Conceptual Approaches to Doctoral Education: A Community of Practice[1]

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Abstract

A silent paradigm shift has occurred in doctoral education. Preparing the next generation of PhDs to function successfully in and contribute to today's and tomorrow's global environment requires an approach that goes beyond conceptualizing an apprenticeship model and institutes *communities of practice,* which should include recognition of peers as learning partners. Coordinated efforts are also needed across many levels inside and outside the university. Because more is being asked of the next generation of researchers—in addition to the traditional academic research competencies, they now need professional skills as well as cultural competencies—what is required today at the PhD level is the kind of purposeful structuring that allows for transformative doctoral education.

Keywords: Globalization, knowledge economy, doctoral education, PhD research pedagogy, learning communities, peer learning partners

Introduction

Traditional concepts of doctoral education view the process of becoming a researcher according to an apprenticeship model, whereby a doctoral student learns from one master—the supervisor (Shulman 2004; Kwiram 2006). But a closer look at current practices in doctoral education (Nerad & Heggelund 2007) and at new empirical research (Flores 2011; Flores & Nerad 2012) indicates that apprenticeship, as the sole learning model, is too narrow an approach for today's PhD students to acquire the competencies they will need in order to become independent researchers in the twenty-first century. Therefore, a paradigm shift has been occurring at a number of doctoral programs around the world, a move away from the one-to-one, top down,

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master-to-apprentice learning approach and toward a structured learning process that takes place within a series of learning communities that operate at multiple levels inside and outside the university. A PhD candidate's fellow doctoral students—the candidate's peers, play particularly important roles in this process, often referred to as *research pedagogy* or *research learning* (Boud & Lee 2005; Flores & Nerad 2012). Future researchers need to conduct research in an ethical, responsible way that crosses disciplinary, national, and cultural boundaries as they strive to solve societal problems or undertake basic research with yet unknown applications.

Why do we need to expand our conceptual thinking about how we prepare our doctoral students? In this time of globalization, with its intensive national focus on innovation, the expectation among governments, research funding agencies, and science councils is for the next generation of PhDs to be innovators and intellectual risk takers. Researchers in the twenty-first century are expected to acquire the following competencies:

- Traditional academic research competencies for successfully undertaking and publishing research
- Professional competencies for ensuring effective dissemination and appropriate application of research findings in various settings inside and outside the university
- Cultural competencies for working with and functioning in multinational teams and settings

To paraphrase a Nigerian proverb—"It takes a village to educate a child"—I argue here that it takes a global village to develop tomorrow's PhDs, and this is especially the case in view of the economic and societal changes in today's labor market for highly trained professionals. It will take coordinated effort at many levels of universities and professional learning communities around the world to prepare the next generation of researchers. With the expanded approach of research learning, we have come to understand that effective research pedagogies are those that combine purposeful structure with maximum flexibility in the learning of true discovery.

But what do globalization and national policies for innovation have to do with doctoral education? And what does this kind of research pedagogy look like?

Globalization: The Context of Doctoral Education

In our efforts to prepare the next generation of PhDs, we need to accept that we live in a context of globalization, and that globalization affects universities as well as the preparation of researchers (Altbach 2009).

In the global economy today, knowledge is viewed as a critical national resource, and theories about the so-called knowledge economy are embraced by governments worldwide. These theories argue that knowledge is crucial to national economic growth and increased prosperity, and they identify the cause of economic growth as novel ideas leading to scientific, technical, organizational, environmental, or health innovations (Slaughter & Rhoades 2004). Innovations and technical changes are seen as the principal means of economic growth and sustained international competitiveness. As theories about the knowledge economy spread around the world, national governments in many places are turning to master's programs, doctoral education, and postdoctoral preparation as a way of educating scientific and technical innovators. Postgraduate education and academic research are now global endeavors; not just nations but also supranational organizations, such as the United Nations (UNESCO) (Meek, Teichler, Kearney 2009), the European Union (Kehm, Huisman, Stensaker 2009), and the World Bank (Bourguignon, Elkanan, Pleskovic 2007), are developing policies to enhance the contributions of doctoral education to national and regional economic growth.

In the context of hope for economic growth and national capacity building, governments are allocating substantial funds to increase the research and development capacities of their countries. The education of high-quality researchers who are able to bring innovative changes to their workplaces, be these in business, government, academe, or nonprofit settings, is increasingly considered to be an aspect of research and development activities and is included in national innovation policies. It is believed, and empirical evidence now suggests, that the economic and social development of a nation is influenced not only by the supply of highly skilled people but also by how widely academic knowledge is disseminated (Dill & van Vught 2010). Or, to put this idea differently, new knowledge must be effectively disseminated and absorbed if innovations and economic growth are to proceed from it. With regard to this approach, the number of researchers has to increase, and the type of education they receive has to be rethought.

Effects on Doctoral Education and Postdoctoral Training

Globalization is having an effect on doctoral education all over the world, as seen in the following developments:

1. There has been an increase in PhD production. More women, international doctoral students, part-time students, and older students are pursuing the doctoral degree. The result for doctoral education is that universities now have to educate a more diverse group of researchers.
2. Given the new innovation policies, education and research training are increasingly organized according to a problem-solving approach that uses multidisciplinary teams and includes participants from various sectors of society. This introduces into doctoral education a form of knowledge production that has become known as *Mode 2,* by contrast with Mode 1, the traditional way of learning from one master scholar within one discipline (Gibbons et al. 1994). In Mode 2, not only does research operate on the basis of its transdisciplinary application but the process also involves multiple actors (universities, industry, business, and governments—think of the many research triangles, such as Silicon Valley and Stanford University, or the Food Valley around the University of Wageningen in the Netherlands, which focuses on food and healthful living). Knowledge production is becoming more socially accountable and, as a consequence, an emphasis on translational research has emerged (Feldman 2008; Woolf 2008), which means that the research process does not stop at basic research findings but also translates basic findings into applications that respond to societal or business needs.
3. New research PhDs are now expected not only to know how to do research but also to be competent writers, speakers, managers, and team members who can communicate research goals and results effectively inside and outside the university. These competences are called professional or transferable skills in North America, and generic skills in the

United Kingdom and Australia. I call them translational skills, since they are not only transferable from academic to nonacademic settings but also are necessary to the translation of research findings into societal applications. The result for research education is that the preparation of doctoral and postdoctoral candidates (early-career researchers, or ECRs) needs to impart many more competencies than the traditional academic ones (Harman 2008; Manathunga 2009; Nerad 2004).

4. There is a worldwide increase in the standardization of doctoral education. Many universities offer more structured programs with clear, selective admission criteria, transparent benchmarks in the form of exams, and panels of advisors, to name just a few trends (Nerad & Heggelund 2008). Standardization in these areas allows for greater mobility among researchers both during and after their education.
5. Another effect of governments' and private funders' greater investments in higher education is greater accountability. As a result, new researchers need to have good project-management skills, including the ability to manage people and budgets and demonstrate effective use of funds.
6. Communication across vast regions, spurred by technological innovation, has become easier, faster, and more widespread. As a result, scholarly networks are flourishing and are actively supported by governmental agencies (research councils, for example) and by international parties such as UNESCO, the World Bank, and the European Union. Researchers need to learn to work in international teams.
7. Higher education is responding to market forces faster than ever before, and this development places additional competitive pressure on the research enterprise (Nerad 2010).
8. Higher education, having become commercial, generates revenue. The academic degree has become a commodity that has value beyond pure knowledge production. This means that there is worldwide competition, at least among those states that permit collection of fees, for doctoral students as a source of revenue.

National governments have responded to these developments in doctoral education. They have established research training schemes, invited industrial participation in national efforts to evaluate the PhD, established doctoral "sandwich" programs that exchange doctoral candidates as well as professors, and established major national grants that foster innovation, interdisciplinarity, and theme orientation in doctoral programs.

Governments, eager to attract investment in the new industries and homegrown Silicon Valleys that they hope will emerge from research findings, also cite the number of their academic institutions listed among the top one or two hundred world-class universities in the Shanghai Jiang Tong University rankings or in the rankings of the *London Times* educational supplement (Salmi 2009). Thus governments are speculating that world-class research universities will transfer knowledge to local organizations, and especially to industry.

Particular Challenges of Globalization

Do these developments present challenges for doctoral education? Of course. English has become the lingua franca of scholarship, and many scholarly journals are in English, and this fact entails one clear set of challenges. In addition, because universities all over the world want and need to prepare their domestic students for participation in the international scholarly community, and because these universities want to attract international students, universities everywhere are now offering doctoral education in English—an advantage to a country's PhD students that simultaneously has the effect of creating even further distance between science and research, on the one hand, and local populations, on the other.

For some countries, the internationalization of doctoral training represents "brain drain"; for others, "brain gain." From a longer-term perspective, this phenomenon is spoken of in terms of "brain circulation" as students return to their home countries, perhaps after a decade abroad, particularly when the home country's economic situation has improved or when it becomes possible to build scientific collaborations at home.

The New Competencies: Toward a Common Definition

We have seen that more competencies are being demanded from the next generation of researchers. Can we find agreement on what these competencies are?

A group of experts from the Forces and Forms of Change in Doctoral Education Worldwide Network, organized and coordinated by the Center for Innovation and Research in Graduate Education (CIRGE, www.cirge.washington.edu), which I founded and direct, investigated this question and found agreement on three points (Bernstein et al. n.d.):

1. The holder of a research doctorate must contribute to knowledge through original research.
2. The holder of a research doctorate must have substantial knowledge in his or her area of study.
3. Training for the research doctorate should include the development of transferable and translational competencies.

Or, to state these ideas differently, the holder of a research PhD must have the following skills and competencies:

1. *Traditional skills and competencies*. These skills and competencies include in-depth knowledge of the researcher's field, knowledge about the development of conceptual frameworks and research designs, knowledge about the application of appropriate research methods, and skill in writing about and publishing research findings. Also important here are critical thinking, analysis, synthesis, research integrity, and ethical conduct of research.
2. *Professional competencies.* As mentioned earlier, the next generation of researchers will need to be able to communicate complex research findings to diverse audiences; work in multi-, trans-, or interdisciplinary teams; write grants; apply knowledge in commercially viable, socially responsible ways; manage people and budgets; and take on leadership roles in complex organizations (Bartelse & Huisman 2008; Nerad 2008; Bernstein et al. n.d.).
3. *Cultural competencies*. The next generation of researchers will need competencies that are pertinent to effective collaboration in international teams dedicated to solving societal problems in multinational settings.

Major Conceptual Approaches to Doctoral Education

How will we turn doctoral candidates into independent researchers who possess these three sets of competencies? We will need to link these competencies with doctoral education's approaches to learning.

The Apprenticeship Model: A One-to-One Approach

The oldest and most widely accepted approach to doctoral training is the apprenticeship model, which a recent Carnegie study called the "signature pedagogy" of PhD education (Walker et al. 2008). In this model, teaching and learning take place in a one-to-one arrangement between a doctoral candidate and a professor. In other words, a master passes knowledge on to an apprentice. But is the master always available? And is the master necessarily the person who knows the most about passing on the additional competencies that will be needed by the next generation of researchers?

Professional Socialization: A Top-Down Approach

In the developmental model of professional socialization, the PhD candidate moves in stages from being a knowledge consumer to becoming a knowledge producer, from the status of novice to that of junior colleague (Bieber & Worley 2006). This is the process by which the student learns and adopts the values, skills, attitudes, norms, culture, and knowledge of a discipline (Merton 1957; Van Maanen 1976; Tierney 1996; Tinto 1997; Weidman & Stein 2003). The model of professional socialization is criticized as a top-down, rigid approach that sees the doctoral candidate as an empty vessel into which information is poured, regardless of who the candidate is and regardless of what the candidate brings to the process (see Flores 2011). This model also ignores the larger environmental context in which doctoral education takes place.

The Community of Practice: An Approach That Widens the Perspective

In the late 1980s, scholars like Resnick (1987) and Lave and Wenger (1988) challenged the assumption that learning is an individualized process, independent of context. They proposed a theory of situated learning, one that viewed learning as a function of the activity, context, and culture in which learning is situated (Lave 1988). They found that newcomers became

integrated into a "community of practice" by acquiring knowledge and skills from experts through participation in everyday activities. The new participants gradually moved from the periphery to the center of the community, as shown by their taking on more complex tasks and assuming greater responsibility for outcomes.

Mentoring: The Panacea?

Professors' mentoring of their doctoral candidates seems to have become the remedy for all the ills of doctoral education, at least in the United States, the United Kingdom, and Australia. If professors would just be better mentors, the reasoning goes, all the problems would disappear. This is an individualistic approach, and it puts the entire burden of a candidate's doctoral education and preparation on the shoulders of one person. It is wonderful, of course, when professors improve as mentors, but in today's world, with so many competing demands on professors, we cannot afford to rely exclusively on this approach.

The "Global Village" Approach to Doctoral Education

Effective preparation of the next generation of researchers will require coordinated efforts at many levels among universities, national and international funding agencies, and learning communities. In other words, to ensure that future researchers are trained for tomorrow's tasks, we need to combine the work of imparting traditional, professional, and cultural competencies with the use of conceptual learning models that encompass the entire learning context, including its various learning communities. This is what I call the "global village" approach. It spans five levels of learning communities, all operating with different learning models and in different learning environments:

1. At the *grassroots* level, by way of the apprenticeship model, professors pass traditional academic research skills on to PhD candidates. This type of preparation takes place in seminars or in weekly lab meetings, during advising hours.
2. At the *departmental* level—within an institute, or in a laboratory that forms the setting for a community of practice—the professional competencies pertaining to a discipline are taught by way of programs and professional development

workshops as well as through social community-building activities. In these ways, novice researchers have opportunities to become junior colleagues.

3. At the level of *formal and informal activities,* by way of cohort-based models, PhD candidates come together with their fellow students—their peers, or learning partners—both to provide emotional support and to share specific content knowledge as well as advice regarding one another's studies. In this model, the institution or academic program is organized around a group of students who enter the program at the same time, get to know each other, and move together along a similar path. Thus the students in a cohort learn from one another's different types and levels of expertise, study new subjects together, and form study groups outside the official program (Flores & Nerad 2012). The creation of a shared workspace for doctoral students at a university facilitates many forms of informal learning whereby students exchange information about resources, prepare together for exams, and help each other develop and pursue their research. This type of peer-to-peer learning is distinct from faculty-to-student learning. It takes a horizontal rather than top-down approach and has its basis in reciprocity. When students are interacting, they are like colleagues who learn from each other—a model that Flores and Nerad (2012) conceptualize as a *learning partnership* approach.
4. At the level of the *central graduate school,* in the typical US model, PhD students learn to teach. They also attend workshops to acquire the skills of professional researchers, and they have opportunities to benefit from the developmental offerings of career centers. Graduate schools also provide training in intercultural awareness to early-career researchers before they leave their home countries and to international scholars when they arrive in their host countries. This is also the level where postdoctoral networks are created and fostered.
5. At the level of the *global village*—encompassing national academic meetings, international conferences and

> collaborations, joint degree programs, and other activities and arrangements that require coordinated effort both within and beyond the boundaries of a single academic institution—doctoral students acquire professional socialization and additional discipline-specific values and traditions. As they participate in professional gatherings and interact with researchers from different countries, they also acquire cultural competencies.

For examples of the "global village" approach in action, we need look no farther than the United States, Germany, Australia, the Netherlands, and the European Union (through its Madame Curie program for Initial Training Networks), where governments have sponsored multiyear grants requiring innovative, interdisciplinary, theme-oriented doctoral education that purposefully structures the learning process within a multitude of learning communities that apply a variety of learning approaches. In the United States, these initiatives are administered through the Integrated Graduate Education Research Training (IGERT) program or, with even more international emphasis, the Partnership for International Research and Education (PIRE) program and are funded by the National Science Foundation or by equivalent programs of the National Institutes of Health. In Germany, *Graduiertenkollegs* are funded by the German Research Council, and under the German Excellence Initiative there has also been special emphasis on and funding support since 2005 for an umbrella graduate school. In Australia, where these governmental initiatives are called Collaborative Research Centers (Nerad 2010; Harman 2008; Manathunga & Pitt 2009; Kehm 2008), the funded programs are required to give doctoral students opportunities for networking with professionals in their fields who work outside academia and to ensure that PhD candidates acquire the necessary professional skills (such as working and communicating in interdisciplinary teams, learning team approaches to teaching, and writing and managing grants). In addition, because funding for these programs is tied to how much emphasis they place on the learning environment and to how well they build learning communities, the programs increasingly incorporate collaboration with peers from other countries.

Conclusion

Because researchers are increasingly required to cross disciplinary, national, institutional, and cultural boundaries, doctoral education must take place in multiple environments, and within a number of learning communities. This type of expanded doctoral education must be structured in such a way that the doctoral student comes to join a community of practice, which may include the traditional apprenticeship approach, department-level activities for professional socialization, formal and informal partnerships for peer learning, skills-oriented workshops in central (post)graduate schools, and learning acquired by way of national and international conferences and multicultural learning communities. The "global village" approach to doctoral education will give the next generation of PhD students greater opportunities than earlier generations enjoyed to acquire academic, professional, and cultural competencies, and to succeed in taking on the type of intellectually challenging research that can lead to societal transformation (Nerad & Rudd 2009).

Until now, the typical PhD program has prepared the doctoral student for nothing more than research and writing as a lonely scholar in a purely disciplinary context, but that type of preparation is no longer adequate for many research careers (Nerad et al. 2008). As graduate educators, we need to accept the idea that it takes more than a single professor or mentor to develop a competent researcher. It takes a global village.

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