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

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Abstract
A paradigm shift has silently evolved in doctoral education. Preparing the next generation of PhDs to function successfully and contribute to today and tomorrow's global world requires to go beyond the conceptualization of an apprenticeship model to that of a communities of practice including the recognition of peers as learning partners. It also requires coordinated efforts of many levels inside and outside a university. More is asked from the next generation of researchers: traditional academic research competencies, professional skills, and intercultural competencies. Learning at the doctoral level needs to be purposefully structured to allow for transformative doctoral education.

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

1. Introduction
Traditional concepts of doctoral education view the learning process of becoming a researcher as that of an apprenticeship, where doctoral students learn from one master, their supervisor (Shulman 2004; Kwiram 2006). A closer look at current practices at doctoral education (Nerad & Heggelund 2007) and new empirical research (Flores 2011; and Flores & Nerad 2012) indicates that a sole apprenticeship learning concept is too narrow to acquire the competencies needed for becoming an independent researcher in the 21

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century. A paradigm shift has occurred and is happening at a number of doctoral programs around the world; a shift away from a sole one–to-one top-down master to apprentice learning approach to a structured doctoral learning process within series of learning communities that operate at multiple levels inside and outside a university. Fellow doctoral students -- the peers -- play particular important roles in this process which is often referred to research pedagogy (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 of how we prepare our doctoral students?

In our times of globalization and intensive national foci on innovation, governments, research funding agencies, and science councils expect that the next generation of doctorates become innovators and intellectual risk takers. Researchers for the 21century are expected to acquire:

- not only the traditional academic research competencies of successfully undertaking research and publishing it,
- but in addition, acquire professional competencies that assure effective dissemination and appropriate application of their research findings in various settings inside and outside the universities; and
- acquire cultural competencies that allow them to work with, and function in, multi-national teams and settings.

Accepting the economic and societal changes in the labor market of highly trained professionals, I argue it takes a global village – to paraphrase the Nigerian proverb, 'it takes a village to educate a child' – to develop tomorrow's doctorates. It takes the coordinated efforts of many levels of a university, and the international professional learning communities to effectively prepare the next generation of researchers. In this expanded approach of research learning we have come to understand that effective research pedagogies are those that *purposefully structure* with maximum flexibility the learning of true discovery.

What have globalization and national innovation policies to do with doctoral education? How does such research learning look like?

2. Globalization Context

In our efforts to prepare the next generation of doctorates we need to accept that we live in the context of globalization and globalization effects universities and the preparation of researchers (Altbach 2009).

In the global economy today, knowledge is viewed as a critical resource for nations. Economic theories of the knowledge economy are embraced by governments worldwide. These theories argue that knowledge is crucial to national economic growth and increased prosperity. Theories of the 'knowledge economy' locate 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 sustaining international competitiveness. As the knowledge economy theory has spread around the world, national governments in many places have turned 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 endeavours and not only nations, but also supranational organizations such as the United Nations (UNESCO) (Meek, Teichler, Kearney 2009), the European Union (EU) (Kehm, Huisman, Stensaker 2009), or World Bank (Bourguignon, Elkanan, Pleskovic 2007) are developing policies to enhance the contribution of doctoral education to national and regional economic growth.

Within 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 non–profit sectors, is increasingly considered part of research and development activities and included in national innovation policies. It is believed, and empirical evidence now suggests, that not only the supply of highly skilled people, but also how widely academic knowledge is disseminated has an influence on the economic and social development of a nation (Dill & van Vught 2010). Or, put 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.

2.1 Effects of Globalization on Doctoral Education and Postdoctoral Training

Globalization has an effect on doctoral education worldwide. We can observe worldwide:

1) An increase in PhD production. More women, more international doctoral students, more part-time, more older doctoral candidates are pursuing doctoral degree. The effects on doctoral education are that universities have to educate a more diverse group of researchers.

2) Given the new innovation policies, increasingly education and research training is organized with a problem solving approach, using multi-disciplinary teams, and including participants from various sectors of society. This brings into doctoral education a form of knowledge production that has become known as 'Mode 2' in contrast to 'Mode 1', the traditional way of learning from one master scholar within one discipline (Gibbons *et al.* 1994). In Mode 2, research not only operates around application in a trans-disciplinary mode, but the process also involves multiple actors: universities, industry, business, and governments (think of the many research triangles – Silicon Valley and Stanford University, and the Food Valley around the University of Wageningen in the Netherlands which focuses on food and health living). Knowledge production is becoming more socially accountable and, as a consequence, an emphasis on translational research has emerged (Feldman 2008; Woolf 2008). This means that the research process does not stop at basic research findings but translates the basic findings into applications that respond to societal or business needs.

3) Consequently, new research doctorates are expected to not only know how to do the research, but 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', as these skills are not only transferable from academic to non-academic settings, but are also necessary to translate research findings into societal applications. The effects on research education are that the preparation of doctorate candidates and postdocs (Early Career Researchers-ECR) need to include many more competencies beyond the traditional academic ones (Harman 2008; Manathunga 2009; Nerad 2004).

4) We see worldwide an increase in standardization of doctoral education. Many universities offer more structured programs, with clear, selective admission criteria, transparent benchmarks of exams, a panel of advisors to name a few (Nerad & Heggelund 2008). The standardization of these trends allow a greater mobility during and after education of researchers.

5) Another effect of more investment into higher education by governments and private funders is a greater accountability. This means the new researchers need to have good project management skills including managing people and budgets to be able to demonstrate effective use of funds.

6) Spurred by technological innovation, communication across vast spaces is easier, faster, and more widespread. As a result, scholarly networks are flourishing and are actively supported by governmental agencies (Research Councils), and international agencies such as UNESCO, World Bank, EU. Researchers need to learn to collaborate in international teams.

7) Higher education is responding to market forces faster than before. This creates more competitive pressure on the research enterprise (Nerad 2010).

8) Higher education has become commercial and generates revenue. The degree has become a commodity that has value beyond pure knowledge production. This means there is a worldwide competition for doctoral students as a source of revenue (for those states that allow collection of fees).

National governments have responded to globalization. They established research training schemes, invited industrial representation on national PhD evaluations efforts, established doctoral sandwich programs that exchange both doctoral candidates and professors, and established major national grants that foster innovation, interdisciplinarity, and theme-orientation in doctoral programs.

Governments also cite the number of their national universities that are among the top 100 or 200 world class universities of the Shanghai Jiang Tong University ranking, or of the London Times, Educational supplement ranking (Salmi 2009), as they hope to attract investment into new industries developed from research findings. Hopes of new Silicon Valleys that benefit from the connection to major research universities are envisioned. This means governments speculate that a world-class research university will transfer knowledge to local organizations and particularly to industries.

2.2 Particular Challenges for Doctoral Education

Do these developments cause challenges for doctoral education? Of course. The fact that English has become the current lingua franca of scholarship, and many scholarly journals are in English, brings challenges. Because universities want and need to prepare their domestic students for participation in the international scholarly community and they want to attract international students, they offer doctoral education in English. This, on the other hand, further distances science and research from the local populations.

Attracting international students means brain drain for some countries, for others it is brain gain. Viewed in a longer term perspective this phenomenon is talked about as brain circulation, as former international students return to their home countries perhaps a decade later, and invest in their and, particularly when the economic situations of their countries improved, or their can build valuable scientific collaborations.

3. More is Asked from the Next Generation

We have seen that more competencies are asked from the next generation of researchers.

Can we find agreement on what these competencies are?

3.1 Common Definition

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

- a research doctorate must contribute to knowledge through original research;
- a research doctorate must have a substantial knowledge in their area of study;
- and research doctorate training should include the development of transferable and translational competencies.

Or said differently, a PhD must have:

1) *Traditional research skills*. These skills include in-depth knowledge of one field, knowing how to develop conceptual frameworks and research design, knowing of and applying appropriate research methods, and writing and publishing one's findings. They also include of course critical thinking, analyzing, and synthesizing skills.
   This also includes learning to conduct research with integrity in an ethical manner.

2) *Professional competencies*. As explained, the new generation of researchers need professional competencies. They 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 2008a; Bernstein *et al*. n.d.).

3) *Cultural competencies working in multi-national settings.* And the preparation of the next generation of PhDs needs to include multi-cultural competencies in order to be able to work collaboratively in international teams on solving societal problems in multi-national settings.

4. Conceptual Approaches to the Development of Doctoral Students

How do we turn doctoral candidates into independent researchers who possess these three sets of competencies? This means we need to link the research competencies with the learning approaches in doctoral education.

a) Apprenticeship Model – A One-to-one Approach

The oldest and most widely accepted approach is the apprenticeship model, called the 'signature pedagogy' of doctoral education, in a recent Carnegie study. (Walker *et al.* 2008). Under the apprenticeship model, teaching and learning takes place in a one-to-one apprenticeship between doctoral candidate and professor. The master passes on this knowledge to the apprentice. But is the master always around and the best person who knows how to pass on all the additional competencies?

b) Professional Socialization

Another conceptual learning model is a developmental model of professional socialization. The PhD candidate moves in stages from a knowledge consumer to a knowledge producer, from novice to junior colleague (Bieber & Worley 2006). Professional socialization is the process through which one learns and adopts the values, skills, attitudes, norms, culture and knowledge of one's disciplines (Merton 1957; Van Maanen 1976; Tierney 1996; Tinto 1997; Weidman & Stein 2003). The professional socialization concept is criticized as being a top down, rigid approach where the doctoral candidate is seen as an open vessel where information is poured in, regardless who the candidates are and regardless of what she or he brings to the process (see also Flores 2011). This model also ignores the larger environmental context in which doctoral education takes place.

c) Community of Practice – Widens the Perspective

In the late 1980's 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 which viewed learning as a function of the

activity, context, and culture in which it is situated (Lave 1988). They found that newcomers became part of a 'community of practice' by gradually acquiring knowledge and skills from experts by participating in everyday activities. The new participants would move from the periphery to the center of the community as evidenced by them taking on more complex tasks and assuming greater responsibility for outcomes.

d) Mentoring - the panacea for everything?
    At least in the US, UK, and Australia mentoring by professors of their doctoral candidates seems to have become the panacea/remedy for all ills in doctoral education. If professors would just better mentor, all problems would be gone. This is an individualistic approach and puts the entire burden of the education and preparation on the shoulders of one person.
    It is great when all professors become better mentors, but we cannot afford to rely solely on this approach in today's world with multiple demands on professors.
    Therefore the doctoral education needs to broaden its approach.

e) 'It takes a global village' to develop the next generation of researchers in our universities, using the Nigerian proverb – 'it takes a village to educate a child'. It takes the coordinated efforts of many levels of a university, national and international funding agency within several leaning communities to effectively prepare the next generation of researchers.

Global Village Approach

Combining the three sets of skills described above that are needed by tomorrow's researchers with conceptual learning models that include the entire learning context and the various learning communities at play, will assure that the new doctorate researchers are effectively trained for tomorrow's tasks. The 'Global Village Approach', spans five levels of learning communities operating with different learning model and different learning environments:

1) At the grass-root level, the professor passes on to the PhD candidate via the *apprenticeship approach* the traditional academic research skills. This is done in seminars, or in weekly lab meeting, during advising hours.

2) At the department level, in an institute, and laboratory in a *community of practice approach* disciplinary professional competencies are taught through programs and professional development workshops, as well as social community building activities. In this way, the novice researcher can become a junior colleague.

3) In formal and informal activities fellow students come together and not only provide emotional support and pass on advice for each other' studies, but also provide specific content knowledge. Peers are learning partners in cohort-based models. This means institutions or academic programs are organized around a group of students who enter a program at the same time, get to know each other, and move together through a similar path. For example, students in a cohort learn from each other's different expertise, study new subjects, and form study groups outside of the official program (Flores & Nerad 2012). Sharing common workspace among doctoral students at the university allows for many forms of informal peer learning, where students exchange information about existing resources, prepare together for exams, and assist each other in the development and pursuit of their research. This peer-to-peer learning is distinct from faculty to student learning. It operates in a *horizontal learning approach* and is based on reciprocity. When interacting, students are like colleagues who learn from each other which Flores and Nerad conceptualizes as a *learning partnership* approach (2012).

4) At the fourth level, at the central graduate school (US model) professional competencies and multi-cultural awareness are passed on in several learning communities. Included are:
   • Career development (career center);
   • Learning of teaching;

- Professional skills workshops;
- Intercultural awareness training before Early Career Researchers leave their home country and for international scholars when they arrive at their host country; and
- Creating and fostering postdoctoral networks.

5) And lastly the global village approach requires a coordinated effort beyond the university. At national and international academic meetings, doctoral students receive professional socialization and acquire more disciplinary academic values and traditions. Participating at international conferences and interacting with researchers from other countries and cultures in international collaborations or joined degree programs, they acquire multi-cultural competencies.

Are there examples of doctoral education where it is purposefully organized in multiple learning communities applying a variety of learning approaches?

5. Examples of the 'Global Village Approach' in Action

Governments in the US, in Germany, in Australia, the Netherlands, and the European Union in the Madame Curie program, the ITN (Initial Training Network) have sponsored multi-year grant programs that ask for innovative, interdisciplina*ry, theme-oriented doctoral pro*grams that have to purposefully structure the doctoral research learning process to take place within a multitude of learning communities applying a variety of learning approaches.

In the US these programs are called 'Integrated Graduate Education Research Training' (IGERT) program or with even more international emphasis, the PIRE program (Partnership for International Research and Education Program) and are funded by the National Science Foundation or equivalent programs of the National Institute of Health. In Germany such grant programs, are called *Graduiertenkollegs* and are funded by the German Research Council. Since 2005 within the German Excellence Initiative, the idea of an umbrella Graduate School are specially advanced and funded. In Australia, these governmemental initiatives are called 'Collaborative Research

Centers' (CRC) (Nerad 2010; Harman 2008; Manathunga & Pitt 2009; Kehm 2008). The programs must provide access for doctoral students to network with professionals in their field who work outside academia. Further, these programs must assure that doctoral candidates acquire the necessary professional skills such as working and communicating in interdisciplinary teams, learn team teaching, grant writing and grant management. Further in order to get funded, these programs must place an emphasis on the learning environment and on building a learning community. Increasingly these programs include international collaboration with peers from other countries who are working on the same topic.

6. Conclusion

Researchers today must cross disciplinary, national, institutional, and cultural boundaries. Doctoral education must to take place in multiple environments within a number of learning communities. Such expanded doctoral education is structured so that doctoral students become a part of a community of practice that includes the traditional supervisor professor/student apprenticeship approach, departmental professional socialization activities, formal and informal peer learning partnerships, skills workshops in central (post)Graduate Schools, and learning in national and international conferences and multi-cultural international learning communities. In a community of practice approach, or 'global village approach', the next generation of doctorate students will more readily acquire academic, professional and multi-cultural competencies and succeed in taking on intellectual challenging research that may lead to societal transformation (Nerad & Rudd 2009). We need to accept that it takes more than the one professor or mentor, but a global village to develop the next generation of competent researchers.

> PhD programs that prepare students only for research and writing as lonely scholars in purely disciplinary context are providing inadequate preparation for many research careers (Nerad *et al.* 2008).

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