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From Practice Fields to Communities of Practice

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Prefatory Note

In writing this piece we (a constructivist and a situativity theorist) struggled with the distinction between situativity and constructivism, and the implications in terms of the design of learning contexts. In clarifying (and justifying) our two sides, we created strawman and pointed fingers with respect to the limitations of each other's perspectives. We found that although discussions of situativity and of constructivism draw on different references and clearly have specialized languages, actual interpretations of situativity and of constructivism share many underlying similarities. Further, when it comes to the design of learning contexts predicated on our respective theories, we found ourselves continuously forwarding similar principles and advocating for similar learning contexts.

We are dealing with evolving concepts—and people use new terms to include and extend old ones. Constructivism was the label used for the departure from objectivism; however, even among those who call themselves "constructivists" there are different perspectives and different sets of assumptions (see Cobb, 1994, 1995; Phillips, 1995). Now the term more commonly used is "situated," reflecting the key proposal from both the constructivist and situativity perspective that knowledge is situated through experience. In the context of this chapter, we found it trivial to distinguish among those learning theories and principles related to constructivism and those related to situativity theory. Rather, we discussed the various learning theories that have informed our understanding all under the heading of situativity learning theories. This term, and its associated assumptions and current interpretations, seemed to better capture the essence of the learning contexts we are forwarding as useful. However, even within the context of situativity theories we found it necessary to make distinctions, and it was these distinctions (not the distinction between constructivist and situativity views) that best captured the essence of this paper.

Currently, we are witnessing a period in which theories of learning and cognition seem to be in a state of perturbation, with numerous books and scholarly articles being published that forward radically new theories of what it means to know and learn. We have been moving from cognitive theories that emphasize individual thinkers and their isolated minds to theories that emphasize the social nature of cognition and meaning (Resnick, 1987). More recently, we have been moving to situative theories that emphasize the reciprocal character of the interaction in which individuals, as well as cognition and meaning, are considered socially and culturally constructed (Lave, 1988, 1993; Michael, 1996). In these latter situative theories (of anthropological origin), interactions with the world are viewed as not only producing meanings about the social world, but also as producing identities; that is, individuals are fundamentally constituted through their relations with the world (Lave, 1993; Lemke, 1997; Walkerdine, 1997; Wenger, 1998).

In general, situative perspectives suggest a reformulation of learning in which practice is not conceived of as independent of learning and in which meaning is not conceived of as separate from the practices and contexts in which it was negotiated . While the dominant movement over the last decade has been to a situated perspective of cognition, there has been considerable variation in our understanding of just what is meant by situated cognition or, the term we prefer, situativity theory (Greeno, 1998; Lave & Wenger, 1991; Resnick, 1987; Young, 1993). In this chapter we examine two dominant themes. First there is an approach arising from work in psychology and education that is focused on learning (or the failure to learn) in school contexts. Because of the schooling context, this work has focused on meeting specific learning objectives or content. For example, the questions that arise are how do we design learning environments to support students in learning mathematics (or learning algebra) or science (or Newtonian principles)? Here, the focus has been on situating content in authentic learner activities. In Senge's (1994) terms, we are focused on creating practice fields[1] in which students in schools engage in the kinds of problems and practices that they will encounter outside of school.

Second, parallel to the development of the psychological perspective of situativity, we have seen an "anthropological" approach[2], reflected most heavily in the work of Lave and her colleagues. Rather than a focus on the situatedness of meaning or content, the anthropological perspective focuses on communities and what it means to learn as a function of being a part of a community. This shift in the unit of analysis from the individual's context to the community context leads to a shift in focus from the learning of skills or developing understandings to one in which, "developing an identity as a member of a community and becoming knowledgeably skillful are part of the same process, with the former motivating, shaping, and giving meaning to the latter, which it subsumes" (Lave, 1993, p. 65).

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[1] Senge introduced the term "practice field" as a metaphor in relation to the practice field of sports.

[2] We caution the reader to not interpret our labels "psychological" and "anthropological" as referring to disciplines or, more specifically, to individuals within disciplines; rather, we chose these labels to denote foci or the unit of analysis typically associated with the work of practitioners of these disciplines.

The goal of this chapter is to explore the implications of these two views of situativity for architecting learning environments. We begin with an examination of the movement from a representational view of learning to a situated perspective. We then examine the psychological perspective of situativity theories in some detail, considering the theoretical underpinnings, distinctions between this perspective and the anthropological perspective, the learning environments associated with this framework, and finally, the key principles for the design of learning environments (practice fields) associated with this group of situativity theories. We then turn to the anthropological perspective and consider how this perspective, in our view, encompasses and enriches the psychological perspective and significantly complicates the design of learning environments (from practice fields to communities of practice). We propose three characteristics of communities of practice that extend beyond those features typically found in psychologically based designs for learning. Finally, we examine in greater detail several examples of learning environments that purport to reflect the anthropological perspective on situativity, i.e., to focus on the development of self in the context of an individual's participation in a community.

Before beginning this discussion, let us emphasize two points that guide the design of this chapter. First, our focus is on schooling—we seek to understand the principles for the design of learning environments that can be utilized in schools. While the designs may require systemic change in the schools, the learning context and the motivation for learning are nonetheless framed within a school environment. Second, it is our belief that the epistemological assumptions we make and our practices are reciprocally determined. Most clearly, one's assumptions about learning and knowledge will reciprocally interact with the design of learning environments and how one participates in those environments (Bednar, Cunningham, Duffy, & Perry, 1992). It is inconceivable that a teacher or instructional designer would advocate a particular lesson or activity without at least a tacit theory of how students think and learn. In turn, however, dissatisfaction with teaching practices is likely to lead to a questioning of the epistemological assumptions on which that instruction is based. Indeed, dissatisfaction with schooling practices, along with the need for theories that account for learning that occurs outside of schools, is a major factor in the development of situativity theories.

FROM AN ACQUISITION TO A PARTICIPATION METAPHOR

Since the cognitive revolution of the sixties, representation has served as the central concept of cognitive theory and the representational theory of mind has served as the most common view in cognitive science (Gardner, 1985; Fodor, 1975; Vera & Simon, 1993). The central tenet of the representational position is that "knowledge is constituted of symbolic mental representations, and cognitive activity consists of the manipulation of the symbols in these representations, that is, of computations" (Shanon, 1988; p. 70).

Consequently, learning is “acquiring” these symbols, and instruction involves finding the most efficient means of facilitating this acquisition.

Since the late 1980s, Sfard (1998) has argued, we have been witnessing a move away from the predominant “acquisition” metaphor that has guided much of the practice in K-12 schools towards a “participation” metaphor in which knowledge is considered fundamentally situated in practice. In large measure, this epistemological shift was stimulated by a growing dissatisfaction with schooling. Learning in school was seen as resulting in inert knowledge; that is, knowledge that was "known" but simply not used outside of schools (Whitehead, 1929). Resnick (1987), in her presidential address to the American Educational Research Association, examined the practices in schools, which are predicated most strongly on the acquisition metaphor, comparing them to how we learn and use knowledge outside of schools. Her analysis focused attention on the collaborative, contextualized, and concrete character of learning outside of school, as opposed to the individual and abstract character of learning that occurs inside of schools. Arguably, it was this analysis that has served as one of the principal stimuli for the development of the participatory perspective with its emphasis on situated activity.

Shortly after Resnick’s (1987) seminal work, Brown, Collins, and Duguid (1989) argued that knowing and doing are reciprocal—knowledge is situated and progressively developed through activity. Central to this theory is the contention that participation in practice constitutes learning and understanding. They further suggested that one should abandon the notion that concepts are *self-contained entities*, instead conceiving them as *tools*, which can only be fully understood through use. Reinforcing this view, Greeno and Moore (1993) argued that "situativity is fundamental in all cognitive activity” (p. 50). It is the contention from this perspective that learning involves more than acquiring understanding; instead, it involves building an “increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves” (Brown et al., 1989, p. 33). This understanding is framed by those situations in which it is learned and used.

The central tenets of this perspective regarding how one conceives of knowledge or of *knowing about* are the following: (a) knowing about refers to an activity—not a thing; (b) knowing about is always contextualized—not abstract; (c) knowing about is reciprocally constructed within the individual-environment interaction—not objectively defined or subjectively created; and (d) knowing about is a functional stance on the interaction—not a “truth” (see Barab, Hay, & Duffy, 1998 or Bereiter, 1994, for further elaboration on these points). This position, we feel, is consistent with the views of Clancey (1993), the Cognition and Technology Group at Vanderbilt (1990, 1993), Greeno (1997, 1998), Roschelle and Clancey (1992), Tripp, (1993), Young (1993), Resnick (1987), and Brown et al., (1989). However, there is another set of discussions related to situativity theory that emphasize the situatedness of identities as well as cognitions. It is through these discussions, with their roots in anthropological circles, that we explore

theories of situativity that focus on the construction of whole persons within communities of practice, not simply "knowing about" (Lave, 1997).

Discussions of situativity that have their genesis in anthropological research, including those being made by some educational psychologists (See Kirshner & Whitson, 1997, 1998), focus on learning in relation to communities of practice and provide a different perspective with respect to what is "situated" and what is constituted within an interaction. In this broadened view, what Lave (1997) referred to as *situated social practice*, there are no boundaries between the individual and the world; instead, "learning, thinking, and knowing are relations among people engaged in activity *in, with, and arising from the socially and culturally structured world*" (p. 67, italics in the original). From this "anthropological" perspective[3] it is not only meanings that are produced, but entire identities that are shaped by and shape the experience. In other words, the interaction constitutes and is constituted by all of the components—individual, content, and context. There are no clear boundaries between the development of knowledgeable skills and the development of identities; both co-arise as individuals participate and become central to the community of practice. We believe that the collection of "psychological" perspectives of situativity that were fashioned out of an interest in cognition, and the work of Resnick (1987) and Brown et al. (1989) in particular, constituted a decisive move away from representational theories of mind and away from didactic models of instruction. The anthropological framework further helps to enrich our conceptualization of this framework for what is meant by "situated." These two perspectives of situativity theories are described in Table 1. It is with this initial analysis of situativity theory that we now seek to develop principles, derived from the psychological framework, for the design of learning environments. Later in this chapter we will take a similar tack with respect to the anthropological framework.

[3] Although we will describe these contrasting alternatives as opposing views and have associated one approach more with the psychological lens and the other with the anthropological lens, it is important to note that much discussion in practice cuts across these two perspectives. For example, many psychologists rely heavily on the anthropological findings in explaining their views of situativity theory, and view whole persons (including cognitions and identities) as being created when learning. In fact, we find few explanations of situativity theory that do not reference the work of the anthropologist Jean Lave, whether these explanations are being forwarded by psychologists or anthropologists. However, many discussions of situated cognition within educational circles are still focused on contextual influences with respect to cognition and not with respect to identity creation, or the reciprocal influence of negotiated meanings, identities, and the communities through which it all emerges. Therefore, we do find the distinctions outlined in Table 1 to be useful in capturing some of the different interpretations of situativity theory (see Kirshner & Whitson, 1997), and in drawing out the implications for designing learning environments. We urge the reader to view these labels as denoting foci or the unit of analysis typically associated with these disciplines, and not the work of individual practitioners within these disciplines.

	Psychological Views	Anthropological Views
Focus	Cognition	Individuals' Relations to Community
Learners	Students	Members of Communities of Practice
Unit of Analysis	Situated Activity	Individual in Community
What is Produced from Interactions	Meaning	Meanings, Identities, and Communities
Learning Arena	Schools	Everyday World
Goal of Learning	Prepare for Future Tasks	Meet Immediate Community/Societal Needs
Pedagogical Implications	Practice Fields	Communities of Practice

Table 1. Focus of Psychological and Anthropological Views of Situativity theory.

ARCHITECTING LEARNING ENVIRONMENTS: PRACTICE FIELDS

Within this theoretical perspective on situativity, the unit of analysis is the situated activity of the learner—the interaction of the learner, the practices being carried out, the reasons why the learner is carrying out particular practices, the resources being used, and the constraints of the particular task at hand. From an instructional perspective, the goal shifts from the teaching of concepts to engaging the learner in authentic tasks that are likely to require the use of those concepts or skills. As Brown et al. (1989) argued, concepts are seen as tools that can only be understood through use.

Designing a learning environment begins with identifying what is to be learned and, reciprocally, the real world situations in which the activity occurs (Barab, 1999). One of those situations is then selected as the goal of the learning activity. Thus, the emphasis is on creating circumscribed "activities" or "experiences" for the learner. Consistent with Resnick (1987), these activities must be authentic; they must present most of the cognitive demands the learner would encounter in the "real world." Hence, authentic problem-solving and critical thinking in the domain is required. Learning activities must be anchored in real uses, or it is likely that the result will be knowledge that remains inert.

Senge (1994), in his discussion of the development of learning organizations, has referred to designs like this as the creation of *practice fields*, and advocates their use as a primary approach to corporate training. Practice fields are separate from the "real" field, but they are contexts in which learners, as opposed to *legitimate participants*, can practice the kinds of activities that they will encounter outside of schools. Furthermore, every attempt is made to situate these authentic activities within environmental

circumstances and surroundings that are present while engaged in these activities outside of schools. However, these contexts are practice fields and, as such, there is a clearly a separation in time, setting, and activity from them and from the life for which the activity is preparation.

Problem-based learning (PBL) is an example of one approach to creating practice fields. In the medical profession, where PBL began and is still most pervasive, the students are presented with real, historical patient cases to diagnose (Koschmann, Kelson, Feltovich, & Barrows, 1996; Evenson & Hmelo, in press). Problem-based learning has extended well beyond the medical profession to elementary and secondary schools, business schools (Milter & Stinson, 1995), higher education (Savery & Duffy, 1996), and a host of other instructional areas. In all of these instances, the goal is to present the students with "real" societal, business, or educational problems. The PBL approach differs from studying cases in that the students are responsible for developing their own position on the issue (their solution to the problem), rather than studying someone else's solution. Thus, they are engaged "as if" they were in the real world working on this problem.

Anchored instruction, as represented in the work of the CTGV (1990; 1993), is another approach to creating practice fields. As with PBL, the goal is to capture a real problem and the context for that problem from the real world. However, in anchored instruction there is no pretense that this is an existing problem for the students. Rather, learners are invited to engage in a fictitious problem. In the Jasper Woodbury Series, rich and realistic video contexts are used to present information relevant to working on the problem. For example, in "Escape from Boone's Meadow," the students must buy into the fact that they are helping to save the eagle in the video, and in "A Capital Idea" they must adopt the idea that they are helping the students at the school develop a fall festival booth[4]. It is only when students "own" these problems that they will be engaged in the same form of problem-solving in which people in the video would engage. Of course, the method of gathering evidence and the range of distractions are considerably different from these practices in the real world. But indeed, in terms of solving the specific problems—developing the most efficient strategy for retrieving the eagle or maximizing profits from the booth at the fair—the students are engaged in solving ill-structured problems.

Cognitive apprenticeship is another approach to conceptualizing and designing practice fields (Collins, Brown, & Newman, 1989). The cognitive apprenticeship framework emphasizes learning at the elbows of experts; that is, experts are present to coach and model the cognitive activity. In reciprocal teaching (Palincsar & Brown, 1984), for example, the teacher and learner take turns in the role of student and teacher, as they seek to understand a text. Or, in the work of Schoenfeld (1996), the expert thinks aloud as he works through a novel problem and then reflects with the students on the strategies used and the paths followed. The design of practice fields has received extensive attention over the last decade (Barab,

[4] Two fictitious problems established in Jasper episodes (see CTGV, 1990, 1993).

Hay, Squire, Barnett, Schmidt, Karrigan, & Johnson, in press; Barab & Landa, 1997; Cognition and Technology Group at Vanderbilt, 1990, 1993; Duffy and Jonassen, 1992; Duffy, Lowyck, & Jonassen, 1992; Edwards, 1995; Hannafin, Hall, Land, & Hill, 1994; Hmelo & Emerson, in press; Kommers, Grabinger, & Dunlap, 1996; Koschmann, 1996; Roth, 1996, 1998; Roth & Bowen, 1995; Savery & Duffy, 1996; Wilson, 1996; Young & Barab, in press). There also have been numerous lists of principles for design since Resnick's (1987) contribution. We summarize the design principles as follows.

Doing domain-related practices.

Learners must be actively *doing* domain-related practices, not listening to the experiences or findings of others as summarized in texts or by teachers. The notion of an active learner has its roots in the work of Dewey (1938) who advocated for learning by doing. Schoenfeld (1996) prompted us to think further about the nature of this "doing" by considering whether students are engaged in performance dilemmas (such as getting a good grade) or domain-related dilemmas (such as finding a cure for cancer). The latter situations give rise to a more authentic appreciation for, and understanding of, the content being learned.

Ownership of the inquiry.

The students must be given and must assume ownership for the dilemma and the development of a resolution. That is, they must see it as a real dilemma worth investing their efforts in, and they must see their efforts as geared toward a solution that makes a difference (not a school solution). Furthermore, they must feel they are responsible for the solution. If they seek a solution from the teacher or a solution the teacher wants, they will not be engaged in the sorts of thinking in the domain that they would be engaged in outside of schools (Savery & Duffy, 1996; Schoenfeld, 1996).

Coaching and modeling of thinking skills.

The teacher's role is not solely that of a content expert, but rather as a learning and problem-solving expert. Hence, the teacher's job is to coach and model learning and problem-solving by asking questions that students should be asking themselves. This is not directive, but rather participatory; it is based not on moving to the "right" answer, but rather, on the questions an expert problem-solver would be asking him or herself (Savery & Duffy, 1996; Schoenfeld, 1996). In part, it is the availability of coaching and modeling as well as other scaffolding (see Duffy and Cunningham, 1996), including support for reflective activities, that distinguishes practice fields from those situations in which individuals are simply doing the job[5].

[5] But of course, decontextualizing the problem from the full community context is the overriding characteristic distinguishing a practice field from doing the job.

Opportunity for reflection.

Too often when we are engaged in work we simply do not have the opportunity to reflect on what we are doing, going to do, or what we have done. The time demands are such that we must move forward, understanding just enough to permit progress in resolving the dilemma. However, in a practice field, opportunity for reflection must be central; indeed, it should be central in the work environment as well. It provides the opportunity to think about why we are doing what we are doing and even to gather evidence to evaluate the efficacy of our moves. Reflecting on the experience afterwards ("debriefing" in the terminology of business) provides the opportunity to correct misconceptions and fill in where understanding was inadequate. The reflective process—an active, rigorous, and analytic process—is essential to the quality of learning (Clift, Houston, & Pugach, 1990; Schön, 1987)

Dilemmas are ill-structured.

The dilemmas in which learners are engaged must either be ill-defined or defined loosely enough so that students can impose their own problem frames (Roth, 1996; Savery & Duffy, 1996). It is only with ill-defined problems that students can own the problems and take ownership of the process. When working with an ill-defined problem, the quality of the solution depends on the quality of the effort in the domain. It is always possible to work a little longer in an attempt to develop a different rationale for a solution, or a more detailed solution, or to consider better alternatives. It is in this inquiry into ill-structured dilemmas that ownership and learning occurs.

Support the learner rather than simplify the dilemma.

The dilemma students encounter should reflect the complexity of the thinking and work they are expected to be able to do outside of the school context when this learning is completed. That is, the problem presented must be a real problem. We do not start with simplified, unrealistic problems since this would not be reflective of a practice field but rather would reflect the more traditional building-blocks approach to instruction characteristic of the representational perspective. Scaffolding is meant to support the learner in working in the practice field by providing the learner with the necessary support to undertake complex problems that, otherwise, would be beyond their current zone or proximal development (Duffy & Cunningham, 1996; Vygotsky, 1978).

Work is collaborative and social.

Meaning is a process of continual negotiation. The quality and depth of this negotiation and understanding can only be determined in a social environment. That is, we can see if our understanding can accommodate the issues and views of others and see if there are points of view that we could usefully incorporate into our

understanding (Bereiter, 1994; **see also Chapter 5 and Chapter 8, Eds.)**. The importance of a learning "community" where ideas are discussed and understandings are enriched is critical to the design of effective practice fields (Scardamalia & Bereiter, 1993).

The learning context is motivating.

In the educational environment, we cannot let students only pursue problems that arise in their life naturally; that is, learning issues cannot be solely self-determined. Rather, there is some need to introduce students to communities and issues or problems that engage that community. In doing so, we are faced with the problem of "bringing the issue home" to the learner (Barrows & Myers, 1993). That is, dilemmas brought to the attention of the learner are seldom engaging in and of themselves. The students must be introduced to the context of the problem and its relevance and this must be done in a way that challenges and engages the student. The importance of being challenged and engaged has a long history in education (Cordova & Lepper, 1996; Dweck & Leggett, 1988) and psychology (Csikszentmihalyi, 1990).

EXTENDING THE PARTICIPATION METAPHOR: COMMUNITIES OF PRACTICE

Clearly, the design of practice fields, as defined above, addresses the differences of in-school learning versus out-of-school learning presented by Resnick (1987). In these contexts, learners are working in teams with concrete artifacts and examples as they address contextualized problems. The design of practice fields is consistent with the implications of situativity theory forwarded by many psychologists, and is consistent with much of the work being carried out by the authors of the chapter. More generally, this view has certainly pushed many educator's understanding of learning and cognition beyond representational views in suggesting educators' a new contextualized emphasis to education. However, the practices that the learner engages in are still "school tasks" abstracted from the community, and this has important implications for the meaning and type of practices being learned, as well as for the individual's relations to those meanings and practices.

With respect to the practices themselves, the cultural context of schools all too often emphasizes learning and grades, not participation and use, and the identity being developed is one of student in school, not contributing member of the community who uses and values the content being taught. Lave and Wenger (1991) argued that:

> there are vast differences between the ways high school physics students participate in and give meaning to their activity and the way professional physicists do. The actual reproducing community of practice, within which schoolchildren learn about physics, is not the community of physicists but the community of schooled adults… [As such] problems of schooling are not, at their most fundamental level, pedagogical. Above all, they have to do with the ways in which the community of adults reproduces itself, with the places that newcomers can or cannot find in such communities, and with relations that can

> or cannot be established between these newcomers and the cultural and political life of the community. (pp. 99-100)

From this perspective, the main problem of practice fields is that they occur in schools rather than in the community through schools. This creates a bracketing off of the learning context from the social world through which the practices being learned are of value and of use. If one acknowledges that interactions with the world produce meaning and identity, then educators need to place more emphasis on what types of interactions and, hence, identities are being created within the context of schools. Instead of a culture emphasizing the contribution of the activity to the community, all too frequently, school culture accords knowledgeable skill a reified existence, commodifying it, and turning knowledge into something to be "acquired."

To clarify, when official channels only offer possibilities to participate in institutionally-mandated forms of commoditized activity, children develop identities in relation to their ability to engage in these commoditized activities directed towards the production of grades (Walkerdine, 1997). For some students, "good students," this helps enculturate them into the identity of a successful student (all too frequently associated with being a "nerd"), but for many others this context results in the "widespread generation of negative identities [under achievers, failures]," as well as the emergence of "institutionally disapproved interstitial communities of practice [burnouts, trouble makers]" (Lave, 1993, p 78-79). Indeed, in spite of the school emphasis on curriculum and discipline, it is frequently the relations to these non-curricular communities of practice that are the most personally transformative (Wenger, 1998).

While practice fields do not fully decontextualize the learning activities or the outcomes (i.e., there is a focus on more than simply the achievement of a grade), the activities are nonetheless divorced from their contribution to society—they are "practice," not "contributions." Hence, even here there is a decomposition of the activity, with the societal contribution (from which societal identity and the meaning of the activity develops) separated from the activity itself. Although this does not necessarily result in the production of negative identities, it also does not create an opportunity for membership in the community of practitioners. It is in response to these concerns that many educators are looking towards communities as an arena for learning. However, we are still in our infancy with respect to understanding the potential of, and what constitutes, a community. While Lave (1993, 1997; Lave & Wenger, 1991) has brought the most focused attention to the concept of communities of practice, this has been done through an anthropological perspective, with an examination of practices in everyday society and not environments intentionally designed to support learning.

There have been numerous efforts to introduce the concept of community into educational practice. For example, Brown and Campione (1990) proposed the design of *communities of learners and thinkers*, Lipman (1988) offered *communities of inquiry*, Scardamalia and Bereiter (1993) advanced *knowledge building communities*, the Cognition and Technology Group at Vanderbilt (see Barron et al., 1995)

proposed *learning communities*, and Roth (1998) suggested *communities of practice*. However, examining these "community" efforts, we are not convinced that they do in fact capture the essence of *development of self through participation in a community*. Indeed, most appear to be in the realm of practice fields. It is for this reason that we want to re-emphasize the importance of the development of the "self," and the importance of legitimate participation as part of a community in the development of that self. We seek to promote an appreciation for the limitations of the "practice field" approach and to establish the strategic direction of making legitimate participation in the community an integral part of meeting our educational goals.

To summarize thus far, it is being argued that being a participant in a community is an essential component of the educational process, and that the community that is most clearly evident in schools is that of schooled adults, not professional practitioners who use the practices being learned. If we move toward a learning-as-participating-in-community approach, what communities are we talking about? Is this a trade school/professional school approach? How do we provide the breadth of learning experiences that our children need if they must be members of all of the communities in order to have the necessary experiences? It sounds beyond what can be managed in even a dramatic and systemic restructuring. It is with these questions in mind that we turn to a more in-depth discussion of communities of practice and their characteristics.

Characteristics Of Communities Of Practice

Lave and Wenger (1991) coined the term "communities of practice," to capture the importance of activity in binding individuals to communities, and of communities to legitimizing individual practices. Roughly, a community of practice involves a collection of individuals sharing mutually-defined practices, beliefs, and understandings over an extended time frame in the pursuit of a shared enterprise (Wenger, 1998). Roth (1998) suggested that these communities "are identified by the common tasks members engage in and the associated practices and resources, unquestioned background assumptions, common sense, and mundane reason they share" (p. 10). Lave and Wenger defined a community of practice in the following manner:

> [Community does not] imply necessarily co-presence, a well-defined identifiable group, or socially visible boundaries. It does imply participation in an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their communities. (1991, p. 98)

Just what is a community and what characteristics of the community—of one's participation in a community—are relevant to the educational process? Predicated on research in fields such as anthropology, education, and sociology, we have found the following features to be consistently present and, we would argue, requisite of communities (see Table 2): (1) a common cultural and historical

heritage, including shared goals, negotiated meanings, and practices; (2) an interdependent system, in that individuals are becoming a part of something larger than themselves; and (3) a reproduction cycle, through which "newcomers" can become "old timers" and through which the community can maintain itself.

Common Cultural and Historical Heritage	Communities go beyond the simple coming together for a particular moment in response to a specific need. Successful communities have a common cultural and historical heritage that partially captures the socially negotiated meanings. This includes shared goals, meanings, and practices. However, unlike the social negotiation of practice fields that primarily occurs on the fly, in communities of practice new members inherit much of these goals, meanings, and practices from previous community members' experiences in which they were hypothesized, tested, and socially agreed upon.
Interdependent System	Individuals are becoming a part of something larger as they work within the context and become interconnected to the community, which is also a part of something larger (the society through which it has meaning/value). This helps provide a sense of shared purpose, as well as an identity, for the individual and the larger community.
Reproduction Cycle	It is important that communities have the ability to reproduce as new members engage in mature practice with near peers and exemplars of mature practice. Over time, these "newcomers" come to embody the communal practice (and rituals) and may even replace "old timers."

Table 2.Characteristics of a Community.

Common cultural and historical heritage.

A community has a significant history, a common cultural and historical heritage. This heritage includes the shared goals, belief systems, and collective stories that capture canonical practice. These shared experiences come to constitute a collective knowledge base that is continually negotiated anew through each interaction. "The negotiation of meaning is a productive process, but negotiating meaning is not constructing it from scratch. Meaning is not pre-existing, but neither is it simply made up. Negotiated meaning is at once both historical and dynamic, contextual and unique" (Wenger, 1998, p. 54). When learning as part of a community of practice, the learner has access to this history of previous negotiations as well as responsiveness from the current context on the functional value of a particular meaning.

Of course, practice fields are designed to support the development of shared goals, understandings and practices among those collaborators working on a particular problem or issue. The contrast, however, is in the embeddedness of the experiences in the community and the impact of that larger experiential

context on the development of self. For example, it is through stories (narratives) that community members pass on casual accounts of their experiences to replace the impoverished descriptions frequently codified in manuals and texts. Through this telling and retelling, individuals do more than pass on knowledge. They contribute to the construction of their own identity in relationship to the community of practice and, reciprocally, to the construction and development of the community of which they are a part (Brown & Duguid, 1991).

It is also through this heritage that communities find legitimacy. When individuals become legitimate members of the community, they inherit this common heritage, which becomes intertwined with the member's identity as a community member. This is a central component in the development of self. Individuals develop a sense of self in relation to a community of practice and this can only arise by enculturation into the history of the community. They do not develop a sense of self in being a scientist simply by engaging in scientific problems, but rather through engagement in the discourse of the scientific community and in the context of the values of that community, as they become a member of the community (Bereiter, 1994; 1997). Through participation in a practice field or even as a peripheral participant to a community of practice, rules and behavior expectations may feel arbitrary, artificial, and even unnecessary. However, through participation in the community over time, one comes to accept the historical context and the importance of socially negotiated norms for defining community and one's own identity. It is only through extended participation in a community that this history and, hence, a sense of self, can develop.

Interdependent System.

Second, most community members view themselves as part of something larger. It is this part of something larger that allows the various members to form a collective whole, as they work towards the joint goals of the community and its members. A community is an interdependent system in terms of the collaborative efforts of its members, as well as in terms of the greater societal systems in which it is nested. Being a member entails being involved in a fundamental way within this dynamic system (the community), which is continually redefined by the actions of its members (Barab, Cherkes-Julkowski, et al., in press). In other words, the individual and the community constitute nested interactive networks, with individuals transforming and maintaining the community as they appropriate its practices (Lemke, 1997; Rogoff, 1990), and the community transforms and maintains the individual by making available opportunities for appropriation and, eventually, enculturation (Reed, 1991). Education and learning, from this perspective, involve "'taking part' and 'being a part,' and both of these expressions signalize that learning should be viewed as a process of becoming a part of a greater whole" (Sfard, 1998, p. 6).

It is through this legitimate participation in this greater community, and the community's legitimate participation in society, that communities and identities are formed. These practices, including the adoption of particular goals, belief systems, and cognitions, are ordinarily framed and valued by this greater

community, and it is through the carrying out of these practices that an individual binds himself to this community. It is also in this way that learning comes to involve the building of relationships with other community members, with tools and practices, with those outcomes valued by society, and with oneself.

> Our activity, our participation, our "cognition" is always bound up with, codependent with, the participation and the activity of Others, be they persons, tools, symbols, processes, or things. How we participate, what practices we come to engage in, is a function of the whole community ecology… As we participate, we change. Our identity-in-practice develops, for we are no longer autonomous Persons in this model, but Persons-in-Activity. (Lemke, 1997, p. 38)

However, it is not just the community members who are a part of something larger. The community itself functions within a broader societal role that gives it, and the practices of the community members, meaning and purpose. If the community isolates itself from the societal systems of which it is a part, then both the individuals and the community become weaker—this relationship to other communities and the "products" they offer society have proven to be a central challenge for Amish and Mennonite communities, for example. "This interdependent perspective prevents communities, from small families to nations, from becoming worlds unto themselves" (Shaffer & Anundsen, 1993, p. 12). This interdependent perspective also prevents individuals from becoming worlds unto themselves. With each newly appropriated practice, individuals are becoming more central to (constitutive of) the community and, in a fundamental way, developing self—a self that is partly constituted by their participation and membership in the community of practice.

Reproduction Cycle.

Lastly, a community is constantly reproducing itself such that new members contribute, support and eventually lead the community into the future. Communities are continually replicating themselves, with new members moving from peripheral participant to core member through a process of enculturation (Lave & Wenger, 1991). It is this line of thinking that led to Lave and Wenger's (1991) discussion of legitimate peripheral participation in which the primary motivation for learning involves participating in authentic activities and creating an identity that moves one toward becoming more centripetal to a community of practice. In this line of thinking, developing an identity as a member of the community and becoming able to engage in the practices of the community are one and the same (Lave, 1993; Wenger, 1998)[6].

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[6] It is this opportunity to become a member of and extend the community that motivates, shapes, and gives meaning to learning the practices and negotiated meanings. This is in sharp contrast to schools in which students pass through practice fields that maintain motivation only through the exchange value (i.e., grades), not through any contribution to the community or any real-world application.

Reproducibility, in which newcomers are able to become central to and expand the community, is essential if the community is to have a common cultural heritage. It is a process that is continually occurring in all communities of practice. Simply consider the experiences of academics: our students apprentice with us, working closely at our elbows. However, they tend to remain apprentices, seeing the world through our eyes and remaining as peripheral participants. Eventually, when they must teach others, when they must fill the role of "old timers," they enter a new level of learning and began to expand the thinking of the community of which they are a part. They come to mentor junior faculty in the research process and in teaching. They continue to learn this process and, perhaps more importantly, grow more confident in their contributions to the community and in their sense of "self" in the community. During this process, they appropriate and contribute to the negotiation and reification of meanings. It is through this cycle that a community of practice and the individuals that constitute the community reproduce and define themselves.

It is also these reproduction cycles that define learning. In other words, the social and physical structure that defines and is defined by this cycle defines the possibilities, and what is considered legitimate participation, for learning. In fact, for Lave and Wenger (1991), legitimate peripheral participation is learning. Any discussions of learning, therefore, must begin within a community of practice and must consider the individual's position with respect to the hierarchical trajectory of the social and power structures of that community. Assumedly, and ignoring other social and political obstacles, it is this position in relation to the community trajectory from novice to expert that defines a particular member's ability with respect to community practices. And, "because the place of knowledge is within a community of practice, questions of learning must be addressed within the developmental cycles of that community" (Lave & Wenger, 1991, p. 100). It is in understanding how educators have supported the emergence of community trajectories and have developed scaffolds to support learners in participating in movement along these trajectories that we now move from practice fields to communities of practice.

MOVING FROM PRACTICE FIELDS TO COMMUNITIES OF PRACTICE

Our notion of practice fields and our notion of communities of practice have much in common, and their creation can be guided by some similar learning principles. For example, both these contexts move us away from the criticisms leveled at in-school learning by Resnick (1987). Specifically, her criticism that in schools there is frequently an isolated learner engaged in unaided thought using symbols that frequently have no direct connection to any real-world particulars. In contrast, while working in practice fields and in communities of practice, students are usually working collaboratively and with concrete referentials (signifieds) so that they may address contextualized problems. Further, central to both these learning contexts is the opportunity for students to actively engage in negotiating meanings through practice.

In spite of these similarities, there are also some important differences (see Table 1). For example, learning through participation in practice fields frequently involves students working collaboratively in a temporary (as opposed to a sustained and continuously reproducing) coming together of people (as opposed to a community of practitioners with a substantial history) around a particular task (as opposed to a shared enterprise that cuts across multiple tasks considered to be the workings of the community). Of prime importance in distinguishing practice fields from community learning contexts are: (1) whether there exists a sustainable community with a significant history to become enculturated into, including shared goals, beliefs, practices and a collection of experiences; (2) whether individuals and the community into which they are becoming enculturated are a part of something larger; and (3) whether there is an opportunity to move along a trajectory in the presence of, and become a member alongside, near peers and exemplars of mature practice—moving from peripheral participant to core member.

It is these three characteristics, which we have suggested are central to communities of practice, that determine whether there is an opportunity for learning/building identities through legitimate peripheral participation. These differences suggest the importance of supporting the emergence of communities with meaningful trajectories of participation or, at the very least, which connect learners into existing communities. Previously, we mentioned the work of the CTGV and medical fields as examples of practice fields. In this section, we will continue to examine examples to illuminate characteristics of, and differences between, practice fields and communities of practice.

The SMART Project.

The work of the CTGV illustrates the movement from the design of practice fields to the attempt to develop a community of practice. The early work (CTGV, 1990; 1993) focused on video-based "macrocontexts" intended to overcome inert knowledge by anchoring learning within the context of meaningful problem-solving activities. In contrast to the disconnected sets of "application problems" located at the end of textbook chapters, macrocontexts refer to stories that take place in semantically rich, open-ended environments. In these anchored macrocontexts, students begin with a higher-order problem and then use top-down strategies to generate the necessary sub-goals to reach the final state. This top-down processing helps students learn the lower-level skills (i.e., mathematical algorithms and facts) in a manner that also gives them insights into the relationships between the skills being learned and the reciprocal opportunities for using them. Anchors "allow students who are relative novices in an area experience some of the advantages available to experts when they are trying to learn new information about their area" (CTGV, 1992, p. 294).

These learning environments nicely illustrate the design of practice fields. However, through the SMART (Special Multimedia Arenas for Refining Thinking) project, the CTGV extended engagement with the problems and broke the isolation of the classroom with a learning community of 100 students (Barron et al., 1995). This project, using the Jasper videodisc problems and a series of video programs, linked

classrooms to each other and to the Vanderbilt community. The CTGV developed four Challenge programs composed of four segments called Smart Lab, Roving Reporter, Toolbox, and the Challenge. These segments were designed to link up the participating classrooms, grounding discussions with actual student data and video clips collected by the roving reporter as he went out to the various classrooms. At the end of the show, as a culminating event, students attempted the Big Challenge in which a problem was shown live on the local PBS-TV station. Students in the learning community were expected to call in answers to the problems and then their answers were summarized and shown at the end of the program for students to see.

The SMART program clearly moves closer to our notion of community than the isolated Jasper videos. Students are, to some degree, developing a socially-negotiated knowledge and practice base. Through the Roving Reporter, they are able to share stories about their experiences. Individuals are, to some degree, becoming a part of something larger as they see themselves and their peers as well as an expert problem-solver engaged in solving the Jasper series episodes. However, the problems are contrived and not necessarily addressing a real-world need, undermining the legitimacy of the community in terms of its interdependence with society. Further, the community itself has little common heritage. This, again, potentially limits the legitimacy of their experience in terms of being a part of something larger. Additionally, the community is formed only for the duration of the project and will not continue to reproduce. As a consequence, there is little movement over time in terms of becoming more central to the core.

In sum, while the SMART project moves toward a community concept, the key elements for the development of self in a community are absent. The project is still a school project—it does not link to or contribute to the needs of society or the on-going needs of the community itself. The students are not playing a role in society and hence do not develop a sense of their identity in society. They are not making a lasting contribution and are not developing a sense of the history of the community and all that implies. Rather, their community is a temporary one, beginning and ending with the task (or set of tasks), much as we find with practice fields. The SMART project does, however, provide a richer set of perspectives and a greater motivational context for the students to assume ownership of the task. Again, these are characteristics of practice fields.

Community of Learners.

Over the last decade, Brown and Campione (Brown & Campione, 1990; Brown et al., 1994) have been engineering “communities of learners.” Central to this work has been the use of reciprocal teaching and jigsaw methods to engage students in collaborative work. The reciprocal teaching approach begins with the teacher modeling and coaching students in the various skills they will be expected to teach. It involves students adopting the role of a teacher, as they appropriate their practices by watching more experienced

peers and teachers model the learning process. The approach is termed reciprocal teaching because the teacher and students alternate playing the role of the teacher and student.

The jigsaw method, in contrast, involves students working collaboratively and developing expertise on one component of a larger task. Then, once they have mastered their component, they use the reciprocal teaching method to share what they have learned with other group members. Using these techniques, they are able to develop repetitive structures in the classroom, so that students can gain mastery over the approaches as they perceive themselves developing mastery over time. Students participate in a research cycle lasting approximately 10 weeks. These cycles begin with a teacher or visiting expert who introduces a unit and a benchmark lesson, stressing the big picture and how the various topics can be interrelated to form a jigsaw. Students then spend the majority of the time in the research-and-teach part of the cycle. Over time, the distributed expertise begins to emerge as students become more competent in their sections. In addition to face-to-face interactions, students can use email to communicate with the wider community as well as with each other. The teacher models this practice over the course of the research cycle. At the completion of the unit, students conduct full reciprocal teaching sessions in groups where each child is an expert on one-fifth of the topic material. Two features central to Communities of Learners are distributed expertise (integral to the jigsaw method) and mutual appropriation—mutual in the sense that experts appropriate student understandings in addition to students appropriating the practices and thinking of experts.

Brown et al. (1994) discussed a classroom ethos in which there is an atmosphere of individual responsibility coupled with communal sharing. There is an atmosphere of respect in which students' questions are taken seriously and students listen to one another. Students also develop a community of discourse, in which "meaning is negotiated and renegotiated as members of the community develop and share expertise. The group comes to construct new understandings, developing a common mind and common voice" (Brown et al., 1994, p. 200). The final aspect is that of ritual, in which participation frameworks are few and practiced repeatedly so that students develop expertise. "The repetitive, indeed ritualistic, nature of these activities is an essential aspect of the classroom, for it enables children to make the transition from one participant structure … to another quickly and effortlessly" (Brown et al., 1994, pp. 200-201).

In our mind, although the Community of Learners classrooms and the principles for community they presents are exemplary, they more completely reflect the design of practice fields rather than the concept of communities that we are forwarding. There is little difference between this Communities of Learners project and problem-based learning (Barrows & Myers, 1993; Savery & Duffy, 1996) or any project-based environment where students are expected to learn collaboratively. Again, we see great value in the design of practice fields, and Brown et al. (1994) provided an excellent example of strategies for creating practice fields in the lower grades.

However, our goal in this section is to examine communities of practice occurring in schools in order to explore the implications of community for the design of learning environments. That is, how do we facilitate the emergence of learning environments that engage students as legitimate peripheral participants in a community, so that they develop their "self" in relation to society? The students that Brown et al. (1994) discussed are not engaged in tasks that contribute to a community that has a heritage or that guides practice, nor is there a community that is larger than the classroom and task. Of course the student is developing a sense of self as a learner in school and as a collaborator in school tasks and as a teacher of text information. However, we question the advantages (beyond other practice fields) of having students teach other kids, or of bringing in experts to set up a particular context when the learning occurs within the classroom context in relation to a classroom-defined task. The goal of participation in community is to develop a sense of self in relation to the society of which we are a part—a society outside of the classroom. We are not convinced that this occurs in the Communities of Learners project.

NGS Kids Network and Teleapprenticeships.

The National Geographic Kids Network, a collaborative effort between TERC and the National Geographic Society, is one example of a growing number of telecommunications projects that involve students in real world projects and link them to experts and other students around the world in scientific or social research. The focus in Kids Network is on socially relevant scientific issues like acid rain and solar energy.

The projects have the following design principles: (a) students can explore real and engaging scientific problems that have an important social context; (b) students do the work and engage in the discourse of scientists; and (c) the science is done collaboratively using telecommunications to link the students with others outside of their school (Tinker, 1996). Additionally, students have contact with scientists who help to interpret student-collected data and to present findings to the community. These presentations have the potential to become more than "parents' night" displays of student work, because students are talking about issues relevant to the community, and they have a rich scientific database from which to draw their conclusions.

Bradsher and Hogan, two NGS project personnel, describe the Kids Network curriculum as follows:

> Students pose and research questions about their local community, form hypotheses, collect data through experiments, and analyze results. The answers are largely unknown in advance, and the findings are of interest beyond the classroom. (1995, p. 39)

While the curriculum is considerably more structured than these descriptions suggest and the findings more prescriptive (Hunter, 1990; Karlan, Huberman, & Middlebrooks, 1997), the approach nonetheless holds potential for engaging students in real scientific problems and real scientific discourse with other students and scientists.

The Kids Network curriculum, begun in 1989, consists of eight week curriculum units designed for fourth through sixth graders. Ten geographically dispersed classrooms (including classrooms in other countries) are linked by the Kids Network personnel to form a "research team." The students begin by reading about the curriculum area (e.g., acid rain), and discussing the issue in relation to their community. The ten classes work as a team, negotiating the approach to the research issues based on the local interests (relevance to their community) of each group. This allows for ownership and legitimacy, as well as support for the process of interdependency and social negotiation whereby groups make global comparisons. The students develop data collection tools and collect samples from their community, with experts from Kids Network available to discuss issues or offer guidance. The data is collected and submitted to Kids Network staff where it is integrated across sites. Data summaries are prepared, along with the interpretation of the data by a scientist, the latter serving to model the way scientists think (Bradsher & Hogan, 1995). The data is then sent to the classrooms. The students complete the lesson by making their own interpretation of the data, drawing conclusions relevant to the community, and preparing a presentation of the findings to a community audience.

There is considerable potential for extending the curriculum unit. As one teacher noted, "…learning extends into other lessons. For language arts, students write letters to their teammates; for science they may look at ecosystems; for science and geography they use a dynamic mapping tool …" (Bradsher & Hogan, 1995, p. 40). Student teams can also conduct additional experiments, collecting data on related issues and extending the web of inference. Thus, Kids Network provides a framework, and the communication technology provides the opportunity for collaboration with peers and experts on socially relevant issues. The Kids Network curriculum has been widely adopted, with more than a quarter million children from 49 different countries involved (Tinker, 1996). But, as we noted, it is only representative of a growing number of teleapprentice projects (Hunter, 1990). Two additional efforts, briefly described, follow:

INSITE. This project was a joint effort among eight school districts, two universities, the Indianapolis Children's Museum, and local industry. Buchanan, Rush, and Bloede (1989, cited in Hunter 1990) describe the goal as not creating textbook science lessons, but creating lessons that reflect current areas of concern and real world issues. Students pose questions to the scientists (via the network) and develop cooperative experiments that require students to contact other students in the various schools. As described, this project involves students working and thinking at the elbows of experts in real world contexts.

*I*EARN.* Copen (1995) described the I*EARN telecommunications environment as establishing a global network, allowing "K-12 students to work on joint social and environmental projects concerning issues of

international importance"(p. 44). The focus is on international linkages. Hence, classes from around the world are paired in environmental, community development, and service projects linked to their curricular goals. Clearly, the students in these projects are making significant contributions to society through their work. The practices in schools have become practices of consulting, where children can find support for their work in society. They are part of something larger – the larger community of scientists studying environmental issues and the other new comers (other classes) to the community. And there is a heritage—the databases from their project as well as other projects.

Community of Teachers.

The community of teachers (CoT) is a professional development program at Indiana University, Bloomington for pre-service teachers working towards teacher certification. It is highly field-based in that each participant is expected to commit to one school where she will do all of her fieldwork. Pre-service teachers are not assigned to a teacher, but rather, spend time visiting the classes of and talking with teachers who are a part of the program. An apprentice relationship is formed with one of the teachers based on a social negotiation and a mutual determination that the relationship will be beneficial. Hence, each student is paired with a mentor teacher in their first year in the program and continues to work with that teacher for the duration.

Similarly, each student negotiates membership in a community of students who are studying to be teachers. They join an on-going community and remain a part of that community for the duration of their study. Students in the community attend seminars together and, as with any community, there are wizened veterans (seniors/students with teaching experience), new comers (Sophomores) and levels between, mixed together in a common endeavor.

The CoT program was designed to allow students to fulfill their individual requirements for certification by becoming a part of a community. The emphasis is not on grades but on participation: "Students achieve a teaching license, not by accumulating credits and grades, but by collecting evidence that they, indeed, possess 30 qualities of good teachers that are described in CoT's Program Expectations" (Gregory, 1993, p. 1).

The CoT is founded on six principles. First is the notion of *community* and its goal is to bring a heterogeneous collection of individuals together around a shared goal. The second principle, *personalization*, has to do with students' being able to own their part in becoming good teachers. Students are also participating in *apprenticeships*, working alongside an in-service teacher and other more competent peers. The program involves *intensive fieldwork*, with students spending approximately one full day each week with their mentor teacher. Students are engaged in *authentic performance* with the certificate predicated on their ability to accumulate a body of evidence that indicates their capacity to teach in a

school. Lastly, there is a democratic governance with each member having the opportunity to propose a change in the program's operation that will be put to a vote.

The program involves a core seminar run by the students at all stages of preparation (from newcomer to student teacher) and supported by a university professor. The community has about fifteen members who meet once a week for three hours to discuss readings, expectations, and work in the schools. Students take turns leading various seminars, planning presentations, bringing information to the group, and leading discussions related to teaching and learning. Over the course of the semester, various "issues du jour" that students are facing in the classroom are discussed. In addition to the weekly seminars, students communicate through electronic mail and the telephone. Over time, students graduate and move on and beginning teachers enter the community. Further, many former students, now teachers working nearby, return to share their experiences with the current community of teachers.

In the CoT program, students are continually negotiating goals and meanings of the community as well as the profession. Further, there is a growing collection of personal narratives that come to embody the canonical practices of the community, and students have developed a shared language to describe particular group practices (e.g., issue du jour) and group members (e.g., grizzled veterans) (T. Gregory, personal communication, July 7, 1998). The community has a tradition and heritage (seven years going) at Indiana University that captures much of the community's understandings. This heritage is continually developed and inherited by members, as they become a part of the CoT program. The community also has a trajectory that extends across multiple classrooms and multiple occasions. Individuals view themselves as becoming a part of the CoT as well as the communities (those formed by in-service teachers) in which the project is nested. Lastly, the community continually reproduces itself as "rolling cohorts" cycle from newcomers to grizzled veterans to graduated students (working teachers).

Both KidsNet and CoT characterize the sorts of communities that schools can foster and support. There is an historical context for the activity, a history of experience to be used[7], and the results of the activity (and hence the learner/doer) contributes to the community. It is this context that keeps not only the learning but also the overall activity itself from being an end in and of itself, i.e., a commodity. As such, participants develop a sense of self in their work in society—not simply in the work of being a student. Practices are not just performances, but meaningful actions, "actions that have relations of meaning to one

[7] Let us emphasize that "experientially-based" does not mean that all learning comes from experts telling their stories. Those experts can in fact be noting what references and resources they found most useful for their own learning. It is also not that the experts have the "correct answers," but rather they have had related experiences and this is what they did (and it failed or succeeded to some degree). The main issue is that the learning is embedded not just in a task but in the history of the community.

another in terms of some cultural system" (Lemke, 1997, p. 43). In this sense, students learn not just what and how to carry out a set of practices, but the meaning of the performance. This understanding is central to becoming a full member of the community. The fact that students have full access to the practices and outcomes, as well as a legitimate role in the functioning of the community, helps to overcome the alienation of students from the full experiences, or what Lave (1997) refers to the "widespread generation of negative identities." It is for these reasons that we view these as exemplary models of building communities of practice in schools.

CONCLUSIONS/IMPLICATIONS

In this chapter we have adopted a perspective of situativity theory in which meaning as well as identities are constructed within interactions. The construction of these meanings and identities is greatly influenced by the broader context in which they reside. This perspective expands previous notions of constructivism in which it was the subjective world, not the individual constructor, who was bracketed off and treated as that which was being constructed. It also expands notions of situativity theory in which, again, it was the meaning of that which was learned, and not the individual doing the learning, that was described as being constituted in the situation. Instead, the perspective being forwarded in this chapter is intended to couple individual and environment, and thereby moves beyond dualistic treatments, treating both as being constituted by and constituting the other—that is, to establish an ecology of learning (Barab, 1999; Barab, Cherkes-Julkowski, et al., in press). Predicated on this assumption, we explored the notion of the communities of practice as an arena for learning that can be integrated into the practices of schools.

One difficulty with schools is that they frequently do not practice what they preach. They teach about practices of other communities, but provide students with only limited access to these external communities. As such, experience is commoditized and learners are alienated from full experiences, resulting in the bracketing off of academic performance and identity formation in relation to this performance (Lave, 1997; Lemke, 1997; Walkerdine, 1997). One attempt to address these limitations of school learning, as well as the abstract, decontextualized, and individualistic nature of school learning, is to design practice fields. In practice fields, students work as part of activity groups as they investigate and engage in practices that are consistent with the practices of real world practitioners. Although practice fields address some of the criticisms leveled at school learning (see Resnick, 1987), they still treat knowledge as a commodity and fail to connect learners to a greater identity (i.e., a member of a community).

Lave and Wenger (1991, p. 52-53) described a community focus as a focus on "the development of knowledgeable skill and identity—the production of persons…[resulting from]… long-term, living relations between persons and their place and participation in the communities of practice."[8] As such, there is not a separation between the development of identity and the development of knowledgeable skill. Both reciprocally interact through a process of legitimate peripheral participation within the context of a community of practice.

This is a considerable shift in focus from the design of practice fields—a shift from a focus on the activity of an individual in a collaborative environment to a focus on the connections one has with the

[8] Of course there is a reciprocal relation, in that through participation there is continued productions and reproduction of the community. However, the present focus is on learning — the development of self — through participation in the practices of the community.

community and the patterns of participation in the community. It is not that a sense of self does not or cannot develop in practice fields. If successfully designed (especially in terms of developing learner ownership), the practice field not only supports the development of specific skills, but offers the individual the opportunity to assess his or her competencies and motivation for that kind of work. Similarly, it contributes to a sense of self, as all of our experiences do. However, there is something more to membership in a community; something beyond the temporary collaborative environment of a practice field. Lave described how formal learning environments (i.e., schools) tend to commodify knowledge and learning:

> The products of human labor are turned into commodities when they cease to be made for the value of their use in the lives of their maker and are produced in order to exchange them, to serve the interests and purposes of others without direct reference to the lives of their maker. (1993, p. 75)

In essence, through commodification, human activity becomes a means rather than an end in itself.

This is indeed true of practice fields. The problems, while "authentic" in the complexity they bring to the learner, are not authentic in the sense that they are an integral part of the ongoing activity of the society. This has implications both in terms of how individuals come to participate and assign meaning to the activity, as well as in terms of the identities that emerge. With the practice field, education is viewed as preparation for some later sets of activities, not as a meaningful activity in its own right. In fact, it is with this reference to "something" and "someplace" else that parents, teachers, and even students use to ascribe value to that which is being taught. It is also this situation that led Dewey to criticize the educational system. Dewey (1897) argued that this is the wrong model: "I believe that education, therefore, is a process of living and not a preparation for future living." p. 78). Further, while participating in communities of practice, the constraints on practices are present in the everyday workings of the community (e.g., more expert member practices, the demands of the clientele, contained in community generated documents and artifacts). In classrooms, these constraints are frequently presented by one instructor (or an occasional visiting expert) who must serve as a "stand-in" for the greater community (Barab, Cherkes-Julkowski et al., in press).

In other words, a community is not simply bringing a lot of people together to work on a task. Extending the length of the task and enlarging the group are not the key variables for moving to the community concept; rather, the key is linking into society – giving the students a legitimate role (task) in society through community participation/membership. We have described communities as having three components: (a) a common cultural and historical heritage, including shared goals, understandings, and practices; (b) individuals becoming a part of an interdependent system; and (c) the ability to reproduce as new members work alongside more competent others.

Within schools, we see the emergence of many communities of practice (jocks, burnouts, musicians, etc.). In fact,

> Communities of practice sprout everywhere—in the classroom as well as on the playground, officially or in the cracks. And in spite of curriculum, discipline, and exhortation, the learning that is most personally transformative turns out to be the learning that involves membership in these communities of practice. (Wenger, 1998, p. 6)

We have already seen some exciting projects in schools that develop and link students to communities with consonant practices. The goals of this chapter are to further our thinking on the characteristics of communities of practice, the advantages of learning from them, and the approaches used by educators to develop them in schools. We hope that this discussion stimulates continued thinking around these questions and we look forward to educators continuing to share their work that is contextualized in learning environments that are predicated on notions of communities of practice and, just as importantly, the individual learner.

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