# Novice Physician-scientists' Learning in Communities of Practice

Min-fen Wang

Lori L. Bakken

## Recommended Citation

# Novice Physician-scientists' Learning in Communities of Practice

Min-fen Wang and Lori L. Bakken

Keywords: Physician-scientist, learning clinical research, community of practice, professional development, workplace learning

**Abstract:** This study drew from sociocultural theory to understand novice physician-scientists' (PSs) clinical research learning experience in the workplaces. The findings suggest that there are various forms of research participation marginalized in the PS-communities. The structural dimension of workplace learning context, such as gender, culture, power, and access needs more attention.

## Research Purpose

The numbers of physician-scientists (PSs) who conduct patient-oriented (i.e., clinical) research (CR) are declining; thus, public health care and research is in serious jeopardy (Shine, 1998; Rosenberg, 1999; Nathan, 1998, 2002; Nathan & Harold, 2000; Nathan, Fontanarosa, & Wilson, 2001;Wolf, 2002). In order to determine how to attract more physicians to CR careers and direct educational interventions effectively, this qualitative study used a sociocultural learning perspective, with particular emphasis on learning as "legitimate peripheral participation" (LPP) in "communities of practice" (CoP)[9] (Lave & Wenger, 1991; Wenger, 1998; Wenger, McDermott & Snyder, 2002) as a theoretical framework for the main research question: "How do physicians become physician-scientists?"

This study explored how novice PSs learn the practice of CR and evolve PS identities in the context of providing health-care service, performing CR in the workplace, attending a post graduate-level CR training program, and managing personal life. The research findings enhance our understanding of the interaction of personal and contextual forces in PSs' early research learning development. The implications are useful for educators of CR training programs, planners and policy-makers in designing effective learning activities to assist novice PSs in a transition from clinicians to clinical researchers. The enhanced quality of curriculum and instructional design will likely lead to expanded recruitment and persistence of more physicians, especially women and international physicians, in CR careers (Kelley & Randolph, 1994).

## Theoretical Framework

Lave (1993) considered learning not as a process of internalization of knowledge by individuals, but as a process of becoming a member of a sustained CoP. This study paid attention to sociocultural context, activities, and tools to understand how adult learners discover, shape and make explicit their own knowledge and take ownership (Hansman & Wilson, 2002).

CoP assumes that engagement in social practice is the fundamental process by which we learn and, so, become who we are (Wenger, 1998). "CoP" places learning in the context of our lived experience of participation in the world. A CoP has three essential components: "a domain of knowledge, which define a set of issues; a community of people who care about this domain;

---

[9] The term *"CoP"* means "communities of practice", a plural form. The term *"a CoP"* means singular "community of practice".

and the shared practice that they are developing to be effective in their domain" (Wenger et al., 2002, p. 27). For individuals, "learning is an issue of engaging in and contributing to the practices of their communities" (Wenger et al., 2002,p.7). This theoretical framework provides a lens to view novice PS's CR learning as a process of gradually evolving a PS identity and developing belongingness to global PS-communities[10]. "CoP" here refers to groups of clinical researchers who share a concern, a set of problems, or a passion about CR and who deepen their knowledge and expertise in CR by interacting on an ongoing basis. "LPP in CoP" concerns the process by which newcomers become part of a community of practice.

## Research Design

In order to uncover the developmental nature of becoming a PS, a basic interpretive qualitative research approach (Merriam, 2002) was used to explore how novice PSs construct the meaning of their research learning experiences. Through purposeful sampling from two institutions in the Midwest, the learning experiences of 15 participants who have various levels of engagement in CR activities formed a continuum of novice PSs' early stages of CR learning development. The levels of 15 participants' research experiences were grouped by advanced (n=4), progressive (n=8), and entrance (n=3) according to their publication records, grant application experiences and participation in ongoing research activities. Maximum variation was used in an effort to include eight women and seven men at two institutions and to draw from various positions, including one fellow, three clinical instructors, nine assistant professors, and two associate professors.

This study focused on participants' retrospective perspectives on how they began to learn CR, what research activities they have done, with whom they interact in their current CR communities, and how they interact with contextual forces. Two 60-minute face-to-face interviews were conducted with each participant over one to two month intervals. During the first interview, each participant was asked to draw a "CR-community" to identify key individuals and groups involved with his/her CR learning. The data collection time period was from July to November 2004. All interviews were audiotaped, transcribed verbatim, and than analyzed.

## Data Analysis

Multiple data analysis techniques were used. The analyses began with open coding as described by Strauss and Corbin (1990). Immersion/crystallization (I/C) data analysis procedures (Brokan, 1999) were followed as the researcher committed substantial time and mental energy to read, reread, and immerse herself in the data. In the second and third layers of data analysis, an "editing" approach (Mill & Crabtree, 1999) was adopted to construct a linear learning autobiography for each participant. At this stage, the CoP theoretical framework was introduced to analyze the learning autobiography texts. 15 research participants were divided into five sub-groups generally according to the level of their research learning as well as academic position titles. Main themes began to emerge within sub-groups and a "central organizing theme" (Addison, 1999) for interpreting how participants evolve PS identities was discovered as "forming multimembership" to integrate the 15 cases as a whole. The fifth layer of data analysis was to write 15 mini learning biographies in which a central organizing theme for interpreting how participants learn in practice emerged as "building a CoP spanning boundaries". For each

---

[10] The term *"global PS-communities"* indicates broader communities of physician-scientists in a general sense.

case study, the theoretical concepts — "domain, community, and practice"—were applied to find out how participants' perceptions of their participation in CR-communities reflect Wenger's theoretical concepts and what perceived barriers and supports the participants had to form their own CR-communities. The researcher, then, brought in other theoretical concepts—three modes of belonging, "engagement, imagination and alignment" (Wenger, 1998), to analyze how their local research participation experiences shaped their belongingness to global PS communities.

## Findings

This paper presents findings focusing on the interplay of participants' participating in local CR-communities and developing a full PS identity (i.e., belongingness) in global PS communities.
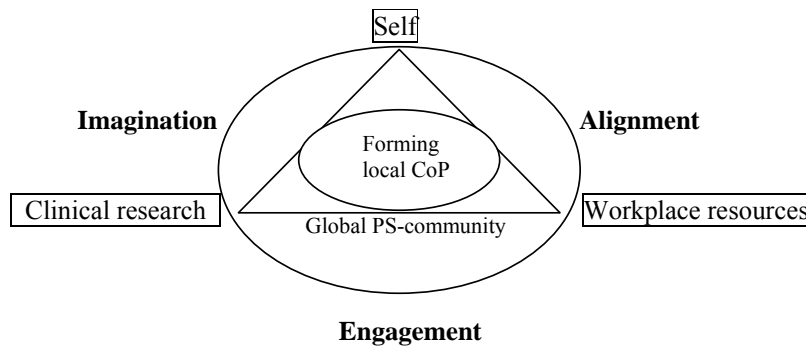
### Building a Community of Practice Spanning Boundaries

*Learning in practice—apprenticeship.* As a form of apprenticeship, participants' research learning and work were seamlessly related. That is to say, their research learning is embedded in their academic career development. Novice PSs are expected to be more like a research producer than a research learner in the workplace. Most participants' research learning was through participating in research projects provided by mentors. Thus, their research learning process reflects theoretical concepts of "LPP in CoP". Participation in CoP met their developmental needs regarding research competence and productivity, academic career guidance and socialization, and social supports from peer groups.

*Obtaining federal grants for a full membership.* For most participants, being an independent clinical researcher was closely related to their ability to write a successful grant. Moreover, they perceived that having a federal grant was the only way to become a full member in global PS-communities. The federal grant mechanism served as a gatekeeper. Once they entered that door, they would feel comfortable to claim their full PS identities. This perception seemed to influence the approach they used to pursue a research career. Most participants were moving toward the goal of becoming an independent PS who had significant federal grants to create their own research practice, particularly focusing on space, facilities, and support staff.

*Interplay of local and global.* In most cases, a single local CoP in which they participated did not provide a full range of research activities and resources for them to practice and require necessary research competence. PSs collected pieces of research resources and personal connections from various CoP in which they participated to develop their own research practice. The desire to have an independent CR practice became PSs' learning dynamics to move forward to the center as a full participant in global PS-communities. Therefore, when they evolved PS identities and moved toward full participation in global PS-communities, they simultaneously formed their own research practice (see Figure 1).

447

**Figure 1.** Physician-Scientists' Ways of Belonging to Global PS-Communities.



*Building a community of practice spanning boundaries.* They built a CoP spanning boundaries, which indicated that participants were trying to link clinical practice and research by building their independent research areas across disciplines. Three main emergent categories that influence PS's learning in practice are summarized and illustrated in Figure 1—1) s*elf* means self-understanding, gender, and cultural background, professional role as a physician, and family role as a parent; 2) *clinical research* indicates the interdisciplinary nature of CR, types of CR, and levels of CR as a discipline developing in medical specialties; 3) *workplace resources* include federal, industry and foundation CR funding supports, organizational history and vision in developing CR, and departmental leadership and scholarship in supporting CR learning.

**Table 1.** Three dimensions of fostering physician-scientists' communities of practice

| Self interacts with CR: Meaning negotiation in learning CR | CR interacts with workplace resources: Participation in local CoP | Self interacts with workplace resources: Research infrastructure support |
|---|---|---|
| **H**aving structured training in CR | **H**aving mentorship | **D**eveloping competence in managing multiple responsibilities |
| **L**earning how to learn CR | **F**inding supports in CoP—research competence, academic career guidance, and social connections | **D**eveloping a vision and a understanding of a research career development |
| **B**eing a MD researcher, not a PhD researcher | **L**earning in practice | **H**aving protected time and support systems to connect the clinical practice and research |
| | **P**articipation in research professional organization | |
| | **D**eveloping proficiency in CR | |
| **G**rowing interest and commitment in CR | **D**eveloping big picture of research fields of interest | **H**aving research and administrative staff support |
| **M**aking career goal choice | **D**eveloping independent area of research | **H**aving network systems connecting MD researchers and PhD researchers |
| **M**aking lifestyle choice | **D**eveloping competence in writing grants | **H**aving internal grant support |

448

*Three dimensions of fostering PSs' communities of practice.* Owing to the interaction of self, clinical research and workplace resources, participants gradually formed their own CR practice. These three categories formed three dimensions—"meaning negotiation in learning research", "participation in local CoP", and "research infrastructure support". The whole spectrum of novice PSs' learning experiences gradually revealed the main characteristics within each dimension. They are summarized in Table 1.

*Negotiating a Full PS Identity in Underdeveloped Workplace Learning Context*

*Overlooking power structure and access to research resources.* Building their own CoP was greatly influenced by several levels of context, including available mentors to provide research participation opportunities, amount of departmental support for research activities, an organizational history in building a research infrastructure, and national grant mechanisms emphasizing individual excellence. Although the research practice of participants in the advanced level reflected the CoP's theoretical concepts of domain, practice, and community (Wenger, 1998), it is clear that novice PSs might not consciously develop these three components. They made progress because they happened to meet good mentors or work in a research resourceful environment that would provide them a good start. Without explicit guidance, they put more emphasis on building control over physical research resources and overlooked other components.

*Marginalized ways of meaning negotiation.* The pathway from entrance level to the desired goal of having federal grants is not clear to most participants. They seem as though they navigate their way through a jungle and greatly rely on their mentors as tour guides. Mentors as gatekeepers open CoP to novice PSs. However, the institutional structure for physicians to learn research and incorporate research activities in their work life is underdeveloped. There are various forms of participation and different levels of involvement in research activities that are marginalized in the PS-communities.

*Culture and gender making difference.* International PSs' early schooling socialization in their home countries and little exposure to CR practice may influence their perceptions of and approach to learning how to learn CR in the workplace. Gender plays a role in participants' meaning negotiation when balancing family and work, adopting a leadership role in the workplace, and making a research career choice.

## Implications

In contrast to a focus on individual learning styles, CoP acknowledge the inevitable tension between individuals and collectivities, illuminating what conflicts and oppressions exist and how individual and social developments can potentially enhance each other. The complex of nature of PSs' learning is unraveled in light of the structural dimensions of individual and workplace context, such as power, access, culture, and gender (Caffarella & Merriam, 2000). This study suggests that various forms of peripheral participation in broadly defined CR should be legitimately encouraged to form layers going from core membership to extreme peripherality. These layers of engagement serve the dynamics of the CR enterprise development and provide multiple and diverse learning opportunities for PSs. Four main issues in the workplace learning relating to 1) learning how to learn in practice, 2) restructuring power and access to learning resources, 3) exercising combination of mentorship and leadership, and 4) understanding cultural

and gender differences need more attention. The results also have implications for facilitating the integration of practice and research in various professional learning contexts. CoP, serving as an analytical tool, demonstrates its flexibility in defining categories of social structure that reflects shared learning (Wenger, 1998) according to research purposes. Future studies are encouraged to use CoP in various levels of analyses.

## Reference

Addison, R. B. (1999). A grounded hermeneutic editing approach. In B.F. Crabtree & W. L. Miller (Eds*.), Doing Qualitative Research.* (2nd ed., pp.145-162), Thousand Oaks, CA: Sage.

Borken, J. (1999). Immersion/Crystallization. In B.F. Crabtree & W. L. Miller (Eds*.), Doing Qualitative Research.* (2nd ed., pp. 179-194). Thousand Oaks, CA: Sage.

Caffarella, R. S. & Merriam, S. B. (2000). Linking the individual learner to the context of adult learning. In A. L. Wilson & E. R. Hayes (Eds.), *Handbook of adult and continuing education* (pp. 55-70). San Francisco: Jossey-Bass.

Hansman, C. A., & Wilson, A. L. (2002). Situating cognition: Knowledge and power in context. In J. M. Pettitt (Ed.), *Proceedings of the 43rd Annual Adult Education Research Conference* (pp. 141-146). Raleigh: North Carolina State University.

Kelley, W. N. & Pandolph, M. A.(Eds.). (1994). *Careers in clinical research: Obstacles and opportunities.* Washington, DC: National Academy Press.

Lave , J. (1993). Situated learning in communities of practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp.63-82). Washington, DC: American Psychological Association.

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* New York, NY: Cambridge University Press.

Merriam, S. B. (2002). Introduction to qualitative research. In S. B. Merriam (Ed.), *Qualitative research in practice: Examples for discussion and analysis* (pp.3-17). San Francisco: Jossey-Bass.

Mill, W. L., & Crabtree, B. F. (1999). Clinical research: A multimethod typology and qualitative roadmap. In B.F. Crabtree & W. L. Miller (Eds*.). Doing Qualitative Research.* (2nd ed., pp. 3-32). Thousand Oaks, CA: Sage.

Nathan, D. G. (1998). Clinical research: Perceptions, reality, and proposed solutions. *JAMA, 280(16),* 1427-1431.

Nathan, D. G. (2002). Careers in translational clinical research—historical perspectives, future challenges. *JAMA, 287* (18), 2424-2427.

Nathan, D. G. & Harold, E. V. (2000). The national institutions of health and clinical research: A progress report. *Nature Medicine, 6,* 1201-1204.

Nathan, D. G., Fontanarosa, P. B. & Wilson, J. D. (2001). Opportunities for medical research in the 21st century. *JAMA, 285,* 533-534.

Rosenberg, L. E. (1999). The physician-scientist: An essential—and fragile—link in the medical research chain. *The Journal of Clinical Investigation,103,* 1621-1626.

Shine, K. I. (1998). Encouraging clinical research by physician scientists. *JAMA, 280,* 1442-1444.

Strauss, A. & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* New York, NY: Cambridge University Press .

Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A practical guide to managing knowledge.* Boston: Harvard Business School Press.

Wolf, M. (2002). Clinical research career development: The individual perspective. *Academic Medicine, 77 ,* 1084-1088.