Communities of Practice in Engineering Education

Organizer/Moderator:
Diane Rover Iowa State University

Panelists:
Karl Smith University of Minnesota
Ruth Streveler Colorado School of Mines
Susan Kemnitzer National Science Foundation
Jeffrey Froyd Foundation Coalition (TAMU)
Panelists

• **Karl Smith**
  – Leadership roles in education programs and centers at Univ. of Minnesota and nationally

• **Ruth Streveler**
  – Current and Founding Director of the Center for Engineering Education at CSM

• **Sue Kemnitzer**
  – Deputy Division Director for Education in Engineering Education & Centers Div. at NSF

• **Jeff Froyd**
  – Project Director of the Foundation Coalition and Director of Academic Development in College of Eng.
Panelists

• **Backgrounds**
  – Science, engineering, educational psychology
  – Academia, industry, government

• **Interests**
  – Passionate about teaching and learning
  – Change
  – Integration
  – Innovative learning and organizational models
  – Communities
Overview

• Motivation
• Introduction of/by Panelists
• Audience Activity
• Commentaries on Community
• Small-group Discussion
• Questions
Motivation

- *ASEE Journal of Engineering Education Academic Bookshelf, January 2003*
  - A Sense of Community: Learning About vs. Learning to Be
      - a group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis
    - *The Social Life of Information*, by John Seely Brown and Paul Duguid
  - Shared message: knowledge, innovation, and learning are social phenomena
Motivation

• **Questions**
  – What social contexts, or communities, are in place or have the potential to enrich the academic environment?
    • What communities form naturally or intentionally among undergraduate and graduate students?
  – Is there a role for communities of practice in academic department organization?
  – To what extent does a community of practice encourage and facilitate faculty development?
  – What characterizes university collaboration with industry and government as a community of practice?
  – Is a community of practice a catalyst for or artifact of socialization?
    • Will it lead to reform, or is reform a prerequisite?
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Introduction of/by Panelists

• Self-introduction

• What does community generally, or community of practice specifically, mean to you?
  – Reflection: Think about a community you are/were involved in or aware of. What characteristics make/made it special?
Audience Activity

• Reflect individually on the same question and write down an answer to be shared later.
  – What does community generally, or community of practice specifically, mean to you?
  • Reflection: Think about a community you are/were involved in or aware of. What characteristics make/made it special?
Overview

• Motivation
• Introduction of/by Panelists
• Audience Activity
• Commentaries on Community
  – what, where, how, and why of COPs
• Small-group Discussion
• Questions
Commentaries on Community

• Karl Smith
Communities of Practice in Engineering Education

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Situated Learning,
Communities of Practice,
Social Capital

FIE 2003 – Session F2G
Insider Knowledge and Communities of Practice

Where do engineering students gain the *insider knowledge* of engineering, i.e., where do they learn how to act, talk, and think like an engineer?

Where do employees gain the *insider knowledge* about surviving (or thriving) in an organization, i.e., where do they learn how to act, talk, and think like a successful employee?

According to Seely Brown & Duguid (1991), “Learning that is informal, social, and focused on meaningful problems helps create *insider knowledge*.”

Gaining insider knowledge is a major part of becoming a member of a community of practice.
Situated Learning and Communities of Practice

Depends on two claims:
1. It makes no sense to talk of knowledge that is decontextualized, abstract or general.
2. New knowledge and learning are properly conceived as being located in communities of practice.

Pointers for practice:
• Learning is in the relationships among people.
• Educators’ role is to help people become participants in communities of practice.
• Learning is a part of everyday life, that is, there is a connection between knowledge and activity.

Learning in theory and in practice
Cognitive Apprenticeship
Re-education

Learning a practice involves becoming a member of a community of practice and thereby understanding its work and its talk from the inside (p. 126)

www.slofi.com
Communities of practice:

A group of people who:
- Share an interest in a topic (Domain)
- Interact and build relationships (Community)
- Share and develop knowledge (Practice)

Communities of practice: The organizational frontier
-- Harvard Business Review, Jan/Feb 2000
Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.

Social Capital

The norms and social relations embedded in social structures that enable people to coordinate action to achieve desired goals -- World Bank

Social capital refers to features of social organizations such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit -- Robert Putnam

Social capital consists of the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible -- Don Cohen & Laurence Prusak
Investing in Social Capital

Making connections

Enabling trust

Fostering cooperation

Age of Interdependence

Tom Boyle of British Telecom calls this the age of interdependence; he speaks of the importance of people’s NQ, or network quotient – their capacity to form connections with one another, which, Boyle argues is now more important than IQ, the measure of individual intelligence.

Additional References


Commentaries on Community

- Ruth Streveler
Communities of Practice

Ruth Streveler
Director, CSM Center for Engineering Education
Using CoP to Expanding Engineering Education

• In engineering education, how do we reach “beyond the choir”?
  – How do we keep our community vital?
  – How do we expand our community?
Wenger’s CoP structure

• Components of the Community
  – Core group
  – Active group
  – Affiliated (peripheral) group
  – Outsider
Our strategy to expand our CoP for an ND proposal

• Determine groups that may not be within the Engineering Education CoP but have much to contribute to this community.

• Contact the core group of this potential “partner” groups.

• Create a new core group, containing members of the affiliated core groups.
Expanded CoP

- Engineering Educators = ASEE
- Learning Scientists = American Educational Research Association (AERA)
- Faculty Developers = Professional and Organizational Network (POD)
Features of this new CoP

- A new, expanded core group composed of members of all 3 organizations.
- A common task (workshops on rigorous research in engineering education)
- Mechanisms for encouraging people to join the community.
Ways to this new CoP

• **Buy-in of leadership of all 3 groups**

• **Mentoring of newcomers by old-timers**
  – Mentoring on the culture of the organization
    • Welcome sessions
    • Info on conference dates and presentation expectations
  – Information links between organizations
    • Web site links
    • Info in organization publications
    • Special sessions at respective conferences
Questions to leave you with

• Who can you include in your CoP who may now be “outsiders”?
• What activities can you create to invite these “outsiders” into the community?
Commentaries on Community

• Susan Kemnitzer
Commentaries on Community

• Jeff Froyd
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• Small-group Discussion
• Questions
Small-group Discussion

- Discussion: 10 minutes
- Divide into small groups
- Share your own reflection on community
- Consider the questions and issues raised about the form, function, and impact of communities in engineering education. Make a list of open questions and action items to explore further.
- Small-group reporting and panel responses: 15 minutes
Discussion Notes

• How do we include in our community difficult members who have demonstrated repeated lack of trustworthiness?
• How do we get our administrators to value the same team skills that we’re teaching our students?
• How do we exchange or sustain the core people?
• How do we establish trust so that everyone in the community of practice values the purpose? “Enlightened self interest”
• How do you establish connections? Groups come and go, but connections/trust often remain. Some very successful faculty members left, because they couldn’t make connections.
• How do you recruit disenfranchised people?
Discussion Notes

- What is the role of leadership? Deans, chairs, senior faculty
- What is the process of establishing goals of the community and how do they interact with the reward structure?
- Find out about the community – background experiences
- Challenges with community – modern technology can help or hinder community, interfaces among us (e.g., email)
- Community development takes energy, how do we bring people back in?
- What exactly do we mean by a COP operationally?
- What is the influence of national culture?
- What can we learn from COPs in different disciplines?
Discussion Notes

- What are the rewards and incentives that might foster COPs?
- People join a community – an important point. COPs have to form themselves.
- Levels of communities – size is an issue
- How involved people become depends on frequency.
- We started talking without any sense of community. After we talked for awhile, we began to act as a community.
- You can’t have community without involvement.
- How I can get the faculty to work more effectively together?
- Francis Fukuyama – The great disruption
- Role of COPs in changing the culture of engineering
  - Implications of technology and impact on society
  - Role of women and minorities in engineering
  - Investigating non-traditional outcomes – trust, tolerance, ability to take risk & encouraging better citizenry
Discussion Notes

• How do we market our COP to others to be interesting, marketing engineering education to researchers
• Can’t force membership
• How do you replenish core members, new generations of core members? What happens when a core member is removed? E.g., one member was transferred to another department. What is going to happen to active and affiliated members if the core members are removed or leave?
• How do you blur artificial organization lines to encourage membership across institutional and national boundaries?
Discussion Notes

• What is the practice that we have in common so that “WE” might form a community? Is it research in another discipline or practice in a classroom? It could be both, but linkages between the two could be improved, having more systematic work to inform practice. The science that we’re applying is the science of learning, but we have to translate science to practice. We have to make decisions when the science is not available. Do we see ourselves that way? To what degree does the science and practice exist?

• What is my practice and what informs the practice? My practice is in the classroom, my research is done throughout the world.

• We come together to talk about what we might learn from each other. That might be a bridge.
Questions?

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• Slides: www.eng.iastate.edu/~drover/fie03cop