APPRENTICESHIP AND INTELLECTUAL COMMUNITY:

LESSONS FROM THE CARNEGIE INITIATIVE ON THE DOCTORATE

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The best doctoral programs foster a deep mutual respect among all of their members as the bedrock of their intellectual community. Graduate students respect the talents and achievements of their professors, but professors respect no less the talents and achievements and promise of their students….When professors and graduate students are truly working together as they should, the relationship of student to mentor is more collegial than subordinate. Hierarchy remains, of course, but as time goes on it should gradually diminish, until finally student and mentor become genuine intellectual companions, even friends.

~ William Cronon, "Getting Ready to Do History," 2006, 347[1]

American doctoral programs produce exciting new knowledge and talented graduates. Yet despite its well-established reputation for excellence internationally, doctoral education in the U.S. faces challenges in the 21st century, many of which have been the focus of recent research, reports and reform efforts. Most of the concern has been around how well doctoral programs are serving the development of their students and their preparation for various professional positions, or how programs and their people are contributing to society more broadly. A growing chorus of voices is calling for increased attention to work done on the boundaries, necessary collaboration within and across fields, and the ability to integrate knowledge in new ways (see for example, Golde and Walker 2006). It is within this context that we propose a reconsidered approach to apprenticeship and an increased focus on how to create and sustain intellectual community. As a result of our work in the Carnegie Initiative on the Doctorate (CID), we believe both will help address the needs of students, programs, and larger society at the dawn of the 21st century.

Doctoral education is perhaps most easily thought of as a series of requirements and milestones that punctuate several stages: courses and dissertation are bridged by the comprehensive exam and capped by the final dissertation defense. At their best, the formal requirements and informal expectations of the doctoral program (course requirements, TA obligations, conference

presentations, lab meetings, and more) allow students to develop the knowledge, skills, and habits of mind to thrive in their chosen field. Within the context of changing needs and external demands, the primary goal of the CID was for graduate programs to make changes in program design to make these elements more powerful, more clearly aligned with evolving purposes.

We started the CID in 2001 with questions of mission and purpose, and these led to ideas about new policies and practices. We recognized from the start that the apparent or surface structure of the doctoral program varies enormously from department to department. Each discipline shapes the programs, as does each university. Recognition of disciplinary differences shaped the CID. But our cross-disciplinary perspective also allowed us to see some of the deep structure that unifies American doctoral education. So, as the initiative unfolded, we found ourselves asking additional questions and proposing different answers, some of which we explore here. In this chapter we explore ideas of apprenticeship pedagogy and intellectual community as two mutually reinforcing ideas that we argue can make doctoral education more effective, regardless of discipline or institutional home.

THE CARNEGIE INITIATIVE ON THE DOCTORATE

The Carnegie Initiative on the Doctorate (CID) was a research and action project to support departments' efforts to identify and broaden the purpose of their doctoral programs and subsequently to improve the quality of their programs through the design and execution of assessable new initiatives. The CID focused in six fields of study: chemistry, education, English, history, mathematics, and neuroscience. The initiative was a major project of The Carnegie Foundation for the Advancement of Teaching and was funded by The Atlantic Philanthropies and the Carnegie Foundation for five years, 2001 through 2005.

The initiative began with a return to first principles, posing the question: *What is the purpose of doctoral education?* We proposed that the purpose of doctoral education, taken broadly, is to educate and prepare those who can be entrusted with the vigor, quality, and integrity of the field. This person is a scholar first and foremost, in the fullest sense of the term—someone who will creatively generate new knowledge, critically conserve valuable and useful ideas, and responsibly transform those understandings through writing, teaching, and application. We chose to refer to such a person as a "steward of the discipline."[2]

In the fall of 2002, the Carnegie Foundation issued an Invitation for Participation to doctoral-granting departments in four disciplines (chemistry, education, English, and mathematics), followed by a similar invitation in history and neuroscience in the spring of 2003. In all, there were 84 participating departments representing a total of 44 universities. The most concentrated interactions

between the participating departments and the Carnegie Foundation CID staff were between January 2003 and December 2005.

The strategy of the CID was for participating departments to do the lion's share of the work. We asked them three broad questions. First, what is the purpose of the doctoral program? Said another way, what are the desired outcomes of the program? What does it mean to develop students as stewards of the discipline? One strategy to answer this question was for departments to describe a prototypical graduate, defining essential educational experiences, and identifying their likely career path. [3]

Second, do current practices best serve those goals? What is the rationale and educational purpose of each element of the doctoral program? Which elements of the program should be retained and affirmed? Which elements could usefully be changed or eliminated? Some possible answers to these questions were prompted by commissioned essays in each discipline. Third, how do you know? What evidence aids in answering those questions? What evidence can be collected to determine whether changes serve the desired outcomes? Many departments surveyed students, faculty and alumni to learn more. In short, departments' leadership teams—which included students—were expected to carefully examine their doctoral programs, assess what elements were and were not advancing desired goals, to deliberate, and to make improvements.[4]

The changes that took place in departments might be characterized as incremental changes implemented deliberately, rather than radical reforms. Many departments made curricular changes, several focused on qualifying exams, and others focused on ways that students are prepared to be teachers and researchers. (For specific details, see gallery.carnegiefoundation.org/cid) As important as the concrete programmatic changes and additions are, we believe the changed habits of mind (such as regularized deliberation based on evidence) and relationships (in most departments students were included on departmental leadership teams) will be long-lasting. We are confident that the changes the departments made will stick because these are changes made without additional external funding or by reallocating internal resources. Implemented changes were undertaken because department members wanted to do them, not because they were bribed or coerced. Historically, there have been many reform initiatives in which the (often laudable) activities have been entirely predicated on external funding, but many do not persist or become institutionalized once the seed money disappears.

The role of Carnegie staff was to facilitate departmental work, and, as noted, we gave no money to departments to do it. Instead, our emphasis was on sharing and cultivating ideas. We provided intellectual grist for the mill through commissioned essays, collected and published in 2006 as *Envisioning the Future of*

Doctoral Education (Golde and Walker 2006). We visited many campuses to offer encouragement and advice. The Foundation hosted meetings and panels at disciplinary society meetings of representatives from all participating departments to update one another on work in progress.

Much of the shared learning took place in three-day working meetings convened by Carnegie, which provided departments with modest funding for travel to convenings. We convened departmental representatives—faculty and students—for three consecutive summer convenings. Convenings were an opportunity to share departments' work, including their successes and setbacks, with other departments in a spirit of candor and the camaraderie of a shared mission. This was also an opportunity to be accountable to other departments for plans and actual progress. The pairing of "critical friends" brought departments into a special relationship with another department that under other circumstances might have been regarded as a competitor.[5]

CID staff were also research partners with particular concern about the future of doctoral education and the process of change in graduate education. We conducted surveys and we watched and listened and learned as faculty and students told us about what was happening on their campuses. Consequently, we prefer to share our observations and insights about doctoral education writ large, and let departments take the lead in describing their work and its local impact.[6]

As the initiative unfolded and evolved, two ideas emerged as central to our thinking.[7] The first is a re-appropriation of the signature pedagogy of doctoral education: apprenticeship. The second proposes that not only is a healthy and vibrant intellectual community the best environment for effective graduate education, but it is possible to create and foster such a community deliberately. These are not new concepts, of course, but the ideas deserve careful reconsideration in light of 21st century realities. We have chosen to write about these ideas together here because it is clear that they are related, and we want to encourage people to make more deliberate and transparent connections between the two. Most simply, they reinforce each other. Strong, healthy apprentice relationships help foster a vibrant intellectual community, and a robust intellectual community supports and reinforces positive, learning-centered relationships between its members. Although they are independent ideas and can exist separately, we argue that doctoral programs are stronger when both are present.

APPRENTICESHIP PEDAGOGY

One distinctive feature of doctoral education is that much of the important teaching and learning takes place in a one-to-one relationship between a student

and their advisor. We would go so far as to call apprenticeship the signature pedagogy of doctoral education. [8]

The tradition of close work between a faculty "master" and student "apprentice" is not the only approach to graduate teaching and learning; there are lecture courses and independent study. But "elbow learning" in seminars and labs has been the prevailing pedagogy of graduate education since the founding of American universities.[9] When the relationship is good, it is very, very good. Outstanding advisers challenge their students, set high expectations and standards, generously share their expertise, and individually tailor their students' educational experiences.

Unfortunately, when the relationship is bad, it can be horrid. Without belaboring horror stories we must recognize inherent problems with apprenticeship. Conformity is one danger; another is the inability to develop independent voice and lines of thought. More insidiously, the student is completely dependent on one faculty advisor, who, through ignorance, convention, or malice abuses or exploits the student. The traditions of solo sponsorship are coupled with traditions of faculty autonomy. Consequently, students usually feel they have few avenues of recourse when they are mistreated or, more commonly, when a relationship sours.[10] Faculty members and departmental leaders are reluctant to intervene in dysfunctional situations. The culture of privacy extends so far that advising strategies and philosophies are rarely the topic of conversation among faculty members.

Consequently, we usually hear those who have learned from excellent advisers refer to themselves as "lucky." This highlights the almost random and haphazard access students feel they have to high-quality advising.

Despite the bad relationships, the master-apprentice strategy certainly beats the alternatives. Unfortunately there are several variants of less structured, more Darwinian strategies readily observable in doctoral education. These include the osmosis theory (students learn by reading good research and being near faculty who are doing high-quality research), the sink or swim theory (students are thrown into their initial teaching experience—or research assignment—and thrash their way to completion of the assignment with little guidance), the talented-students-will-self-discover theory ("good" students figure out what they need to know and go get it or abandon the process), and the high-pressure crucible theory (a doctoral program proceeds as a set of high-stakes tests and hurdles). These strategies—which we do not advocate—do little to actively promote learning or take a deliberate hand in the formation of scholars.[11] The cognitive sciences have shown us that most people learn more and develop further in a more purposefully constructed environment, indeed this is the premise of formal schooling (Bransford, Brown et al. 2000).

Classic apprenticeship done well is the best of the alternatives, but we believe it is possible to imagine a better form of apprenticeship appropriate for doctoral education in the 21st-century American university. We want to resuscitate the word apprenticeship, but free it from its connotations of indentured servitude. The key shift is from seeing students as apprenticed TO to recognizing that they are apprenticed WITH. Simply put, apprenticeship relationships are relationships in the service of learning.

Rather than apprenticeship as a practice reproduced generation after generation because "that's how it's always been done," we envision a set of skills, practices and characteristics that can be developed deliberately in a way that is beneficial to students and mentors. Our reconsidered apprenticeship—"apprenticed with"—has four features which we discuss in greater detail.

Apprenticeship as Pedagogy

Apprenticeship is a theory of teaching and learning. Apprenticeship pedagogy is experiential, it is "elbow learning." As Brown and his colleagues noted, of all levels of formal education, apprenticeship is probably most recognizable and widespread in graduate education.[12] It begins with observation, which affords the novice the opportunity to see and develop models of what it is they are trying to learn. Observation is followed by many opportunities to practice the skill being developed. With repetition and success, students move from simple to more complicated tasks, from low to high stakes tasks, and to situations of increased ambiguity in which they must exert independent thinking and decision-making.

The role of mentors cannot be underestimated.[13] Faculty members have three tasks. Expert practitioners must understand and explain the constituent parts of expert practice and demonstrate how they fit together in a whole; they are responsible for constructing assignments that help the student develop; and they coach and guide, providing more support at the beginning and intervening less frequently as the student develops.

The mentor is expected to model authentic practice in full view of the student. Because the process of learning begins with observing authentic complete practice, the student must have opportunities to observe the mentor doing the craft—in this case the complex expert practice of research and scholarship. This helps students develop conceptual models and understand and interpret their own experience as they learn subtasks and get feedback (Collins, Brown et al. 1991, 2). It is the job of the teacher to decompose expert practice into smaller, manageable, learnable components, and to explain these components as well as how they are integrated in practice.

The role of the mentor is to provide "scaffolding," structured support provided in decreasing amounts of over time. "Scaffolding is the support the master gives apprentices in carrying out a task. This can range from doing almost the entire task for them to giving occasional hints as to what to do next" (Collins, Brown et al. 1991, 2). As support is removed, the mentor fades, and the student takes increased responsibility. The student engages in repetitive practice with coaching and feedback. Students are encouraged to reflect on what they are learning and compare their work with that of experts (Collins, Brown et al. 1991, 10).

Mentors devise approximations and assignments so that students can practice components in low stakes, scaffolded, supported situations. These might be simulations (defending a grant proposal to a mock panel review), or problems with known solutions (identifying research questions in published articles), or well designed small components of a larger work (a course on scholarly publication).

The sequence of tasks the student attempts are of increasing complexity, incorporating more and more of the skills and concepts necessary for expert performance. By sequencing tasks and using scaffolding appropriately, students are guided to the increased complexity of practice using a wider and wider variety of strategies and skills, transferring their knowledge and understanding to increasingly diverse settings (Collins, Brown et al. 1991, 11).

This expects a lot from mentors: they themselves need to be expert, to understand their expertise well enough to be able to model the whole, and to break the whole apart into constituent components, develop strategies for teaching the pieces, and help students integrate them back into the whole (Grossman, Compton et al. 2005). They must know when to steer, and when to let students try and fail. This assumes that mentors have an internal model of the typical apprentice's development over time, and the kinds of scaffolding and coaching that will move them along the trajectory towards expertise, independence and interdependence. Ideally, mentors should customize learning experiences for each student, whom they know well. We know that these skills are not something every graduate faculty member possesses. However, we believe (and discuss briefly later) that all faculty can not only learn, but benefit from these practices.

Students also have to work on these relationships. For many students this may be a new way to learn, especially in the context of formal schooling. The experiential nature of apprenticeship learning expects them to reflect on what they have done, in order to develop models and patterns and generalize to other contexts. Not only must students take active responsibility for their own learning, but they have a special obligation to take risks and be willing to fail.

Many doctoral students have little experience with failure in school context, as it is their prior successes that landed them there.

Multiple Relationships

Today's students are best served by having several mentors. "The rapid growth of fields and of interdisciplinary work … means that incoming students often do not have interests that map closely onto those of a single faculty member"(Damrosch 2006, 38). Even if a new student's interests converge with those of a faculty member, it is inevitable that the knowledge terrain will undergo so many upheavals and redrawing of boundaries that the 21st century scholar must be able to draw from several intellectual lines of thought. Versatility and the ability to grow are essential. Their professional lives will require them to be adept in a number of skill areas; if they become faculty members they will be expected to be good teachers and researchers, as well as engaged citizens of the university and the world. Engaged scholars need opportunities to apply and transfer their work into multiple domains. They will be expected to integrate all of these roles. The world of work, whether inside or outside of the academy (or both), is complex and changing rapidly. No one mentor can possibly teach all of the necessary skills equally well, nor should students expect them to.

For all these reasons the solo mentorship model does not adequately serve. We believe in distributed and multiple apprenticeship relationships for every student. Students ought to have research mentors as well as teaching mentors. Regularizing multiple mentors will require giving up cherished habits and traditions. This is something that the science disciplines could usefully adopt from the humanities, which already do this quite well.

Moving away from a single dissertation director, adviser, chair, boss, or PI is a frightening leap for many.[14] The reality is that one or two faculty members will probably assume primary responsibility for each student's development. But this is quite different from ceding them sole responsibility or control of the student. Practically, this means that faculty members must meet and work out agreements about how students are funded and how they are expected to spend their time. For their part, students must be assertive about identifying what they need and want to learn and in seeking out mentors with whom to apprentice. They must also play an active role in reconciling conflicting advice and expectations. This is easier, of course, if the department fosters a culture in which students are encouraged to actively shape their own educations.

So far we have emphasized a pairwise perspective on apprenticeship pedagogy. But groups—courses, research labs, writing groups, cohorts—are important mini-communities for learning. Participating in a multigenerational group provides access to many teachers.[15] Science labs are one example of a

multigenerational workgroup in which students also learn to mentor. In a research lab there is usually a strong culture in a lab of "cascading mentoring," in which students teach those more junior. Postdocs mentor senior graduate students, senior graduate students mentor junior graduate students, junior graduate students mentor undergraduates. Not only do teaching and learning relationships form among group members, but labmates have responsibility to the group for their work, and are held accountable for timely and regular progress. And, working in proximity to other students (rather than in isolation) provides opportunities for informal conversation that can help to normalize problems ("That happened to me in my third year too") and generate solutions ("Why don't you try X, it worked for Jane") (Delamont and Atkinson 2001).

Collective Responsibility

Having multiple mentors does not mean dividing responsibility so that one faculty member is the research mentor and another is the teaching mentor, a situation that easily allows important things to fall through the cracks. Instead we believe that many mentors working collaboratively, from a shared vision of student development as stewards, is preferable. Apprenticeship teaching of graduate students is one of the department's most important collective goals and responsibilities. Taking collective responsibility means setting shared and transparent expectations, holding one another accountable, and providing formal and informal safety nets.

A shared vision of the knowledge, skills, and habits of mind faculty expect their graduates to possess is a precursor to taking collective responsibility for ensuring student formation. This leads logically to the department setting frameworks for mentor-apprentice relationships. By making norms and expectations explicit—regarding expected progress through the program, a timeline for formally and informally identifying mentors, customary speed of response to draft papers and chapters, the scope of conversation and documentation from annual reviews—fear and the potential for misunderstandings are reduced. One expectation can be that faculty members and students meet regularly to set (and revisit and revise) mutual expectations for their relationship.

Holding one another accountable for students' development does not need to be intrusive. Instead, we believe that faculty members need to have more of the kinds of conversations that many already do. "How is Mike progressing? He is working with you as a TA, isn't he? How well did his recent lecture go?" "Can you talk with Leslie about her upcoming conference presentation? I think you could be helpful to her." Making students' development everybody's business means integrating "checking up" into daily life. Formally, annual reviews are a minimum. Informally, it is about a culture of shared, rather than abdicated, responsibility.

Nevertheless, setting at least minimum standards means that faculty members are responsible for calling each other on unacceptable behavior. Just as certain behaviors (not coming to class, yelling at students) are not tolerated in the classroom, they cannot be excused outside of it. This is the Board of Health notion of standards—accountability rests on meeting shared and enforced standards of minimally acceptable behavior.

Students must be held accountable as well. Setting clear expectations for progress, and making the expectations for high quality work clear can aid in this (Lovitts Forthcoming). Students cannot be passive recipients of education, instead they must actively define their own goals, near-term and for their careers, and seek out the experiences that will help them learn.

Characterized by Reciprocity, Respect, and Trust

Wholeheartedly engaging in an apprenticeship relationship requires committing to the relationship. Both parties -- faculty mentors and students -- have responsibility to help the relationship result in the desired learning. Apprenticeship relationships are more likely to flourish when they cultivate the qualities of respect, trust and reciprocity. These qualities are important not simply because it is more pleasant to be in such a relationship, instead, but because they set the conditions that foster learning. These are also characteristics, as we will describe shortly, of vibrant intellectual communities, which are environments that foster learning.

Starting from a stance of mutual respect, it may go without saying, is a hallmark of good apprenticeship relationships. Respect for ideas is paramount. How are the mentor's ideas and feedback incorporated into the student's work in a way that recognizes the teacher's greater experience, but also respects the student's growing intellectual independence? How are the student's ideas given room to grow and develop? Personal respect (which does not presuppose affection or friendship) is also important, and can build from respect for ideas.

Trust grows over time from interactions based on respect. If a student knows that her questions and ideas are going to be considered carefully and respectfully, she will trust that her mentors are concerned with her development. Just as importantly, a student who engages and responds to ideas with respect—even when questioning them—communicates to a faculty member that he is committed to his own learning.

Reciprocity within the relationship is the third leg of the stool. It is generally obvious what students get from a healthy mentoring relationship with a faculty member—training, advice, sponsorship, funding, support, encouragement, feedback. Faculty members get something too—new ideas, infusions of energy and excitement, the satisfaction of developing the next generation, and

intellectual legacy. Approaching the relationship from stance of reciprocity reduces the chance that power differentials become so great that they are unhealthy.

These ideas are not new; relationships this strong and healthy exist already in some settings. But not in all and not in a way that is recognized and valued to the extent it should be. Although the ideas are not new, they require a commitment on the part of faculty and students—and their programs—to ensure that they are the norm rather than the exception. The rewards of a doctoral program made up of strong, learning-centered relationships far outweigh the costs. These kinds of relationships both strengthen and are strengthened by robust intellectual communities.

INTELLECTUAL COMMUNITY

The idea that doctoral education flourishes most effectively in a healthy intellectual community is a second organizing principle that we believe is very fruitful. To the extent that people think about it at all, intellectual community is assumed to be a product of other activities, or simply taken for granted, like the air we breathe. What most people often fail to consider is that intellectual community influences not only relationships as described above, but affects the way knowledge is produced. Intellectual community is a condition, indeed the foundation, for the core work of doctoral education, building knowledge.

Knowledge-building takes many forms, including mastery of content, challenging existing ideas, and pushing new frontiers. A vibrant intellectual community that values ideas and argument and collaboration advances this knowledge. The work of research, teaching, and, particularly, apprenticeship takes place in this larger context, and the nature of a department's intellectual community influences everything that occurs in it. Intellectual community affects how people wrestle with ideas (is there honest exchange, or hostile subversion?); how teaching is valued (do people recognize which faculty and graduate students are good teachers?); how students learn to engage with senior colleagues (do faculty patronize students or are they open to the potential of junior colleagues?); how failure is treated (are risks supported or avoided?); how people work together (is collaboration actively promoted by the structures of the department?); how independent work and taking risks fostered (do students have opportunities to tackle new questions and ideas?). All of these facets—and many others—affect not only the intellectual life of a department, but, significantly, shape how scholars are formed and how well they develop into stewards of the discipline, preserving tradition and advancing knowledge.

The intellectual community is, in this sense, not simply a matter of potlucks and hallway conversation; it is "the hidden curriculum," sending powerful messages about purpose, commitment, and roles (Bender 2006, 305). Describing an

academic department as an intellectual community proposes a vision of academic life characterized by real partnerships between faculty and students, habits of respect for and interest in one another's work, and a place where all parties have meaningful access and participation. Where such community is carefully nurtured and sustained, one also sees a sense of shared responsibility—stewardship—for the integrity of the field and for shaping its future. As historian Thomas Bender puts it:

> "Much more attention needs to be directed to the culture of the department: making it a safe place for all faculty and students; making intellectual and pedagogical discourse part of the department's public culture; making it a place of participatory governance, openness, and recognizably fair in the treatment of all members." (Bender 2006, 304-5)

As with apprenticeship, creating and fostering intellectual communities is something that can be done deliberately, based on the goals and expectations of their members. It should not be an afterthought, but rather an integral consideration in any aspect of departmental life. We highlight five features of intellectual communities, several of which resonate with earlier discussions of apprenticeship. These qualities help reinforce each other in the service of doctoral education.

Knowledge-Centered

The overarching raison d'être of intellectual community in doctoral education (from an academic department to a specific research group) is knowledge generation. Ideas and learning are central. Although it is possible to amass and create a great deal of knowledge independently, much of what we learn comes from interaction with others, formally or informally. We get new ideas because something a student said triggers a different approach; our colleague helps identify a weakness in an argument that we missed. As Wenger suggests, "learning is fundamentally social" (1996, 3). The more opportunities we have to interact in an intellectual community—in class, in offices, in social spaces—the more likely we are to share ideas, collect input and learn more.

Interestingly, the culture and community in which graduate education occurs has received less attention than in undergraduate education. Perhaps the most robust area of innovation in undergraduate education has been "learning communities," various arrangements for linking courses and organizing intellectual work around central, cross-cutting themes; these arrangements have shown real power to increase student engagement and retention.[16] But the qualities of learning communities that are most successful—regular opportunities for discourse, collaboration—can translate well to other settings as well. In short, "If the right social conditions, institutional structures, personal

relationships, and opportunities for personal expression can be created, stimulated, and nurtured, then we can make our campuses more invigorating places to work and learn" (Tepper 2001, 7).

Some would claim that doctoral programs are settings in which independent intellect trumps intellectual community, and there are certainly examples of individual geniuses who seem to manage—without the benefit or hindrance of others—to generate breath-taking new ideas. For these individuals—be they students or faculty—the goal has been to simply get out of the way. But this is a reversion to Darwinian theories of learning and achievement, and has been shown to be a leading contributing factor to high rates of doctoral student attrition (Lovitts 2001; Golde 2005). And, in fact, individual achievements may not be as individual as they seem: "The hothouse effect…asserts that such singular 'creatives' are more likely to emerge from within a group of skilled practitioners than from isolation" (Kunstler 2004, 3). The point is not simply being part of a group, but being part of the *right* group: engaging with others who are interested and passionate and thoughtful and creative. These kinds of interactions—and the ideas they generate—are a hallmark of intellectual community.

Knowledge-building can happen in any place within an intellectual community. The most obvious is as part of the formal curriculum. Interactive seminars that allow true discussion with respectful disagreement create new ideas and perspectives; labs where all opinions are solicited to form or challenge a hypothesis—these are places where the right leadership and openness to ideas contribute to the intellectual life of the department. A more deliberate way to make a community knowledge-centered is to schedule colloquia that reach more than just a narrow subspecialty within the field, or to make connections with colleagues in other fields as a way to explore possible new collaborations. By debating the big ideas that shape our disciplines, we both solidify what we value and move beyond what is no longer relevant. These exchanges bring vitality and energy to a community.

Broadly Inclusive

For an intellectual community to be robust and able to stimulate ideas and development, there must be active participation from lots of different people, regardless of background and status. Graduate students, post docs, and faculty of all ranks have complementary roles to play, regardless of how long they have been at the university. There must be "an appreciation for the generative potential of multiple perspectives" (Feito cited by Huber and Hutchings 2005, 47). Far from requiring agreement on everything, true intellectual exchange must have a wide range of opinions that can challenge and inform thinking.

Knowledge-building requires change and growth. Only when a community has access to many viewpoints can it tackle intellectual issues.

A vibrant intellectual community is one in which students are integrated as junior colleagues. In fact, one of the most significant findings of the CID is just how great a contribution students can make to a department. If doctoral students are to develop into stewards of the discipline, they must have opportunities to try on some of the skills and habits of mind they will need as scholars in the field. A department with a healthy intellectual community is marked by the level to which students are engaged in all of the activities of the department: serving on committees, hosting outside scholars, planning events. Just as students must have increasingly independent opportunities to teach and do research, they can also become increasingly involved in other departmental activities as they develop as stewards.

Flexible and Forgiving

The best environment for intellectual stimulation and creativity is one that provides opportunities for experimentation and risk-taking. One of the most important parts of the learning process is making mistakes and trying something new. Too often, departments are structured (and funded) in a way that leaves little time or space for exploring ideas or theories that might not pan out. Yet, almost as often, a mistake leads to an idea that is fruitful. Creating a space—literally and metaphorically—to test out new thinking is an important activity for students *and* faculty. It is important to make clear to all members of the community that fresh perspectives on problems are a source of strength, not a waste of time or resources. We do not mean to trivialize the many real pressures faced by all members of the community, but if a student is not given an opportunity—in an environment that can support him and provide guidance for next steps—to learn how fail, he may never fully develop the skills necessary to take chances on his own. Those skills are essential to becoming an excellent scholar and steward.

Respectful and Collegial

Although discussions of relationships in a department can seem peripheral to larger shared goals, ideas about apprenticeship help us understand just how central relationships and interactions between people are. Over and over, our CID partners and others stress the value and importance of respect and collegiality within a departmental community. Concretely, this means that community members take each other's ideas and input seriously, and that conversely they offer ideas and input generously. Without creating a climate of political correctness, there are ways to communicate that treating one another respectfully—regardless of difference of opinions—is a necessary and valued aspect of a community. Indeed, without it, it is not possible to engage in genuine

intellectual interaction. As one CID participant explained it, there must be "camaraderie built on engagement, if not agreement."

Although many departments may be collegial in a nominal sense, departments that "emphasize consensus, shared power, consultation and collective responsibility" are more productive and vital places as a result of genuine connections and community (Massy, Wilger et al. 1994, 12). Departments that are characterized by genuine and respectful collegiality are more likely to foster intellectual communities.

There are a number of settings in which these norms can be enacted. Some departments include graduate students as members of governance committees, including curriculum development, admissions, and faculty hiring. Departmental seminars with invited speakers can be a setting in which graduate students to ask questions and enter the intellectual fray, as long as the participants respect and value their contributions.

An intellectual community is based not just on common scholarly interests, but also personal connections. It is characterized by interaction not isolation. The social aspects of a community are non-trivial means to the end of creating vibrant intellectual communities. Respectful, trusting personal connections create better opportunities for collaboration, open exchange, and overall engagement, and such connections can only develop with time and repeated interactions. A vibrant intellectual community is a place where people actually enjoy spending time together and are generous with their time, ideas, and feedback. "The extent to which the department is seen as a social network of relationships as well as a professional, discipline-oriented, community of scholars," was identified by the mid-1970s an important dimension of the departmental environment that can positively or negatively affect the nature and quality of the graduate student experience (Hartnett 1976, 71).[17]

Purposeful and Deliberate

In the CID, we use the acronym PART to describe the desirable features of a doctoral program. A well-structured program should be *purposeful* (programmatic requirements and elements aligned with specified goals), has been created by a process of iterative individual and collective *reflection*, it is *transparent* (collectively understood by the faculty and graduate students), and *assessable* (the pieces of the program—as well as the entire program—can be evaluated in terms of their contribution in achieving the purposes of the program).

It is clear that as complex a cultural construct as a "robust intellectual community" must also be the product not of accident, but of purposeful action. Like high functioning workplaces (which have been analyzed in the business and

management literature), which, of course, academic intellectual communities are, they must be created, nurtured, fostered, and tended.

There are ways to be intentional about creating an environment that has the features described above and that therefore helps to foster intellectual connections and knowledge building. Such an environment challenges and supports community members more generally and helps doctoral students develop into stewards more specifically. There are ways to create these environments purposefully and authentically, but they require the commitment of leaders and community members. The potential benefits are great, for the department and the larger institution.

To be concrete, specific activities must become routine. The *structure* (including activities, time and space) of the community must be transparent; members know what is expected of them and are given opportunities to raise questions and make suggestions about elements that are not clear or might be made more effective. There should also clear expectations for participation in the community. Departmental life must include *opportunities to teach*. We can create settings that allow people of all background to be experts. Journal clubs rotate leadership, a time when each member is expected to present and facilitate discussion. A mini-conference with a poster session gives students a chance to present their work and explain it to others. Not surprisingly, these moments correspond directly to *opp to ortunities to learn*. Because no one is expected to have all the answers, an open and transparent community allows people to be comfortable with what they do not know. Both journal clubs and mini-conferences are less formal learning settings, as well. It may be easier to ask questions if there are fewer people around, or if the person teaching is a peer. More formally, doctoral programs can create cultural norms about things like invited speakers. One program in the CID has a rule that the first three questions after a talk must come from students.

Just as importantly, there must be *opportunities to take risks*, to try new ideas that are "outside the box." Once there is trust in a community, people are more willing to take risks, and, as we know, often the best advances come from risks. No idea is too crazy, too untenable, too costly. By encouraging true intellectual imagination, new energy and ideas can flourish, regardless of the final outcome. In many departments, creating genuine opportunities to try new things is among the most valuable and most difficult things to do. But if we truly embrace the goal of forming scholars, of developing stewards, then all members of the community must commit find ways to stretch their intellectual wings. Some faculty have made a point of setting aside specific time for thought experiments in the classes they teach. By asking a question "contrary to fact" they not only allow, but encourage themselves and others to set aside structures and try new ideas. An example that we might use in the CID would be something like, "If

you could no longer have dissertations, what would you do to accomplish the same goal?" The point is not that we are going to throw out dissertations (though some would like to), but that the process of thinking in new ways breaks down obstacles while stimulating new ideas. The very act of engaging in the discussion—debating the merits of some ideas, trying to persuade others—is a wonderful exercise in intellectual community.

Last, but not least, the fifth principle is to include the all-important *social* components. Although it can be easy to dismiss social connections as "touchy-feely," and though they may feel inauthentic at first, creating personal connections is a key to strengthening intellectual connections. Much of the research on organizational culture points to the value of informal interaction; Brown and Duguid (2000) call this "incidental learning." And although incidental learning is, by definition, not something that can be planned, it is possible to create settings that facilitate that possibility: coffee machines, kitchens, places where students (especially those who do not have on-campus offices) can connect with others and keep in touch with the activities of the department. Events can be planned that have enough flexible and interstitial time that conversations and connections develop naturally. Several of the CID departments plan retreats that have both formal and informal goals. There may be an agenda that includes specific topics to cover, but just as often there are social times—meals, games, walks—that allow people to connect in ways that are authentic. For many, this is an anticipated, annual event, serving as a way to re-connect with current and past colleagues, and get to know new.

Intellectual community is not a concrete thing we can look at, any more than we can a department, really. Although often taken for granted, intellectual community frames and shapes the experiences of doctoral students and faculty in ways that are not often valued or even noticed. In fact, it is most often noticeable by its absence. By determining what is most important to them, members of intellectual communities can find ways to facilitate and cultivate an environment that both supports and challenges, creates new knowledge and develops the next generation of scholars. This process will strengthen not only the community, but reinforce the many other activities that occur within it, including apprenticeship.

A REINFORCING PROCESS: APPRENTICESHIP AND INTELLECTUAL COMMUNITY

Many of the activities and characteristics described above overlap and reinforce each other nicely. Leading a journal club meeting one week might lead to a student asking a mentor a question then next. That question might trigger a new idea for a journal article by the mentor who invites the student to collaborate. Each of these experiences strengthens the development of the student and the

ongoing knowledge of the community. Although we do not want to conflate apprenticeship and intellectual community, we do think it's worth acknowledging the many overlapping features that make them stronger. We hope that the fact that they are so important in multiple ways encourages additional focus.

Humane relationships. Whether in the more tightly coupled mentoring relationships that characterize apprenticeship, or in the multiple more casual relationships every departmental member has with many others, the same interpersonal qualities are desirable. Cultivating relationships based on trust, respect, and collegiality yields the kind of professional generosity that we all treasure in academic communities.

Collective vision. Our vision of an intellectual community that supports effective graduate education is predicated on a shared sense of purpose. At the broadest level, we hold that an intellectual community puts knowledge development and learning at its center. More specifically, we argue that the department can discuss the purpose and goals of the doctoral program, going so far as to specify the skills, knowledge, and habits of mind of the prototypical graduate. This process requires a commitment to creating a collective vision (as distinct from seeing an academic department as a farmer's market of solo proprietors). Importantly, and in parallel, and our vision of apprenticeship requires shared commitments. Our vision of apprenticeship takes place in a community where every student has multiple mentors, and in which the department (and all its members) take collective responsibility for student success and learning.

Learning and improving. Like conducting research or writing, mentoring is a skill that everyone can and should seek to improve and develop. Being a good mentor is not an innate talent, but a learnable skill. Applying the ideas of apprenticeship pedagogy to apprenticeship itself means that prospective faculty members need opportunities to practice. Opportunities to grow and improve as a mentor should be available to all faculty members. It is important to create opportunities to discuss challenging moments and challenging students. Mentoring is a relationship, so it cannot be reduced to formulaic "moves." Because it is a form of teaching it is a complex practice, but it can be improved. It is highly individual; it just does not work all the time for all the people in all the same ways. The British might be onto something with institutionalized professional development workshops on graduate student advising (in British terminology, "postgraduate supervision"), "It is now normal for institutions to require new supervisors to be trained before supervising students; some institutions now require regular continuing professional development for existing supervisors" (Eley and Jennings 2005, ix).

We also want to highlight the role of intentionality in fostering both apprenticeship pedagogies and intellectual communities. Serving as a student adviser who fully embraces our vision of apprenticeship will entail a shift in thinking and practice for many faculty members. Thinking about how to integrate practices takes time, energy and imagination. For example, presenting a scientific poster is as much an opportunity to teach as part of the research process, and feedback to students can explicitly focus on both. Fortunately, faculty members are smart and creative. Assuming the collective responsibility for student development, and serving as one of several co-mentors, requires the kinds of discussions and communication that are not part of current practice for most faculty. These can become commonplace as the result of individual faculty action coupled with enlightened departmental leadership. The same qualities of leadership, risk-taking, and willingness to try something unfamiliar are necessary to shifting of departmental culture to the more inclusive and knowledge-centered environment we envision.

At the same time we want to be clear that apprenticeship and intellectual community are not synonyms. The latter is not simply an aggregation of apprenticeship relationships. We see intellectual community as the culture and context. It is a fabric deliberately woven. It is a setting in which learning takes place. Apprenticeship, on the other hand, is a teaching and learning strategy, it is a form of pedagogy. They are reinforcing, but independent, ideas.

TWO CONCLUDING NOTES

Predictable Obstacles

We have already hinted at some of the predictable challenges and obstacles to implementing our vision. Two deserve particular attention, traditions of faculty autonomy and a lack of time.

Perhaps because of its individualized nature, and because it has been largely a private relationship, faculty members rarely discuss their philosophy or strategies of teaching or mentoring with one another. This is a lost opportunity for learning. Moving to our new vision of apprenticeship means directly challenging the norms of privacy and autonomy that mark advising relationships today.

Providing rewards will make it more likely that faculty members will turn their attention to improving their mentoring skills and habits. When faculty members invest in their relationships with their students it can have many intrinsic rewards, and often has instrumental payoff in research as well. But it rarely comes with public accolades or rewards. Shifting the culture around the advising will be easier if, as the National Academy of Sciences suggested, advising

programs were embedded "in institutional systems of rewards and promotions" (Committee on Science Engineering and Public Policy 1997, 66).

It can also be a challenge to publicly debate and defend one's vision of the purpose and mission of a department. Engaging in these discussions forces members of the department to invest in the community, intellectually and personally. By taking part in the collective responsibility for meeting the goals and expectations of a doctoral program, each member is committing to working together, sometimes in new ways.

These new ways can also take more time and energy. It is not easy to learn a new way of doing things, whether it is interacting differently with students, or co-constructing a curriculum. Academics are always overcommitted and rarely have time to think about things not directly related to their current scholarship. If things seem to be working reasonably well, it's hard to convince people to do things differently. Usually a crisis or external pressure forces that change. However, we argue that making change because it's right for the members of the community is a much better and healthier way to start something new.

We do not advocate change for change's sake. Too often, artificial or busy work masked as essential departmental work takes people away from other priorities. New ideas and practices must be authentic and the result of a shared vision for how things can be. The point is not simply to create occasions for their own sake but to be sure that these actually foster the intellectual and professional development of graduate students as stewards who can contribute to and learn from the many communities to which they belong. "It is easy enough to increase the number of venues and opportunities for intellectual exchange," one program team pointed out, "but how do we increase the intensity of the engagement with texts and ideas? It is easy enough to get people in a room to talk about their work to others, but how can we more deliberately foster intellectual identities and scholarly personae? Is doing more of the same going to produce a leap in quality?" These questions, posed by one of the CID participating departments, put the focus where it should be: on intellectual community as a means. Simply proliferating activities and structures wo not necessarily lead to greater intellectual engagement and development. Rather, these strategies must be linked to and evaluated in light of the outcomes they are intended to produce.

Why It Matters

Most doctoral students enter graduate school fired up with passion and idealism. Along the way, this seems to get pounded out of them. The positive side of this is that unrealistic and overly optimistic impressions of academic life are replaced by more realistic visions. The negative side is that the passionate zeal with which many began their studies is unnecessarily eroded. Surprisingly, faculty decry this

shift as much as students do. Faculty deplore the loss of passion and its replacement with technical competence. Whether or not there is a golden age to return to is not important to debate. But it is important to figure out how to help students maintain the passionate commitment which launched them into this life in the first place.

And then there are little lies and small betrayals which accumulate and compound and serve to discourage if not embitter far too many students. We argue for transparency, by which we mean that there ought to be far more conversations about mutual expectations. What can students expect of faculty? What do faculty expect of students? What can students expect in graduate school? What is the normal trajectory of development: how do students change, what will they experience? We do not suggest that every moment be preplanned and accounted for. Every person going through graduate studies is different. Every faculty member is unique. Each relationship and every community has its individual characteristics. But there is a general path which most students follow. Some doctoral programs seem to be organized solely for the benefit of the 2% of true geniuses who will pass through it, giving scant attention to the other 98%. This is hardly a desirable situation.

Writing this chapter affords us the opportunity to step back and critically examine the process and structures of doctoral education. We have done so in partnership with many dedicated faculty members and graduate students at the CID participating departments. We all continue to be surprised by how little scholarly and research attention has been turned to this important, albeit small, sector of higher education. It is almost impossible to explain to those who do not spend their days in academia that most institutions do not know what proportion of their doctoral students their complete studies, never mind having a good theory about why. Our inability to even document the normal practices of graduate education, wholly apart from a concerted effort to assess the effectiveness of conventional practice, is discomforting. Most of what we do when we educate students is emulate the practices of those who came before us and those who are around us. Lore and osmosis are two key pedagogical strategies. It should go without saying that they are insufficient.

In this chapter we have outlined two ideas—a reclaimed vision of apprenticeship and intellectual community—that we believe hold great promise for resolving some of the problems that face graduate education in United States today. Learning, as one prominent cognitive scientist notes, "is fundamentally social" (Wenger 1996, 3). By recommitting our doctoral programs to learning, and the formation of doctoral students as stewards of their discipline, we can achieve so much. We can create interdisciplinary solutions to complex problems facing our world. We can tackle the conundrums of doctoral student attrition and diversity. We can create communities that will make departments more competitive for

graduate students and new faculty. We can create doctoral programs in which more students arrive and develop to their full potential.

ENDNOTES

[1] The quotation comes from an essay commissioned for the Carnegie Initiative on the Doctorate (Cronon 2006). Essays on the future of doctoral education by leading scholars in each of six disciplines were commissioned at the start of the CID. William Cronon is the Frederick Jackson Turner Professor of History, Geography, and Environmental Studies at the University of Wisconsin Madison. The essays have been collected in "Envisioning the Future of Doctoral Education" (Golde and Walker 2006).

[2] A more detailed description of what we mean by the term "steward of the discipline" appears in Chapter 1 of "Envisioning the Future of Doctoral Education" (Golde 2006). We defined stewardship as encompassing a set of roles and skills, as well as a set of principles. The former ensures competence and the latter provides the moral compass. A Ph.D.-holder should be capable of *generating* new knowledge and defending knowledge claims against challenges and criticism; of *conserving* the most important ideas and findings that are a legacy of past and current work; and of *transforming* knowledge that has been generated and conserved by teaching well to a variety of audiences, including those outside formal classrooms. The label, "steward," is deliberately used to convey a role that transcends accomplishments and skills. It has an ethical and moral dimension. By adopting as a touchstone the care of the discipline, and understanding that one has been entrusted with that care by those in the field, on behalf of those in and beyond the discipline, the individual steward embraces a larger sense of purpose.

[3] For an excellent example of a product of that process, see the University of Nebraska mathematics department
http://gallery.carnegiefoundation.org/collections/cid/math/nebraska/cid_work.html

[4] Despite the similarities we are emphasizing in this chapter, we stressed strongly with each participating department the importance of tailoring their questions and responses to their local context. The CID chose not to be prescriptive, instead providing starting questions and a range of ideas shared across departments.

[5] The first two years we hosted one three-day convening for each discipline. In the summer of 2005 there were three cross-disciplinary convenings organized around one of three themes that have emerged as central to our analysis: developing effective teachers, developing researchers and scholars, and supporting intellectual community. Many participants attended more than one convening over the years. Although we wanted to share the excitement of convenings with as many people as possible, returning participants were great resources in subsequent convenings. In all, over 260 individuals participated in CID convenings: about 125 faculty members, 100 students, and 35 observers (knowledgeable individuals we invited to participate, such as graduate deans and heads of disciplinary societies).

[6] See, for example, the spring 2004 issue of peerReview, titled "Advancing the Conversation between Undergraduate and Graduate Education."

[7] They are explored in greater detail in the book we are currently writing, entitled "The Formation of Scholars: Doctoral Education for the 21st Century," scheduled to be published in 2007 by Jossey Bass.

[8] "Signature pedagogy" is a term coined by Carnegie's president Lee Shulman to describe "characteristic forms of teaching and learning... that organize the fundamental ways in which future practitioners are educated for their new professions" (Shulman 2005, 52). Examples of signature pedagogies include the case dialog method of teaching in law schools and bedside teaching on daily clinical rounds in medical education. Signature pedagogies are windows into the cultures of their fields because they incorporate into the operational acts of teaching and learning assumptions about how to teach knowledge and skills (such as how to think like a lawyer) and implicit assumptions about professional values (54-5). Signature pedagogies share three features: they are pervasive and routine; they entail public student performance; and "uncertainty, visibility, and accountability inevitably raise the emotional stakes of the pedagogical encounters" (56-7). Apprenticeship learning may not fully meet Shulman's definition of a true signature pedagogy, but it is pervasive and well understood.

[9] The term "elbow learning" is how the first president of Clark University, Dr. G. Stanley Hall, a noted psychologist, described students and faculty working side by side in research labs. Hall was revered among his students for his seminars, as well as creating a vibrant intellectual atmosphere in Clark's early years (Ryan 1939). One of the leading lights of early graduate education, Clark University (Worcester, MA) has not fulfilled that promise in more recent decades.

[10] In Golde's dissertation research on doctoral student attrition she found several cases of students who transferred from one university to another because they could no longer work with their advisor, and they felt there were no options for them locally (Golde 1996).

[11] A cogent critique was offered by Ronald G. Douglas, then Executive Vice President and Provost at Texas A&M University, at a Workshop on Actions for the Mathematical Sciences sponsored by the National Academy of Sciences. "For people who view the profession as a kind of priesthood, is appealing to reduce numbers by keeping out all but the most worthy. However, there might be several negative consequences to such an approach. First, there would be the terrible human waste of labeling a large group of our most talented people as failures and choking them out. ... Second, while Darwinian selection … [seems to be] a fair way to choose those who succeed, the playing field is often not as level as many would like to believe. In many cases, it's as though someone taught some of the animals how to use weapons and accepted the outcome of which animals survived as having been dictated by nature" (Board on Mathematical Sciences 1997, 43).

[12] Our conceptual framing draws heavily on the work by John Seeley Brown and his colleagues on cognitive apprenticeship. The term "cognitive apprenticeship" as distinct from traditional apprenticeship learning, draws attention to this as a strategy for solving

problems and carrying out complex cognitive tasks and developing expertise (Collins, Brown et al. 1989, 457). Their work has emphasized it is pedagogical strategies in the elementary grades, for teaching reading, writing and mathematics (Brown, Collins et al. 1989; Collins, Brown et al. 1989; Collins, Brown et al. 1991). Our colleagues at the Carnegie Foundation have found it useful for analyzing professional education. We believe is also applicable in doctoral education, and are extending it into that arena.

[13] For this chapter we have elected to use the term mentor, rather than advisor or teacher. Advisor is a formal role, and most doctoral students have an advisor. But the term advisor presupposes unidirectionality, it does not have room for reciprocity. Nor does it foreground student learning to the extent we desire. In the university context, teachers are relegated to classroom settings, and in doctoral studies, classroom learning is only a small subset of the teaching and learning venues.

Mentors play an advocacy role, and the term mentorship conveys sponsorship and support that extends beyond the years of graduate school. We were also drawn to the term mentor because popular usage assumes that anyone can, and perhaps should, have multiple mentors. The term also reminds us of the active role students take in identifying and cultivating mentors (this is often advocated as a compensatory strategy for those who may find themselves marginalized in an organization by virtue of their minority status). Mentorship is aligned with the idea of stewardship. It connotes the development of a person's complete professional identity, not limited to particular skills or tasks. The term implies affection and care, but, like stewardship, we associate it with high standards. It is not about being nice or friendly, but rather about setting the conditions that elicit high-quality work.

[14] The range of terminology across the disciplines is intriguing, and yet each word emphasizes hierarchy and control.

[15] Here we are also indebted to the work on communities of practice (Lave and Wenger 1991; Wenger 1998).

[16] Relatedly, there is a growing body of evidence the doctoral student attrition is mitigated when students are integrated quickly into the academic community of their department (Tinto 1993; Lovitts 2001; Golde 2005).

[17] Unfortunately this seems altogether too rare, Hartnett's survey of nine leading departments found that between only 6 and 35% of students agreed strongly with the statement said "this department has a humane environment characterized by mutual respect and concern between students and professors" (Hartnett 1976, 75).

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