments, but also families and home communities) within which students and their networks are embedded. We have also explicated an often-implicit link between knowledge development and identity development. The combination of theoretical insights from network and sociocultural researchers, we have argued, provides a more comprehensive conceptual framework for studying critical changes in knowledge and identity that occur during doctoral study – and thus may enhance the study of learning and identity development in doctoral education.

Acknowledgements

We want to gratefully acknowledge the advice received from Chris Golde and two anonymous reviewers during the writing of this manuscript. A previous version of this article was presented at the Association for the Study of Higher Education annual conference in Jacksonville, FL in November 2008. This research was supported by a grant from the Hewlett-Mellon Fund for Faculty Development at Albion College in Albion, Michigan.

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