Learning Communities: Common Ground and Critical Differences in Designing Technical

Support


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# Abstract

*The psychological model we hold for the mind influences the way we think and act in designing and participating in intentional learning settings Social and cognitive scientists have been expanding educational models of learning with their examinations of the distinctions between individual cognition and social cognition, promoting a conception of shared mind. Using terms such as collective sense-making, distributive intelligence, dialogue, group mind, systems thinking, or activity theory, they suggest a view of learning in which there is a shift in power relationships, a respect for practitioner knowledge and an emphasis on group learning through intentional activity, collective reflection, and participatory decision-making. This view gives rise to a range of popular phrases in the field of education including: learning communities, communities of learners, learning circles, learning organizations, knowledge communities, communities of practice, professional community and learning organizations. These terms are attempts to characterize new forms of social/cultural learning. The terms are often used interchangeably, despite the fact that each evolves out of a different research tradition, thus highlighting different aspects of collaborative work and group structure.*

*Our objective in this chapter is to provide common language for understanding the different forms of social organization, goals and outcomes of learning in communities. We suggest three distinct but overlapping forms of learning within communities-task-based, practice-based and knowledge-based learning–and discuss practical design implications of these distinctions. In doing so, we keep a focus on how networked technologies support these variations in perspectives on collaborative work. Finally we offer the concept of a "learning organization" to describe organizational efforts that aggregate different forms of learning communities into a larger structure. In the overlap of different types of*

*communities engaged in learning we find a common cultural core of continuous reflection and change.*

Over the past three decades, learning theory has evolved from a cognitive theory of acquisition of knowledge to a social theory of increased participation in activity (Bruner, 1973; Cole, 1988; Lave, 1988; Mehan, 1983; Norman, 1980; Rogoff, 1994; Wertsch, 1997). A social view of learning adopts a systems or network view of interaction and activity. Intellectual development becomes a process of negotiation of meaning in everyday practice with others (Dewey, 1916; Vygotstky, 1978). Learning occurs though engagement in authentic experiences involving the active manipulation and experimentation with ideas and artifacts--rather than through an accumulation of static knowledge (Bruner, 1973; Cole, 1998; Dewey, 1916).

While it may appear that some learning is an individual accomplishment, in fact, even when "alone" the individual relies upon and is influenced by socio-cultural tools, signs, and symbols to make sense and produce work. Studies of craft workers, for example, reveal that, though they may appear to stand alone beside their work, their work identity and production is very much influenced by and exerting influence upon a surrounding network of colleagues, friends, and family (Mishler, 1999; John-Steiner, 2000). People co-construct knowledge by building on the ideas and practices of group members. Social scientists from cognitive anthropology (Chaiklin & Lave, 1993; Rogoff, 1998), sociolinguistics (Smagorinksy, 2000), Sociology (Circourel, 1973, LaTour, 1987; Mehan, 1983) anthropology (Hutchins, 1996; Lave and Wenger, 1991) and cross-cultural psychology (Cole & Scribner 1974) have studied ways in which the actions of the

individual both acquire and contribute to meaning within a larger context of the group as shared understandings, "group mind," distributed cognition, or cultural practice (Brown & Duguid, 2000; Newman, Cole, and Griffin, 1989; Pea, 1993). The incubation of most great ideas has taken place in groups (LaTour, 1987).  Competitive ideas and creative inventions are often the outcomes of cohesive work groups, through the natural evolution of practice that comes from the infusion of new members and from the critical, dialectical tension that arises from the social and economic conditions in which the community lives  (Lave & Wenger, 1991; Cole & Engestrom, 1993; Pea & Gomez 1994; Wenger, 1998).

## Learning Embedded in Community

The term "community" has rapidly become a clichéd bit of jargon used to refer to a social group in which learning is an intentional, explicit goal. To understand the functional meaning of learning communities, communities of practice and knowledge-building communities, we must first anchor our definition of the term *community*.

### What is a Community?

A community is a multigenerational group of people, at work or play, whose identities are defined in large part by the roles they play and relationships they share in that group activity. The community derives its cohesion from the joint construction of a culture of daily life built upon behavioral norms, routines, and rules, and from a sense of shared purpose. Community activity also precipitates shared artifacts and ideas that support group activity and individual sense-making. A community can be multigenerational; that is, it can exist over time and the comings and goings of individuals. In short, a community differs from a mere collection of people by the strength and depth of the culture it is able to

establish and which in turn supports group activity and cohesion.

Communities are not always healthy contexts of close interpersonal relationships. A community may be dysfunctional or troubled, stemming from a failure to accommodate to change or variation. Sometimes a community is scattered and isolated. Unable to interact with each other or sequestered from community cultural resources, members may find it difficult to develop common practices or share values. . Sometimes a community becomes insular by demanding unquestioned conformity or the enduring purpose of the group becomes unclear or contested. If a community fails to attract new members it will not be able to ensure its continuation and development. Where the community is dormant, or where membership is static, there may be no development or evolution of the system, the activity, and the roles that support it. In these cases, learning is more problematic and limited. In short, simply labeling a group of people as a 'community' neither ensures that it functions as one, nor that it is a beneficial, cohesive unit in which learning will take place readily.

Successful communities are able to sustain themselves over multiple generations of members and yet do so without becoming brittle. They grow their collective knowledge-in-use, or 'practice,' by incorporating variations or responding to contradictions that arise from the diversity of their dynamic membership and their collective interaction with the larger communities, e.g., political systems or institutions in which their community exists and with which it interacts (Engstrom, 1987). As communities continue to exist over time, embracing new members, switching roles and functions among members, altering practices, tweaking tools, and expanding activity, they are, in a very real sense, 'learning' from their

collective experience. Over time the residue of these experiences remains available to newcomers in the tools, tales, talk, and traditions of the group. In this way the newcomers find a rich environment for learning. They can have access to current practitioners at various degrees of experience, and to the past development of the activity.

Identity is socially constructed in part by the function the individual fills in the group. But how do the individuals acquire different roles and responsibilities as they continue to participate in a community? Communities are social organizations, and over time they precipitate a culture, with all the features and mechanisms associated with cultural systems (Durkheim, 1915). Members occupy roles only with the implicit or explicit support of the community. Where the community is small and its time together quite bounded, there may be little opportunity for individuals to do or be other than they were at the outset. Where the community is newly formed, with little history to guide activity, there may be much ambiguity about roles and activities.

**Variations Among Learning Communities**

Variations in explanatory models of community-based learning mirror variations of focus within the notion of community. At a micro level, a small group of people toils on a task, and over time accomplishes it together. In the process, individuals learn from their interactions with others, with objects of the effort, and from their own participation. At a most macro level, a widely dispersed organization accomplishes its work, evolving, developing, and improving, through the collective contribution of generations of individuals and subgroups over time. From the largest to the smallest unit, these groups are often referred to as "communities," because of their cohesiveness and purposefulness. Both

macro and micro views consider the same issues in their analyses, but focus them on different units of analysis. For instance, in the micro view, researchers examine participation structures to understand how the group is organized to support interaction among participants. The same analysis at a macro level might consider the division of labor and power in an activity system, and how that organizes participation opportunities.

Two theories in particular, Communities of Practice (Lave & Wenger, 1991; Wenger 1998) and Activity Theory (Cole & Engestrom, 1993) suggest that the individual's changing role in the community or activity system enables his or her developing knowledge. That is, they suggest that learning is a process of identity transformation -- a socially constructed and socially managed experience.

In this paper we will be talking about three distinct but overlapping types of learning communities, task-based, practice-based and knowledge-based learning communities.Our first distinction is "task-based" learning communities. These are groups of people organized around a task who work intently together for a specified period of times to produce a product. While the specific group may not, in the strictest sense, share all of the properties of a community that we list in our definition of community (for example multi-generational is handled in a very different way), the people who participate in them often experience a strong sense of identify with their partners, the task, and the organization that supports them. In task-based learning communities, the emphasis is on learning and community is used to signal a form of learning that is very different from simple collaboration (Schrage, 1995).

The second type of learning community we examine is practice-based. These are

larger groups with shared goals that offer their members richly contextualized and supported arenas for learning. Indeed, some corporate organizational groups are evolving their approach to workplace learning to leverage of the learning power of community. The term, *Community of Practice* (Lave & Wenger 1991) was created to provide a way for talking about the institutional and interpersonal activities that unite groups of people who are engaged in the same occupation or career. *Community of Practice* widens the frame to include the community dimensions of work in fields that are not commonly described as professions.

In the third section of this paper, we discuss organizations that move in this direction and can be described as a *Knowledge-Building Communities* They share all the features of a community of practice, and have the additional feature of deliberate and formal production of knowledge about its own practice. Where most community of practice organizations rely on ongoing participation of members to move embodied knowledge around, knowledge-building communities have made the overt commitment to harvest and share knowledge outside of its immediate use or active context.

In the final section of the paper, we will focus on organizations, programs or systems of activities, where there is an effort to bring together many different layers of communities with the intentionally effort of using the parallel structure to help facilitate the growth and development of each of the communities.  These different communities are strengthened by the activities and interaction with other communities in a larger structure of a learning organization.  Creating systems of interchange between different communities with a goal of supporting the development across communities promotes a culture of

community learning within learning organizations (Argyris, 1977; Senge, 1990). Some corporate workplaces deliberately design and implement cultural and technical mechanisms to harvest and share workplace knowledge (Dixon, 2000; Davenport, 1997; Davenport & Prusak, 1998; Houtopoulos, 1997) Since the 1990s, paralleling the increasing sophistication of networked applications, we have seen the rise of high level corporate positions tasked with establishing and supporting this process. Job titles have evolved, from "Chief Information Officer" to "Chief Learning Officer" or "Chief Knowledge Office." This represents a deep conviction about the knowledge value of community culture, and a serious effort to make tacit knowledge or knowledge-in-use, explicit and capture it for reuse by others. This effort is made possible by advances in networking and software, and has spawned a niche business in enterprise portals and knowledge management networks.

**Dimensions of Learning Communities Comparison and Contrast**

Throughout this chapter we discuss the three kinds of communities by considering their similarities and differences along four dimensions or characteristics: membership, task features and learning goals, participation structures, and mechanisms for further growth and reproduction.

*Membership.* An important element of community is membership. Who joins? How do they find their way to the group? What is the life cycle of their participation in the group? What sort of differentiation, if any, exists among members?

*Task Features / Learning Goals.* Obviously groups come together for a purpose. In some instances, the group may be explicitly tasked with a product to develop or an

activity to complete. For others, the group is simply engaged in joint activity as part of some larger enterprise.

*Participation Structures.* A critical distinction among groups arises from the formal or informal means of group members with access to the full range of community activity, e.g., tools, events, history, and other members. Furthermore, groups differ in the opportunities they afford members to participate in a variety of ways. Some communities are very open to and supportive of shifts in members' roles and identities in the group.

**Reproduction & Growth & Mechanisms.** These are the means by which the community grows and the mechanisms by which the community continues to exist independent of members who might join or leave the community.

## Task-Based Learning Communities

The explicit goal of task-based *learning communities* is to assemble a set of people with maximum diversity of perspectives that can be focused on a common issues or problem, and then, though the processes of group formation, discourse and common work, create a common systemic understanding.  Their shared goal is the communal use of diversity to achieve a deeper understanding of issues, to find a solution to problems, or to complete a task in a way that is beyond the capabilities of any single person. Close interpersonal relationships and work patterns often arise in the process of creating the product or completing the task together.

Table 1: Task-Based Learning Communities

| Community Dimensions | Product-based Learning Communities: |
|---|---|
|  |  |

| Membership | Membership is assigned or grouped |
| --- | --- |
| | Members know one another |
| | Group identity is temporary. |
| | Leadership is assigned or evolves through interaction. |
| Task Features and/or Group Goals | Topic, project, or group goal is well specified. |
| | Learning goals are defined as a part of the project. |
| | Timeline often with phases and a specified deadline are used. |
| | Value of the product assessed by others. |
| Participation Structures | Participation is often defined with specific roles and responsibilities. |
| | Small group interaction, which may be shaped by explicit division of labor |
| Reproduction & Growth & Mechanisms | Specific Learning Community ends with the production of the product that reflects the learning. |
| | Transfer of practices and procedures from one community to the next through products, procedures and guidelines. |
| | Community practices carried between discontinuous groups by organizational leaders or programs. |

The group product or outcome reflects the learning process and stands as a completed "static"object.  While the product may be used by others, it is not likely to revisited or revised by others. For example, a task-based learning team might be formed to study the pollution in local rivers. Each member has a better understanding and leaves what she or he has learned. A report might be written and sent to other people in the neighborhood or to local officials, but it exists as a finished document. This stands in contrast to a "living" document or database that continues to develop in knowledge-based learning communities.

Learning communities in the formal school setting are most often task-based and emphasize group learning as a way to scaffold individual learning. We begin our discussion of task-based learning communities with an exploration of the distinctions between community models of learning in schools and more traditional forms of classroom learning.

Studies of children in the home neighborhood offer evidence of how deeply learning is embedded in social activity (Greenfield, 1999; Cole, 1996; Heath, 1983; Scribner, 1990; Rogoff, 1995). Children in school are certainly located in a social context and with roles, traditions, language, and have cultural tools at their disposal. However, the goals of their group efforts are often unclear. Is their task to do well on standardized tests? To pass to the next grade level? To get 'high marks' from the teacher? To acquire specific pieces of information such as times tables? To avoid punishment? To become a good citizen? To prepare to enter the workforce?

Traditional classrooms, weighted down by the burden of a prescribed curriculum, constrained by the limitations of age and ability grouping, and with compulsory attendance, lack the defining characteristics of a cohesive community. Collaborative learning might be employed for a specific lesson, as an instructional strategy. However, for most of the time, the traditional classroom is a thinly contextualized, unfocused collection of tasks that does not support a community-based learning.

There are, however, striking contrasts to this model where individual classrooms involved in projects like Knowledge Forum (Hewitt, this volume); Kids as Global Scientists (Songer, 1993); The Jason Project (Eklund, 1993), The Globe Project (Means, 1998) the iEARN Projects (Rennebohm-Franz, 1996) and Learning Circles (Riel, 1998). In some cases whole schools (Brown, Ellery, Campaine, 1998; Goldman, 1997; Coalition for Essential Schools, 2000), are transformed into communities of learners that extend across grade levels and involve interactions with experts beyond the classroom. In these examples, there is an effort to modify classroom norms and student identities to create

workspaces in which students collaborate with teams of students and experts building knowledge together. In our discussion of task-based learning communities, we offer a description of how the community-learning model operates in these connected classrooms, in what we call task-based learning communities.

Fostering task-based learning communities in the classroom may be the beginning of a more extensive school structure for learning or they may be temporary communities with the intentional purpose of helping students learn how to work in communities.  They are in some ways  "micro-communities" because they do not share all of the characteristics of full-blown communities. The timeline on task-based learning is relatively short, making it more difficult to develop community mechanisms such as shared discourse and shared sets of practices, values and tools. Also, a task-based learning experience begins with the same set of people and ends with the production of a product. The regeneration is with a new cohort and any knowledge across "generations" of groups may be carried by people in the larger community identified for this purpose or through program materials left for the new group. And perhaps most importantly, they are not voluntary groupings.  A student cannot decide to physically leave the classroom communities (although students can refuse to participate). For these reasons, some of the authors of this volume questioned the use of the term community within the classroom context.

Recognizing these differences, we nevertheless use community to index a fundamental shift in classroom social organization that moves closer to patterns of community interaction and a social-cultural framework for learning.  Often these task-based learning communities do continue but with new groups of students and these bounded

groups do in small ways, contribute to the knowledge of the larger community—the school or project organization.

**Designing Technical Environments to Support Task-Based Learning Communities**

Communication technology makes it much easier to find and work with people who share a common learning goal. These people can come from different regions, be part of different organizations and different experiences and interests. Spontaneous support groups and interest groups can arise and develop into virtual communities (Rhiengold, 1993), and a great deal of learning might occur in these virtual communities. However, a task-based learning community requires an intentional focus on advancing the knowledge of the collective. The transformation to a learning community requires the development of group goals focused intentionally on a learning outcome. This structuring is often accomplished from within a project, program, community or organization.

Teachers, often in formal learning programs, also become members of online task-based learning communities perhaps with the goal of creating a lesson facilitated by collaborative tools such as those found on Harvard's Education with New Technologies website, University of Indiana's Inquiry Learning Forums (Barab, this volume), or in SRI International's Tapped in (Schlager, this volume). Organizations such as ThinkQuest encourage students and teachers to join task-based learning communities outside of the school with a goal of fostering learning both in and out of schools. Many learning communities that meet in face-to-face settings also use technology to support their collaborative work.

A comparison of two task-based learning communities, one sponsored by an

organization, and one by an international teacher community, illustrates the dimensions of supporting a task-based learning community online. The International Education and Resources Network (iEARN) supports Learning Circles, highly interactive, project-based partnerships among eight to ten schools located throughout the world. The learning circle participants design and complete a series of projects that are summarized in a group publication. Network Learning Services, a company, sponsors the ThinkQuest Challenge, a contest in which teams of students and adults, often from 3 different countries, work over the internet to design a educational website.  The development work generally takes place out of school but often involves teachers as team members.

iEARN uses discussion forums and email notices to announce the start of a learning circle session to teachers from diverse regional, social, linguist, cultural, and national diversity. Thinkquest sets a date for team formation and students use the Thinkquest website to advertise for teams members with specific skills.  With a competitively advantage for team diversity (gender, ethnicity, and SES) students use a variety of strategies to locate team members from distant locations.  In both cases, the smaller task-based learning communities are dependent on a larger community structure for their formation, organization and support. Once a Thinkquest team or learning circle is formed, the members are set.   Participants in both of these learning communities begin by learning more about their partners and discussing their shared task. They share a goal of designing a project or set of projects, collecting group ideas, data, and writing, and finally publishing their collected materials.

Collaboration over the internet makes it possible for each class participating in a

Learning Circle, or member of a Thinkquest team, to be one an active part of the management team. School-based Learning Circles and extracurricular Thinkquest teams have a similar structure to Quality Circles in the business community (Deming, 1993) where the hierarchical boundaries between workers and managers are reduced through a cooperative approach to decision-making and product development.

Learning Circle and Thinkquest interaction is organized into phases, each with goals and tasks facilitating cooperative planning among the participants. Web published timelines and email announcements of the beginning of each phase help organize the group exchange. In Learning Circles, each school sponsors one of the Circle projects and in doing so, takes on the role of expert in that area. All schools have the opportunity to sponsor a project, and the responsibility to respond to the projects of the other classroom teams. In ThinkQuest, each student takes on responsibility for part of the shared task.  Students assume roles like researcher, writer, and programmer, and often find coaches who can help with content and structure and design.

Completing the Circle, for Learning Circles, or submitting the website for Thinkquest teams, marks the completion of a round of the learning community. All of the interaction in these activities is mediated by technology, both as the tool of communication and as productively tools for creating the shared artifact.  This technical product is the reflection of group process. If schools continue to participate in Learning Circles, they join a new Circle in the next cycle. Students who continue in Thinkquest form new teams. The teacher and coaches, as well as the social-technical design of the Learning Circle and ThinkQuest programs carry the continuity from one session to the next. Student products,

either a website or digital or print publication, reflects what they accomplished as team and can serve to guide future teams as an example. It might be left in a class or school library, or posted in online libraries. These reports and websites primarily serve to document the group learning processes.

In these task-based learning communities, the learning takes place both online facilitated by many different forms of distant communication and in through interaction which takes place locally *as a direct result* of either the sending or receiving the messages. The technology is used to create both technical and social environments (Kling &      this volume) where members depend on one another and are asked to incorporate different worldviews into their frame of perception.

Technology structures for task-based learning communities may also have as an implicit goal of introducing students to professional communities and the learning that takes place in these settings. . For example, The Jason Project, Passport to Knowledge projects, and a number of other electronic field trips use combinations of live video, feeds of data collection, web and communication tools to give students a sense of being a part of a team of researchers and support staff engaged in doing real science. Participation structures provide students with opportunities to handle the tools of authentic science inquiry, to converse using specialized language, and to observe more sophisticated members of the community going about their work. For instance, when Passport to Knowledge presented "Live from the Hubble Telescope," U. S. students were allocated time on the Hubble telescope. They could use this powerful tool and focus it into space and receive back their data for analysis. They could not do this alone, but with planet "advocates" who were able

to scaffold student thinking with questions, observations, and anecdotes to engage in an online discussion of which planet to examine and why. Once the decisions were made, students were able to watch via live televised broadcasts as their data was received. The scientists then responded, and engaged the students with questions intended to help the student to interpret "their data. " In this task-based learning community they are also able to participate somewhat like "tourists" in a community of practicing astronomers, but they are not really members of a community of practice of scientists.

## Practice-Based Communities

A practice-based community arises around a profession, or discipline, or field of endeavor. It may be as broad as a group of Linux programmers around the world developing and sharing their work in journals, conferences, and online forums. Or it can be as narrow as a team of teachers at a single school who are working together to improve the practice of reading instruction on site by meeting, discussing, sharing, around their practicing with new methods and materials. It differs from a task-based learning community in significant ways, most of which are captured by the voluntary participation in field or "practice."

There is a strong emphasis on the notion of a community as a shared activity and goals, though there may be differences in expertise and experience. Members of a community of practice have identities that are defined in part by the nature and extent of their participation in the practice. Additionally, members share a social responsibility to learn from and learn for the community.

Table 2. Practice-Based Communities

| Community Dimensions | Practice-Based Learning Community |
|---|---|
| Membership | Members join and are acknowledged formally by the community through dues, licenses, or certification. |
| | Community identity is defined in terms of evolving expertise, and by the division of labor in the practice of the community. |
| | Leadership identified through role in the community. |
| Task Features and/or Group Goals | Reproduction and preservation of the practices that have been found most effective in the past. |
| | Design and experimentation with new practices to solve evolving community challenges. |
| | Development of tasks, tools, or roles in the practice arising in response to internal and external changes |
| Participation Structures | Access to peers, near-peers, and experts engaged in practices |
| | Opportunity to participate in authentic tasks of the practice, and to become more fully involved Access to the rituals, tools (including language), history of the practice as support for learning |
| Reproduction & Growth Mechanisms | Tension between new and old experts and expertise within the practice resulting modification and development |
| | Development of the practice and community through r development of discourse, tools and artifacts of work, action routines, anecdotes about practice, and other cultural mechanisms. |
| | Exchanges with adjacent Practice Communities, e.g., across companies in an industry, or across departments in a company, or across schools in a district. |

When the emphasis is on "practice," the concept of community indexes a view of "learning" as increased participation and responsibility in activity, and a view of "knowledge" as knowledge-in-use. These terms characterize the reproduction and distribution of knowledge throughout a group of people who constitute a working community on the basis of their shared goals and interests in productive activity of some sort, e.g., work. These "practice-based communities" focus on the evolution, preservation and reproduction of the common or shared understandings of the group beyond the current

social grouping.

In a community of practice, the knowledge is embedded in the performance and the organizational culture in which it occurs (Lave & Wenger 1991). Each of the participants helps to shape the knowledge but mostly as a consequence of modifying practice, not explicitly to build knowledge. Indeed, a community of practice often relies on tacit understandings that are shared among members and passed along through mentoring and apprentice experiences.

Practice communities locate knowledge in two symbiotic activities: reification and participation. Reified knowledge is codified and captured. It resides in policies, documents, talk, and even in tools themselves. This provides the community with a stable but brittle knowledge base, made more flexible by the complementary notion of participation. Participative knowledge, or experiential or lived knowledge, is the wisdom that accumulates in people, their practices, and their stories. This is dynamic knowledge that develops and changes over time and across practitioners. If only tacit, experiential knowledge exists, the community is vulnerable to the loss of key individuals. Both sources of knowledge are critical to the health of the community.

A characteristic of healthy practice communities is their permeability by "brokers" -- members of multiple, related communities who move between them, functioning as conduits between them. Communities avoid isolation and support their own development by interacting with groups engaged in tangentially related practices. In this way, a community of practice that is quite focused on its own activity can avoid becoming an isolated cult of practice.

We define a community of practice as a culture that has grown up around an activity system. As a cultural system, it relies on cultural tools to hold the community together and ensure continuity across generations: language, artifacts, rituals, routines, and stories. In the everyday and work worlds, outside of formal public education, practice communities abound.  But, unlike task-based learning communities or knowledge-based communities, their cultural work is tacit. They are not consciously building dynamic knowledge systems for future generations of practice; they are instead going about their work refining procedures or developing new tools. Further, not all practices develop strong community structures; many are dysfunctional, locking their members out of opportunities to grow and develop further, and limiting the evolution and development of the practice. Such communities still have a strong cultural dimension, but the tools of cultural work are used to limit and control. In their seminal work on Communities of Practice, Lave and Wenger (1991) offer up the tale of the meat cutters, a community that has stunted its own growth by the isolation of new workers from "old timers." Though Lave and Wenger do not discuss school in terms of a community of practice, it is not a far reach to see teachers as equally isolated and sequestered from each other, and from greater expertise in their field.

Practice communities share the same vulnerabilities as cultures. Much of their knowledge is knowledge-in-action that comes from tacit understanding and familiarity with tools, signs, and symbols of practice. When we try to capture the tacit knowledge of communities we end up with a snapshot of current practice, current knowledge, current cultural routines. This reified knowledge is useful, but brittle and fragile, for it has only captured a moment in time, a version of activity. However, both the ongoing participation

of diverse members, and the access that makes that participation possible, provide a balance to the rigidity and limitations of frozen, reified knowledge. Participation and reification are complementary characteristic activities of Practice Communities.

Practice communities need nurturing and protection. Wenger (2000) uses the metaphor of the garden to describe the nature of support that works for something as delicate as a community of practice. You cannot, he says, make the flowers grow by pulling on their leaves. You can, however, keep the flower beds free of weeds and pests, ensure there is water and sunlight, and you can even apply some plant food. But, the flowers must do their own growing. What does that sort of support for the flowerbed look like in an isolated and troubled profession such as teaching?

The Japanese method of lesson research or study (Lewis & Tsuchida, 1998) provides a model of how the educational profession might be different if teachers were engaged in a practice-based learning community. Teachers in Japan and increasingly in the United States form small groups to design, review, and modify lesson plans. They observe one another teaching their group lesson and analyze the differences trying to better understand the relationship between the teaching and the learning. The goal of this shared work is to find ways to improve their practice. Teachers see lesson study as a part of teaching. "If we didn't do lesson research, one Japanese teacher commented, "we wouldn't be teachers." Their identity as teachers includes a commitment to analyze their practice as a method of continuous improvement. Teaching is learning to teach.

*The Problem of School as a Practice Community*

A practice-based learning community best describes a particular way of organizing

associations of people in a field of endeavor, a profession, an avocation, or other activity system. In most cases, when the term "Community of Practice" is invoked in the classroom setting, it associated with efforts to liberate students from the confines of the classroom and connect them, immerse them, in an active formal community in which knowledge is instrumental and in practical use by knowledgeable professionals. However, almost always, this results in an experience that is more like an extended site visit with people engaged in professional practice, rather than joining as members of the practice.  Students get limited access and have limited participation opportunities in otherwise genuine work efforts that are underway outside in the "real world."  Projects like Globe, Co-Vis, Jason, and Passport to Knowledge use networking technology to connect students with peer and adult experts engaged in specific fields of endeavor that lend authenticity to the school's inert curricular knowledge.

Brown, Ellery and Campione, (1997) assert that a school can be constituted as a community of practice where the practice is school learning.  Their work with a school in Oakland shifts the focus from fragmented knowledge acquisition to an intense program of learning how to be learners.  The students are viewed as novice (grade school) learners working with more expert learners (teachers and researchers) and more experienced learners (other students including graduate level students) to develop the practice of learning. The students selected major and minors subjects of study, and were made responsible for both learning and teaching in these area of expertise. There is multi-age and multi-ability student grouping to help facilitate the informal mentoring and apprentice learning that is a part of community life.  The research team helped the school employed a

number of participant structures that are very different from conventional classrooms, reciprocal teaching meta-cognitive strategies, jigsaw patterns of collaborative research, guided writing, benchmark lessons and cross talk (Brown, Ellery and Campione, 1997). All of these procedures have become community mechanisms that help define roles and responsibilities and provide a strong sense of group identity.

While these examples seem to suggest that classrooms can approximate communities of practice, the temporary time period and the students' lack of choice to participate make it difficult to characterize them as members of a community of practice. Furthermore, the classroom routines do not evolve out of the expert practice of the teachers and researchers as 'expert' learners themselves, nor do students do no see their community experts at work. And finally, the larger sociocultural, political contexts of public schooling (e.g., standardized testing) and researcher intervention (i.e., temporary and specially funded) cloud the authenticity of the enterprise.

**Designing Technical Environments to support Practice-Based Communities**

The dawn of computer networking across geographic boundaries was also the dawn of much experimentation with network-based support for otherwise isolated Practice Communities outside the business world, such as classroom teachers or university researchers (Harasim, Hiltz, Teles, Turoff, 1994). Efforts to use technology tools to develop and facilitate online communities of practice continue to grow:

TERC used email and online conferencing to foster a community of teachers of project based science in LabNet. While this community is no longer active, it was one of the first to develop a community of practice online with tele-mentoring. The connections help

many teachers take a more reflective stance toward their practice and to experiment with shifts to new forms of teaching in a supportive environment. This was one of the early projects to demonstrate how an online community of practice could form an alternative to traditional methods of diffusion of knowledge with a community.

The Math Forum brings together teachers, students, and researchers working with school. The resulting math community relies on a range of web communication tools, including the virtual environment developed by SRI International, Tapped In. These tools help support diverse participation structures in the community. For example, pre-service teachers are employed in a process of analysis of students work and enlisted to provide online feedback to students who submit their reasoning on the "problem of the week." Other online communities include Education with New Technology (ENT) at Harvard and the Inquiry Learning Forum at Indiana University (Barab, MaKinster, & Scheckler, this volume), both of which provide extensive online contexts for reflection on practice by a community of practicing teachers. Teachers of art can find others who share this identity through the Getty ArtsEd Network,

Teacher who see service learning and global citizenship as an important function of schooling have connected with one another in the International Education and Resource Network (iEARN). The levels of participation have resulted in a structure of management that uses the United Nations as a model. Each country has a regional community that grows as volunteers in the community take on leadership roles. Once they have evolved a structure, they can participate on the management council that manages the international community. The international secretariat moves from country to country. Their annual

meetings in face to face settings move from one continent to the next. The rest of the work is all facilitated by work in online conferences.

The Virtual High School and the Global Educator Network are online communities for educators who teach online in high schools and universities. In both cases, there are efforts to use the online tools to provide community support, to develop roles, and to evolve a structure of continued participation and with it an identity.

These examples highlight the roles that technology plays in fostering online communities of practice. The participants may not know everyone in the community and there will be many different levels of participation from highly active members who play critical roles in the continuity of the community to those who have registered and yet remain on the fringe.

Designing online communities of practice offer new challenges because the participation structures are new. New members engaged in learning their practice must also learn new conventions and skills for engaging one another. Communities require channels for communicating among members and for accumulating and archiving the history of their group interactions. When communities are spread across time and space, networking tools support those actions. But virtual networks must also be able to support subtle cultural mechanisms that shape interaction, identity, and access, such as rituals and traditions that distinguish new comers from old timers in communities that rely on face-to-face encounters.

**Knowledge-Based Learning Communities**

Knowledge-based learning communities construct, use, reconstruct, and reuse knowledge in deliberate, continuous cycles (Scardamalia & Bereiter, 1994; Bereiter, 2001; Hewitt, this volume). A knowledge-building community seeks to advance the collective knowledge in a subject or field of inquiry, and to do so in a way that supports the growth of each of the individuals in the community, i.e., the intentional development of experts within the community.  The group is engaged in a process of thinking about knowledge as knowledge. Knowledge-based learning community members continue to adapt the knowledge product to new and emerging conditions, to better understand processes that are dynamic in nature.  The clearest example of a knowledge building community is a set of researchers who work toward understanding a phenomenon, concept or relationship, e.g., earthquakes, black holes or the effect of divorce on children.  Like most learning communities, these groupings exist within programs, organizations, and professional societies.  They function to make program, organizational, or community knowledge an object externalized from the tacit understandings, unbundled from practice, and available for iterative evolution.

Table 3. Knowledge-Based Communities

| Community Dimensions | Knowledge-Based Communities |
|---|---|
| Membership | Membership is defined by credentials as knowledge builders. |
| | Members may or may not know each other personally. |
| | Strong identity with the knowledge building endeavor |
| | Leadership evolves from the efforts of knowledge building. |
| Task Features and/or Group Goals | Evolution of the knowledge base through current use and for future users. |
| | Focus on validation knowledge, e.g., through peer review of cycles of generation of knowledge products. |
| | Focus on learning how to learn, or learning how to strengthen or counter ideas or arguments. |
| | Shared interest in development of the community. |

| Participation Structures | Long term commitment to construct and reconstruct knowledge base. |
| --- | --- |
| | Organized and defined by the tasks of production of intellectual work. |
| Reproduction & Growth Mechanisms | Construction of a shared language for characterizing group work. |
| | Development and evolution of a set of procedures for evidence and interpretation that are passed form one group to the next. |
| | Interchanges with similar knowledge-building communities. |

What makes a knowledge building community distinct from a task-based learning community is a central focus on the design of an external representation of the community thought. While a task-based learning community is also engaged in the process of making knowledge, it is generally making it as a reflection of what members have learned. Task-based community members create a collection, an anthology, a lesson plan, a set of procedures, or a publication that is finished.  It can be read or used by others but does not invited republishing, amendments or modifications. The task-based community often disbands after the product is designed. They may not look at the product again other than to suggest others use it. In this regard, the knowledge building community shares some characteristics with the task-based community. However, here the task is much broader, and the group commitment much deeper.

Unlike a task community, a knowledge building community does not complete a product, publication, or gallery as an end point of effort. Instead members work on living documents or database of ideas, which is a living, changing record of their shared mind. Their contribution moves in a larger discourse where each contribution is to be examined, reviewed and analyzed for clues on how to take the next turn in the community discourse.

It is an intellectual conversation with a trace that can be revisited and rewritten to fit new notions of the ongoing activities. A knowledge-based community views its work as one move in a process of continual change to a common external codified knowledge base around the practice.

An important distinction between a knowledge-based learning community and a practice-based learning community is a consequence of this intentionality. In the latter, the development of practice relies on the natural evolution of practice over time and individuals. That is, it relies upon the natural variation that emerges as novices advance in the practice and add their own modifications, and the reciprocal shaping of tool and practice. In practice-based communities these mechanisms create tension in the community that further pushes the evolution of practice and practical knowledge. However, in the knowledge-based community, the intentionality is explicit, not tacit. Members actively seek to evolve the practice of knowledge building as well as the content.

**Designing Technical Environments to Support Knowledge -Based Communities**

An educational example of a knowledge building community can be found in the social infrastructure that is created around groups of school-age students using the networking software, Knowledge Forum, as the tool for externalizing their understandings (Hewitt, this volume). In the schools Hewitt describes, the goal was to transform whole the social organization of the classrooms to a knowledge building community. Students engaged in a number of different knowledge building activities some of which involved the use of Knowledge Forum as the tool for externalizing their understandings. In knowledge-building communities, tools evolve that make it possible for groups to store and reuse

knowledge, but the group use of a tool does not necessarily index a knowledge building community.

For example, Bugscope, is a web accessible electron microscope available for student and teacher use from the classrooms. Students send their collected bug samples through postal mail and Bugscope technicians mount them for viewing with the electron microscope. Using a web interface, the students can examine and save images of the eyes, skin, hair, mouth, parts, and legs of even the tiniest creatures. The pictures taken by one class are added to a database so that everyone can view them. In this way they are collectively creating a visual database of what a group of students choose to examine on bugs, spiders, worms and flies. While these students are collectively building a database of information, they are doing so as individuals with no ties to a larger community. The pictures are not individually labeled which makes it difficult to view images of other schools. To be participants in a knowledge building community they would need to work together to understand the knowledge that can be derived from the data collection. As yet, there has been no real community development around this online tool, but it is an example of a technical tool that could provide the online technology support for a knowledge-building community of educators and students who are interested in the study of small organisms.

An example of the role of technology in a knowledge-building community can be see in the partnerships that the city parks and recreation department of Apple Valley, Minnesota forms with the their local high school program of environmental studies. Students, in this interdisciplinary program use a range of technical tools to make careful

measurements of the quality of water, types of organisms present, and characteristics of the water environment in a city pond (NCREL). They do so at the request of the city parks and recreations services and they work in teams and share their data with the community in multimedia products. Since each new class starts the activity over when they enter the science course and they do not use or build on the work of prior students, their collaborative work, in this system of classification would be an example of a task-based learning community. The city parks and recreation department by organizing these data measurements in a flexible system for repeated use over time, would be characterized as a knowledge-building community. It might make sense to think of the high school students as visiting "interns" in this knowledge-building community.

In a similar project organized by a primary teacher, Kristi Rennebohm-Franz, very young students are active participants in building the knowledge about a pond of water in their community. The students and teacher are using web technology to record what they are learning and to save it so that each successive class of students can build on the work of what has been done by the previous class. The knowledge-building is evident in the students' web pages in both written and visual forms. While mindful of the reasons that we discussed earlier challenging the use of communities to describe student groups, this group of primary students come as close to a knowledge-building community as one is likely to find in a school setting.

The *Knowledge Loom* is a knowledge building community organized around best practices in teaching and learning. The *Knowledge Loom* is a web-based resource developed by the Northeast & Islands Regional Educational Laboratory at Brown

University (LAB) with support of the U.S. Department of Education. It features a database of the best-practice resources for elementary, middle and high school teachers.  The website provides a meeting place as well as the technical structure for members to continually "add their own threads of wisdom and experience to the content."  They can do this by sharing their teaching knowledge in the form of "success stories," responding to one of the posted success stories or participating in panel discussions.  Community experts are available to respond to questions posed by members, and leaders in the field are available for online panel discussions on different topics.

Membership in the community is through a process of registration and communication with the community is achieved through a biweekly newsletter. Members can play move from passive observer to active contributor through their actions and the reactions of the community. All members can contribute their ideas while other more central community members serve as peer reviewers to assure quality of the content. The site helps generate a language and a structure for the sharing of teaching practices.  A practice is defined and then illustrated by stories and supported by research. The loom is a technical-social infrastructure for the building of knowledge as an ongoing task of the community.

In the workplaces, outside of formal educational settings, the notion of intentional knowledge building has emerged from a perceived crisis of competition. As companies strive to improve production and capture market share, they have turned to the deliberate capture and reuse of workplace knowledge as a critical strategy (Davenport & Prusak, 1998). This notion of knowledge includes worker knowledge and expertise as well as the development of 'knowledge' out of raw information mined from clients. Obligingly,

technology companies in the 1990s generated a variety of "knowledge management" software systems, designed to allow for worker contributions in many forms (documents, email, images, sounds, and so on) and offering an array of actions that could be performed on archived data, such as linking and context-sensitive searching. A second major class of software development, also a database of sorts, is the customer relations management package (CRM and e-CRM). Customers, especially e-customers, are now viewed as niche communities, from which valuable development information can be gathered (Hagel & Armstrong, 1997). In the late 1990s companies began to develop 'information policies' and hire high level executives into positions like "Chief Learning Officer" or "Chief Knowledge Officer," to direct these activities. Because the production of knowledge is still generally not perceived as the main goal of these companies and organizations, companies must establish an organizational culture in which this activity is highly valued (Dixon, 2000)

Knowledge-based communities, share many of the characteristics of practice-based communities, but add the intentional, focused activity of building, managing and using information over time. Technical environments for knowledge-building communities must support the development of communities of practice, but have at least two additional requirements. First, the technical environment must support fairly sophisticated knowledge handling system, i.e., a means for identifying, adding, annotating, modifying or extending, for making connections, for searching, retrieving, and unpacking contributions. Further, this system must be able to handle contributions in a variety of formats. Second, there must be a mechanism for warranting knowledge, that is, a means for validating its worth according to community values.

# Summary of Topology of Learning Communities

We have characterized three types of learning communities.  As a summary of the preceding discussion, Table 4 provides a comparison of differences between task-base, practice-based and knowledge-based learning communities, as we have discussed them.

Table 4: Comparison of task-base, practice-based and knowledge-based learning communities.

| Dimensions | Product-Based | Practice-Based | Knowledge-Based |
|---|---|---|---|
| **Membership** | Members assigned or grouped on the basis of task features | Members seek participation to become more experienced practitioners | Members participate by virtue of relevant expertise and common interest |
| | Members know one another | Members may or may not all know each other | Members may or may not know each other |
| | Temporary Group identity with task | Strong identity with role in ongoing practice/ profession | Strong identity with knowledge/expertise |
| | Informal or emergent division of labor | Formal division of labor based on roles and identities | Formal division of labor based on roles and identities |
| | Formal or informal leadership, linked to completion of task | Leadership emerges from acknowledged experience and expertise, a source of ongoing tension in the community | Leadership evolves from knowledge building successes and reputation in the knowledge field |
| **Task Features and/or Group Learning Goals** | Well defined topic, project, or problem , with clear start and finish | Productive, collective activity comprised of many tasks | Evolution of the knowledge base through current use and for future users to improve practice. |
| | Learning goals as a part of the project. | Learning as the tacit or explicit consequence of ongoing practice; Continual redesign and experimentation to solve challenges, accommodate variation, and integrate development of tools. | Learning as knowledge; Focus on knowledge production, validation, and dissemination. |
| | | | |
| **Participation Structures** | Small group interaction with informal division of labor. | Open access to practice, practitioners, culture and tools of practice; changes in members' roles reflect changes in their knowledge; roles related to division of labor | Written dialogue and documents used to externalize, construct and reconstruct the knowledge base. |

| | Ends with the completion of the product that reflects the learning. | Engaged in continual production of practical work, in the course of which learning opportunities arise. | Organized and defined by the production of intellectual work and theoretical constructs. |
| --- | --- | --- | --- |
| | | | |
| | | | |

| Reproduction and Growth Mechanisms | Explicit transfer of practices and procedures across groups through products, procedures and guidelines. | Evolution of the practice of through discourse, tools and artifacts of work, action routines, anecdotes about practice, and other cultural mechanisms, both tacit and explicit | Develops and evolves a set of procedures for evidence and interpretation that are passed form one group to the next. |
|---|---|---|---|
| | Shared vocabulary and agreed upon practice for the duration of the task | Shared values and language; reproduction and evolution of valued practices, i.e., an evolving culture | Shared values and language; reproduction and evolution of valued practices, i.e., an evolving culture. |
| | Community practices carried between discontinuous groups by organizational leaders or programs. | Exchanges with adjacent, relevant practice communities, e.g., across companies in an industry, or across departments in a company, or school, often through intentional brokering. | Interaction with similar knowledge-building communities, often through intentional brokering. |

We recognize that there are social entities that contain all three of these types of learning communities, and membership in these different "communities" varies in ways that are not always clear. This echoes back the discussion at the beginning of this chapter about macro or micro perspective on communities. It complicates the issue of how to characterize the community of learning communities. However, for the final section of the paper we will propose a group system that emerges from the intersection of our three communities: the learning organization.

**The Learning Organization**

Learning Communities are often subdivisions of larger organizations, or activity systems. While they may be brief in duration or longer lasting, they support the work of ongoing groups to further their understanding and to develop their ability to work

creatively. In this section we focus on the overlapping or share features of the three kinds

of communities we have discussed. Figure 1 illustrates the three types of learning

communities that we have described -- task-based, practice-based and knowledge-based --

in a system of overlapping circles. In the common core, where all three overlap,  lies the

fertile ground of organizational learning (Senge, 1990).

Each of these three 'community' types, shares characteristics in common. For

instance, all have a working culture that members can rely upon to help them make sense of

the work underway. However, obviously, time and other constraints in the learning

community keep that culture from developing into a more enduring, rich resource for future

work. Also, while each community type is goal directed, differences in goal or intent or the

organized social activity mean differences in the nature of activity. A community of practice

is focused on the accomplishment of the practice, not the protection of knowledge about the

practice gained as a by-product. On the other hand, the knowledge building community can

be viewed as a community of practice that has taken as its practice, the deliberate

construction of ongoing, dynamic, knowledge base about some productive field of

endeavor, such as second language acquisition or ABS braking systems.

We believe each type of community has a particular emphasis or focus that best

defines it. The community of practice is largely about learning as the transformation of

identity within the practice, e.g., novices becoming more expert. And, because it is focused

on a 'real world' practice, the community of practice situates knowledge in the context of its

use in practice.  The learning community is a work group, focused upon a time limited task

or effort. The knowledge building community is oriented toward the intentional

development of reusable knowledge, and more importantly to its continued growth and development.

The community of practice and the knowledge building community are able to rely upon cultural mechanisms to aid members in their participation. Both are most functional when they provide for access and participation among members of varying degrees of experience and expertise. The community of practice and the learning community share far fewer characteristics, but both rely on the mechanism of interpersonal interaction to move the activity forward. The learning community and knowledge building community share the common element of deliberate, explicit efforts to accomplish learning.

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Figure 1: Learning Organization-the Intersection of task, practice and knowledge-based Communities

All three kinds of community activity exist within one larger socio-cultural organization such as a business, a school, or an institution. We use the terms "organizational learning" to describe a collective unit under which these groups are nested.

The notion of the "learning organization" is a relatively new description of workplace culture as the source of tacit and explicit learning that supports and develops the organizational enterprise. This idea emerged in the field of business management and leadership from seminal work by Argyris (1977) and extended by Senge (1990).

Kofman and Senge (1995) describe a learning organization as a "culture of systems" in which innovations evolves though generative conversations and concerted actions in contrast to fragmentary competitive organizations which are driven by reactions to

problems without a sense of the whole. A learning organization is a system in which knowledge sharing is overtly valued and supported within the culture of the workplace. The refinement and extension of networking and database technologies and the crush of competition in the economy are two influences that have pressed on the practice of business and begun to evolve the practice of knowledge creation, use, and sharing in the organization (Barksdale, 1998; Davenport & Prusak, 1998; Dixon, 2000; Nonaka & Takeuchi, 1995).

**The Learning Organization: An Example:**

Graduate education is one setting in which task-based, practice-based, and knowledge-based communities co-exist, potentially. If the institution deliberately takes on this role, it can function to connect individual practitioners with the larger community of professional practice which contextulizes their work and generates formal knowledge for the field. We believe this is a powerful role for higher education in the future, and one that is well supported by network applications even today. When positioned in this way, the professional graduate school becomes a learning organization, deliberately self-aware and constantly evolving both its practice as an organization and the knowledge base it relies upon. To illustrate this, we use an example that we are both familiar with--the online Masters in Educational Technology Program at Pepperdine University. The Graduate School of Education and Psychology (GSEP) designed this program with the explicit goal of helping students develop a deeper understanding of community through their reflections on task-based learning experiences in the program and more importantly through transforming their identities in their local "communities of practice." And throughout the process, a reflective metacognitive stance is accomplished by making changes in their

thinking observable thought explicit knowledge construction.

**Task Based Community.** While students bring with them their membership in a local practice, their participation in the graduate program also places them in a task-based learning community, the goal of which is explicitly to carry out work and learn something in the process. When admitted, students are formed into cadres and take all of their courses together. Their first week of the program is a series of face-to-face activities often with a range of technology tools structured by the cadre that has just completed their degree. They pass on the learning culture in a "camp" experience. After the first week, they continue to interact through a series of task- based "learning communities" organized online as part of their coursework. Their work together in a learning community provides access to variations in practice, and thus to discussions and work groups aimed at improving practice.

**Practice-Based Community**. Students come to the program from primary and secondary education communities, some are members of university or corporate communities. They represent countries as distant as Japan or as different as Alaska. Thus each student brings a personal, local version of technology in education as practiced in his or her workplace. The program is designed to make use of this, rather than ignore, reject, or deny it. The work experiences they share in the ongoing discourse of the program's yearlong action research project and companion courses offer a view of the variations and the commonalities in problems, issues, objects, histories, and goals. The elementary school computer lab teacher and the aerospace information technology worker share common frustrations at the consequences of working on the peripheries of their organizations. The high school English teacher, and the university media specialist share their common concerns about information literacy and acceptable use policies for student Internet use. For each of these students, their roles in communities of practice is the basic unit of design of each learning experiences. The overarching goal of the program is for each student to understand their role in a primary community of practice, and then develop new strategies

for how they might serve this community in effective ways.

**Knowledge Based Community**. Students and faculty also have experiences as members of "knowledge-building communities." For example, in learning about mentoring and team leadership, the students inherit the Pepperdine Mentor Center, an online repository of what past cadres have learned about mentoring. They also inherit the responsibility to grow the database of cases. The medium of the web with multi-access to information stored in databases, makes it possible for makes it possible for students to leave their work for future generations of students and, at the same time, maintain access for their own use. This property of the technology to provide students intellectual ownership of their property and, at the same time, be able to share them future students changes the way teachers and students can work in classrooms. It allows for the multi-generational form of knowledge building.

Faculty and students are also jointly engaged in a "knowledge building community" as they collectively reshape the program in an iterative fashion. In contrast to face-to-face teaching, most of the dialog of each online course is stored and made available online for visits by other faculty or students. This provides a framework for how the course was taught in the past. Faculty and sometimes students share ideas for assignments, activities, and projects in the online teaching and so effective strategies diffuse rapidly through the program. New faculty can visit courses from the past to see how they were taught. In this way each year faculty are learning from one another. Students, faculty, and alumni of the program also participate in an annual program debrief, conducted during the final face-to-

face meeting, as a greatly modified version of the Future Search (Weisbord & Janoff, 1995).

## Technical Support for the Learning Organization

Over the past five years, the impact of social, community based models of learning and the rise of the Internet and Intranet webs have combined to give birth to software designed to support online teaching and learning as well as knowledge capture and sharing in organizations.

Rather then work within the limitations of packaged software, faculty model for students different ways of constructing the learning context. They set this example as they expect that students will also learn to use the technology to create similar models that can be used in their communities of practice. Asynchronous, threaded discussions, (Newsgroups) are a foundational part of online learning. In addition, the synchronous, multi-user, chat environment, Tapped In , (see Schlager & Fusco this volume) provides students, faculty, and guests with a landscaped, real-time space for interaction. Where newsgroups supports longer reflective pieces, Tapped In supports fast-paced, short conversational turns.

In newsgroups, students have the time and space to reference their workplace, in anecdotes or as examples to illustrate course ideas. This sharing is probably most useful as students use their own community contexts to make sense of theoretical and empirical content of the courses. This opportunity is heightened by the responses of peers and the opportunity to see peer versions of the workplace. Students move flexible from the narrow confines of the specifics of their school or organization, or from ideas presented in a book

to a more expansive view of how many schools and organizations deal with a problem or implement ideas. Students also have access to server space and build their online portfolio as a central location to keep information about their learning process.

In the learning organization, there is a deliberate, self-conscious attempt to support all three kinds of community systems by harvesting experience and supporting its shared us among members. To support the continuity and the evolution of the OMAET culture, the tacit and explicit knowledge embedded in the many community activities must find a repository that is accessible to members of the organization. Over the past five years, the impact of social, community based models of learning and the rise of the Internet and Intranet webs have combined to give birth to software designed to support knowledge capture and sharing in organizations. There are many varieties of specific knowledge management software packages, but most share these characteristics: backbone of a searchable database of web objects (text, images, graphs, spreadsheets, and so on), ability to link objects together for personal use, support of collaborative or shared workspace, ability to push information to others (through publishing or email or other broadcast methods). Four interesting KM packages include: Intraspect, Simplify, BSCW, and Lotus.

Pepperdine has been using Intraspect for three years. Figure 5 shows the listing of folders in the OMAET Group Memory database. As the titles suggest, the database holds artifacts that capture tacit dimensions of program culture and tradition.

Figure 5: Pepperdine's Group Memory Database

[Insert Figure 2 here]

**Learning Designs for the Future**

This example suggests a shift not only at the classroom level, but at the institutional level as well. A learning organization requires a redefinition of learning as a social activity-one that is inherently tied to group membership and identity. We have suggested that this culture will include a range of different forms of community learning, focused on the development of products, practice and knowledge. While schools at present are divided into autonomous "class" units, to create the culture of learning necessary for learning organization means engaging learners in a system that supports collaborative designs, and the preservation and sharing of knowledge . Networking technology can support the aggregation of these communities across distance and time into a learning landscape that looks very different than the schools of the past century. This offers a dramatically different role for technology integration in schooling than we have seen over the past three decades, during which time technology was largely viewed as a conduit for delivering curriculum to individuals.

In this chapter, we have discussed learning as a function of situated activity, whether that activity be situated in a task-based, practice-based or knowledge-based community. In fields other than education, the activity is focused on something other than learning and knowledge is the by-product of other productive work. It is much less threatening and much less difficult to support intentional knowledge building enterprises in organizations that do not have 'learning' as their chief product and process (Wenger, 2000). Yet, teaching is a professional practice, with an evolving body of knowledge, and a diverse and divided work force. Networking technology offers the teaching profession an

opportunity to organize as a distributed learning organization, to integrate historically

divided  groups particularly researchers and teachers, and to more effectively evolve

practice through collaborative reconceptualization of learning practices.

## References

Argyris, C. (1977). "Double Loop Learning in organizations." Harvard Business Review (September - October),pp 115 - 125.

Barab, S. & Duffy, T. (2000). From practice fields to communities of practice. Chapter 2 in Jonassen & Land eds. Theoretical foundations of learning environments. Hillsdale, NJ: Lawrence Erlbaum Associates.

Barksdale, J. (1998). Communications technology in dynamic organizational communities. Chapter 9 in Hesselbein, Goldsmith, Beckhard, & Schubert (Eds.) *The community of the future*. San Francisco: Jossey-Bass.

Berieter, (2001), *Education and the Mind in the Knowledge Age*. New Jersey: Lawrence Erlbaum and Associates (in press).

Brown, A. L., & Campione, J. C. (1994). Guided discovery in a community of learners.  In K. McGilly (Eds.) *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 229-270). Cambridge, MA MIT Press/Bradford Books.

Brown, J. S., and Duguid, P. (2000). *The Social Life of Information*.  Boston: Harvard Business School Press. Brown & Duguid, 1999

Brown, A., Ellery, S.  and Campione, J. (1998) Creating zones of proximal development electronically. In James Greeno & Shelly Goldman (eds.) *Thinking Practices in Mathematics and Science Learning*. New Jersey:Erlbaum.

Bruckman, A. & Resnick, M. (1993). Virtual Professional Community: Results from the MediaMOO Project. In Third Internation Conference on Cyberspace, Austin, Texas.

Bruner, J. S, (1973). *Beyond the information given*. New York: Norton.

Chaiklin, S. & Lave, J. (Eds.) (1993). Understanding practice: Perspectives on activity and context. New York: Cambridge University Press

Cicourel, A. (1973) *Cognitive Sociology: Language and meaning in social interaction*.

London: Penguin.

Coalition for Essential Schools, (2000). Reinventing high schools: Six case studies of change. Jobs for the Future. Available online from Coalition of Essential Schools (www.essentialschools.org).

Cole, M. (1988). Cross-cultural research in the sociohistorical tradition. *Human Development*, **31**:137-157.

Cole, M. (1996). Cultural psychology: The once and future discipline. NY: Cambridge University Press.

Cole, M. & Engestrom, Y (1993). A cultural-historical approach to distributed cognition. In Salomon ed.. Distributed cognitions: Psychological and educational considerations. NY: Cambridge University Press.

Cole, M. & Scribner, S. (1974). Culture and thought: A psychological introduction. New York: John Wiley

Davenport, T. H. (1997). Information ecology: Why technology is not enough for success in the information age. NY: Oxford University Press.

Davenport, T.H. & Prusak, L. 1998. Working knowledge: How organizations manage what they know. Cambridge, MA: Harvard Business School Press.

Deming, W. E. (1993) The New Economics For Industry, Government, Education. Boston: The Massachusetts Institute of Technology.

Dewey, J. (1916). *Democracy and education.* New York: The Free Press.

Dixon, N. (2000). Common knowledge: How companies thrive by sharing what they know. Cambridge, MA: Harvard Business School Press.

Durkheim,E.(1915) (reprinted 1995) Elementary Forms of Religious Life. Glencoe, Il:The Free Press.

Eklund, J. (1993) Interview with Robert Ballard. Division of Computers, Information, & SocietyNational Museum of American History, Smithsonian Institution. Available online at http://americanhistory.si.edu/csr/comphist/ballard.html

Engstrom, Y. (1987). Learning by expanding: An activity-theoretical approach to developmental research. Helsinki: Orienta-Konsultit.

Engestrom, Y. (1999). Activity theory and individual and social transformation. Chapter 1 in Engestrom, Miettinen, & Punamaki eds. Perspectives on activity theory. NY: Cambridge University Press.

Gergen, K. (1995). Social construction and the educational process. Chapter 2 in Steffe & Gale eds.. Constructivism in education. Hillsdale, NJ: Lawrence Erlbaum Associates.

Goldman, S. & The Cognition and Technology Group at Vanderbilt (1997) Supporting Student Learning in Schools for Thought Environments. Paper presented at the August 1997 biannual meeting of the European Association for Research on Learning and Instruction. Athens, Greece. Available online at http://peabody.vanderbilt.edu/projects/funded/sft/formoreinfo/srg/srgearli97.html

Greenfield, P. M. (1999). Historical change and cognitive change: A Two-Decade Follow-Up Study in Zinacantan, a Maya Community in Chiapas, Mexico. MIND, CULTURE, AND ACTIVITY, 6, 92-98.

Hagel, J. & Armstrong, A. (1997). Net.gain: Expanding markets through virtual communities. Cambridge, MA: Harvard Business School Press.

Harasim, L., Hiltz, S., Teles, L., & Turoff,M. (1994). Learning Networks: A Field Guide. Cambridge, MA: MIT Press.

Heath, S.B. (1983). Ways with word s: Language, life, and work in communities and classrooms. Cambridge: Cambridge University Press.

Hewitt, this volume,

Houlopoulos, T., Spinello, R., & Tomjs, W. (1997). Corporate instint: Building a knowing enterprise for the 21$^{st}$ century. NY: Van Nostrand Reinhold.

Hutchins, E. (1996). Cognition in the wild. Cambridge, MA: The MIT Press.

John-Steiner, V. (2000). Creative collaboration. NY: Oxford University Press.

Kofman, F. & Senge, P. (1995). Communities of Committment: The heart of learning organizations. In S. Chawla & J. Renesch (Eds.) *Learning organizations: Developing cultures for tomorrow's workplace*. Portland: Productivity Press. p. 15-44.

LaTour, B. (1987). Science in action. Cambridge, MA: Harvard University Press.

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

Lave, J. (1988). Cognition in practice. NY: Cambridge University Press.

Lave, J. (1993). The practice of learning. Chapter 1 in Lave & Chaiklin eds. Understanding

practice: Perspectives on activity and context. NY: Cambridge University Press.

Lewis, C.C. & Tsuchida, I. (1998). A lesson is like a swiftly flowing river: How lesson research improves Japanese education. American Educator (also available at http://lessonresearch.net/lesson.html).

Means, B., (1998). Melding Authentic Science, Technology, and Inquiry-Based Teaching: Experiences of the GLOBE Program. *Journal of Science Education and Technology*, 7, 1, 97-105.

Mehan, H. (1979). Learning lessons: Social organization in the classroom. Cambridge, MA: Harvard University Press.

Mehan, H. (1983) Social constructivism in psychology and sociology. Sociologie et Societes. XIV(2):77-96.

Mishler, E. (1999). Storylines: Craft artists' narratives of identity. Cambridge, MA: Harvard University Press.

Newman, D., Griffin, P., and Cole, M. (1989). *The Construction Zone: Working for Cognitive Change in Schools*. Cambridge, UK: Cambridge University Press.

Nonaka, I. & Takeuchi, H. (1995). The knowledge-creating company. New York: Oxford University Press.

Norman, D. (1980). Twelve Issues for Cognitive Science, *Cognitive Science,* **4**, 1-32.

Pea, R. (1993). Practices of distributed intelligence and designs for education. In G. Salomon (Ed.), Distributed Cognitions: Psychological and Educational Considerations (pp. 47-87). Cambridge, UK: Cambridge University Press.

Pea, R. D. & Gomez, L. M. (1994). Distributed multimedia learning environments: Why and How? *Interactive Learning Environments,* **2**(2), 73-109.

Rheingold, H (1993). *The Virtual Communities*. New York: Addison-Wesley.

Riel, M. (1998) Learning communities through computer networking. In James Greeno & Shelly Goldman (eds.) *Thinking Practices in Mathematics and Science Learning*. New Jersey:Erlbaum.

Riel, M. & Fulton, K. (2001) The role of technology in supporting learning communities. *Kappan*. **82**:518-523.

Rennebohm-Franz, K. (1996) "Toward a Critical Social Consciousness in Children: Multicultural Peace Education in a First Grade Classroom." Theory into Practice.

Autumn 1996: 264-270.

Rogoff,, B. (1995), Observing sociocultural activity on three planes: participatory
appropriation, guided participation, and apprenticeship. In Wertsch, Del Rio, &
Alvarez (eds). Sociocultural studies of mind. NY: Cambridge University Press.

Rogoff, B. & Lave, J. eds. (1984).  Everyday cognition: Its development in social context.
Cambridge, MA: Harvard University Press.

Rogoff, B. (1994). Developing understanding of the idea of communities of learners.
Mind, Culture, and Activity, 4, 209-229.

Scardamalia, M., & Bereiter, C. (1994). Computer support for knowledge-building
communities. The Journal of the Learning Sciences, 3(3), 265-283.

Schlager,M, & Fucso J. this volume

Schrage, M. (1995) No More Teams! : Mastering the Dynamics of Creative Collaboration.
New York: Doubleday.

Scribner, S. (1990) A sociocultural approach to the study of mind. In Greenberg & Tobach
(eds) Theories of the evolution of knowing. Hillsdale, NJ: LEA.

Senge, P (1990). The Fifth Discipline, Doubleday, London.

Singleton, J. C. (1998). Learning in likely places: Varieties of apprenticeship in Japan. NY:
Cambridge University Press.

Sizer, T. (1992).  *Horace's school: Redesigning the American high school.*  New York:
Houghton Mifflin.

Smagorinksy, P. (2000). If meaning is c onstructed, what is it made from? Invited address,
Annual Meeting of the American Educational Research Association, New Orleans.

Songer, N. (1993). Learning science with a child-focused resource: A case study of kids as
global scientists. *Proceedings of the Fifteenth Annual Meeting of the Cognitive
Science Society* (pp. 935-940). Hillsdale, NJ: Erlbaum.

Turkle, S. (1984). The Second Self: Computers and the Human Spirit. New York: Simon
and Schuster

Vygotsky, L. S. (1978). *Mind in Society:  The development of higher psychological
processes.* (M. Cole. B. John-Steiner, S. Scribner, & E. Souberman, Eds and
Trans.) Cambridge, MA: Harvard University Press.

Weisbord, M. & Janoff, S. (1995). Future search: An action guide to finding common

groun in organizations and communities. San Francisco: Berrett-Koehler Publishers.

Wenger, E. (1999). Communities of practice: Learning, meaning, and identity. NY: Cambridge University Press.

Wenger, E. (2000). Building communities of practice. Invited speaker, Call to Leadership, Pepperdine University. Culver City, CA, September.

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

Wertsch, J. (1997) *Mind As Action.* London: Oxford University Press.