

Re-considering On-line and Live Communities of Practice

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Abstract: It remains a major challenge to find appropriate ways to use the Internet for teacher professional development. We look carefully at one widely-used analytical construct, *communities of practice* (CoP). We present a review of the research along with original research that highlights the need to understand the many overlapping live and online communities of practice a teacher may belong to. We revisit the original work of Lave and Wenger (1991) and highlight crucial structural features of CoPs. We give several examples of overlapping on-line and live CoPs. We conclude by describing a design experiment which attempts to align the structure of the online community with live communities.

Introduction

Shulman (1987) wrote "One of the frustrations of teaching as an occupation and profession is its extensive individual and collective amnesia... teaching is conducted without an audience of peers. It is devoid of a history of practice." The extraordinary increase in access to the Internet has created hope that affordable network technology might be able to solve longstanding problems in Western teacher practice and teacher professional development. Pearson (1999) eloquently formulates these hopes as the promise that online technologies might support the creation of Teaching Audience (potential audience is no longer restricted by time or geographical location; furthermore, technology will allow the scaling of many person to many person conversation to large numbers), Teaching Notation (the ease of mass storage may allow the recording of Shulman's desired history of practice), and Teaching Reflection (the asynchronous nature of most online communication may allow time for considered thought). However, he goes on to report that his online class of pre-service teachers did not successfully create these qualities, and the community conversations were passive, guarded and unreflective.

This experience remains more common than not. Recent work by the PI (Hsu, 2001 and 2004) studies an electronic community thoughtfully designed using the principles of the Concord Consortium, and finds the community was disconnected, guarded and did not engage in genuine exchange of ideas. Bos et al (1994) surveys 13 teacher electronic communities and finds disappointing results. Wisenmayer and Meadows (1997) studied hundreds of science teachers discussing Internet resource sites and found "Fewer than 3% of the sites were described in terms that presented how the teachers would use a particular resource in their own classroom. Perhaps even more disturbing, only 3 teachers noted the possibility of communicating with other teachers, other classes or other Internet users as a potential application.

The extraordinary increase in access to the Internet has created hope that affordable network technology might be able to solve longstanding problems in Western teacher practice and teacher professional development. However, it remains a major challenge to find appropriate ways to use the Internet for teacher professional development. Under current theoretical perspectives, the reasons for success and failure are mysterious, as are the reasons for participating or withdrawing. Schlager et al (2002) report, "Most attempts have fallen short of needs and expectations, despite adequate funding, dedicated and enthusiastic staff, and advanced technology."

Structural Features of Communities of Practice

There are a small but significant number of intersections in the literature between the anthropological perspective and the design experiment perspective. At this intersection, design experiments are shaped so as to encourage the development of a community of practice social structure. This term was first introduced in the work of Lave and Wenger (1991) and its subsequent elaboration in (Wenger, 1998) and (Wenger et al, 2002). The original work of Lave and Wenger presented an analytical perspective on various social settings called *communities of practice* (CoPs). These communities are equipped with a particular structure: newcomers are given meaningful forms of participation by old-timers in the community practice (legitimate peripheral participation in their terms) by

which they gain an identity of mastery which gives them access to fuller participation and they become in turn the old-timers. This seminal work was very influential, but it also explicitly avoided defining a community of practice.

Wenger's subsequent work produced an accompanying theory of CoPs which expanded the scope of the term to cover any collection of people who care about a common domain of knowledge and practice. The latter is defined as "frameworks, ideas, tools, information, styles, language, stories and documents that members share in" (Wenger et al, 2002, p.29), as opposed to a specific professional culture. Over the last five years, much of the analysis of virtual communities has framed itself in this general language of communities of practice, though the definitions vary from researcher to researcher (see Johnson, 2001, for one interesting survey). Indeed, the CoP framework is as often used to study virtual classrooms as virtual professional groups.

One unfortunate side-effect of generalizing the definition of *community of practice* is the obscuring of important features of particular CoPs. By revisiting the original Lave and Wenger (1991) work, we want to call attention to important structural features a CoP might have. These are all key ideas that appear in the original work, but the terms are original to the author. A *layered* CoP is a CoP with differing degrees of fullness of participation. The CoP of tailors in Liberia that is examined in the 1991 work is layered, since newcomers are allowed to complete suits, but only master tailors and advanced apprentices are allowed to begin the suits. A *connected* CoP is a layered CoP one where newcomers are allowed peripheral participation which systematically leads to fuller participation; the tailor community mentioned is connected, but the community of butchers studied in the 1991 work is not connected, since newcomers were locked into menial entry tasks and never allowed to progress to cutting. A *transparent* CoP is one in which members have a significant (though possibly partial) understanding of what fuller participation means and how their current work will gain them fuller participation. A *generational* CoP is one in which most of the current members with full participation began as newcomers. In other words, the CoP has survived at least one cycle of renewal where newcomers have replaced central participants.

The 1991 work examined the cases of midwives, tailors, naval quartermasters, alcoholics in Alcoholics Anonymous, and butchers. The first four cases are all CoPs which are layered, connected, transparent and generational. (Because of this, sometimes a CoP with all four structural qualities will be called a *classic* CoP.) They are also all communities that have adapted to social change and successfully renewed themselves. Furthermore, they are all settings without formal teaching where significant learning occurs and where learners gain professional expertise and identities of mastery. Learners learn tasks with a large amount of intrinsic motivation compared to formal school students; indeed Lave and Wenger attribute this motivation to the fact that transparency (as defined above) makes plain the use value of the skills newcomers learn; the layered nature and connectedness give direct motivation to persevere on the trajectory through the CoP (i.e. to learn of necessary skills and culture); generationality gives confidence that the planned trajectory to fuller participation is stable and the CoP will endure long enough to gain fuller participation. The case of butchers is presented as a dysfunctional CoP. That CoP is layered and generational, but not connected and not transparent. Most newcomers either left or felt trapped in dead-end jobs. Using these definitions, a brief summary of Lave and Wenger (1991) would be that they assert that what we think of as a process of true useful learning is actually a person's trajectory towards full participation through a CoP that is layered, connected, transparent and generational.

It is striking to note that the vast majority of current and past designed learning communities are layered but not connected. This applies even to whose design is influenced by Lave and Wenger's work. The layering structure is usually very simple: most have a teacher/facilitator layer and a student layer. Some CoPs have more roles, such as outside expert advisors or technical assistants. These CoPs are as a rule not connected; that is, there is no possibility of students gaining teacher/facilitator roles. Some are constructed to be as non-hierarchical as possible, which lessens the overt difference in access between teachers and students, or to reduce the visible leadership of the teacher; however, this is not the same as systematically moving students into teacher roles. The power difference is hidden, but remains (e.g. the teacher still has ultimate authority to assign a grade). In this framework, central participation is about power and access to roles and resources, not being the center of attention.

Furthermore, most online CoPs are not generational. For one thing, most of them do not survive long enough to experience a turnover in the central participants (i.e. the leadership). On the other hand, some current online CoP theorists assert that CoPs cannot be generational. Levin and Cervantes (2002) is an eloquent survey of a number of online learning communities which asserts that these communities coalesce around a project and have a specific cycle of activity: proposal, refinement, organization, pursuit, wrap-up, and publication. At the beginning of a cycle, participants self-select out of interest and at the end, they disperse.

Overlapping Live and Online Communities of Practice

In the case of online professional development, the targeted teachers will each already be involved in a live community of practice. That community may be dysfunctional and may not have the special structure described in the previous section, but its effects cannot be ignored a priori. Indeed, there is evidence that its effects may dominate the online social dynamics.

It has become a folklore result (that is, accepted by most though never formally proven) that live contact is essential for the formation of online ties. In a survey of 13 electronic communities, Bos et al (1995) report that purely text and conversation based electronic communities that are not sustained by significant real-world contacts tend to dwindle and disappear. A number of studies in the survey by Johnson (2001) declare this as well.

Example 1. Algebra Teachers in Texas

One striking result in this vein appears in the author's study of an online course in Texas analyzed in (Hsu, 2001). Twenty-five in-service algebra teachers from schools around the state began enrolled in the course. The course was set up to mirror the format of a graduate seminar; thus it was layered (with a small group of moderators driving the discussion and making assignments) but neither connected nor generational; Because of the relative professional isolation between the schools (even within the same district), only a tenuous CoP encompassed all the teachers. However, 11 of the registered teachers had someone in their school also registered. These partnered teachers were not officially partnered, but they came into the online course with existing live CoP relations with their partners, via department meetings, shared understanding of responsibilities within the school hierarchy and local school conditions of teaching, etc.

To see the effects of the overlapping CoPs, consider the fact that of the 25 registered, only 14 teachers ever posted; only 11 (44%) finished the course. This is not so uncommon in online communities: Johnson (2001) notes "One of the greatest problems in virtual communities is fading back or withdrawing" (p.54). Many drop-outs gave medical issues, family issues and overwork as reasons; however, those who remained in the course endured similar overwork and some very serious medical and family emergencies. Of the 11 registered partners, 9 posted and all 9 completed the course. Of the 14 un-partnered registrants, only 5 posted and only 2 finished. Furthermore, even though online conversation was guarded and teachers did not engage in serious debate about issues, all the live partners reported significantly closer ties with their partner teacher(s). In fact, live partners moved closer in educational opinions (e.g. on validity of reform math), which served to polarize the class in a non-confrontational but real way. What began as an attempt to create online community ended up being dominated by the local live communities of practice of the teachers. The online relations were cordial but clipped and guarded.

Example 2. AP Calculus Teachers across America

As contrast, consider the live community of practice of AP Calculus teachers. There is some disagreement about the relevance and appropriateness of the content of the test, but accepting its mathematical norms, the professional development structure surrounding it is impressive. To trace the boundary of a CoP, one needs to examine the trajectories of newcomers as they improve their craft. A newcomer to AP Calculus is given a calculus class in a high school and sometimes attends official College Board training sessions and reads prepared materials. As one becomes more effective at preparing students, one may be invited to become a Consultant. If one applies to grade the exam, survives the application filtering and endures the six year waiting period(!), one can become a grader. Once one excels as a grader, one can supervise graders as a table leader. Excellent table leaders can become question leaders, then test developers or chief readers. From the point of view of CoPs, there is a huge range of more central participation available to the newcomer (so it is layered). There is a support structure for newcomers to improve and become consultants or graders, etc., so it is connected. The CoP is transparent, since once can see how becoming a better teacher makes you more qualified for the next layer of increased participation. It is generational, as the exam has been administered for many years and have a regular turnover at every level of participation.

There is ongoing research by the author examining the social dynamics of the official AP Calculus support mailing list conversations taking place at the same time as the Texas course. The preliminary results show that compared to the Texas class, there were more long conversation threads and more conversation focused on mathematics and classroom practice. From some other theoretical perspectives focusing on the online community, this may be a puzzling result. After all, the AP teachers on the list were scattered geographically all across the U.S. and for the most part never met. The moderator was invisible except to occasionally block an offensive post, and did nothing further to foster a sense of community. There are many other high-traffic online communities which serve as

support groups for communities of practice. Many of these have devolved into hostile flame-wars. Similarly structured teaching mailing lists and newsgroups in the "k12.ed" hierarchy had disconnected and scattered conversations which occasionally burst into unresolved arguments about educational philosophy. The level of civility and community and the quality of the conversations on the AP Calculus list cannot be explained by examining only online social dynamics. From this proposal's perspective, the cohesion of the group is not surprising. After all, it is completely embedded in a real CoP. Furthermore, as analyzed above, this live CoP is a classic layered, connected, transparent and generational CoP; these qualities give the CoP a powerful social structure. Even though the list members have largely never met, the list has inherited the social dynamics of the live CoP. As qualitative confirmation, an examination of the posting show that the people with highest status online and who influence conversations the most are the ones who in real life have more central participation, i.e. graders, test developers, etc.

Examples 3 and 4. Graduate Teachers

A SFSU CoP consisting of Masters students serving as graduate instructors suffered a similar structural issue as the Texas CoP, in that it was layered but not connected, transparent or generational. However, all the participants were in the same Masters mathematics program, and most people had social ties within the CoP of Masters students at SFSU. Thus, the SFSU online CoP was embedded in an existing live CoP which was layered and generational. The result was that even though the SFSU teachers posted about the same number of posts per week, there were significantly more long conversational chains. In the TX course, people rarely (20 times) contributed more than once to a conversational thread; in the SFSU course, there were 204 such occasions. All 27 graduate teachers registered (approximately the same as the Texas course); 25 completed the class. The conversations were qualitatively more focused on issues of practical classroom practice; there was also more apparent engagement of different views.

As a final example, consider the CoP studied by Pearson (1999), who was quoted in the introduction. He describes an online course for students in the College of Education, in-service teachers in primary schools. This course is structured like an online version of a student seminar with on-going asynchronous conversations, and again students have equal access. The CoP is layered, as the teachers have significantly more power and central participation, but it is not connected, in the sense that there is no systematic way that the students can be promoted to take over the teacher's roles. Since no fuller participation was available, it was not transparent, and it is not generational.

Pearson reports passivity of student posts, reticence and a reported fear of criticism, and an anti-camaraderie where students often posted anonymously. What is striking is that he also notes that the reticence, fear of criticism and passivity of the students online mirrors the live social dynamics of the teachers and students in the School of Education. The move online was intended to erase those negative existing dynamics from the live CoP the students belonged to, but served to amplify those dynamics.

A Design Experiment

We are working on a design experiment which attempts to create an online CoP that has all the features of a classic CoP. An initial analysis runs as follows. Most SFSU MA students intend to teach at community college. Alumni of the MA program at SFSU now teaching at community colleges are fuller participants in the CoP of community college instructors, to which SFSU graduate instructors will have a sense of belonging. In these important live CoPs, these alumni are participants with more full participation than the graduate instructors. One naive way to align the CoPs would be to recruit these alumni to serve as moderators and teachers in the online course; in this way, the online CoP layers of participation (i.e. moderators have fuller participation) would parallel the live CoP layers of participation (i.e. successful alumni have fuller participation). Further layers could be created by hiring older graduate instructors to be intermediate-level moderators. As the basic course continues, in successive years the participants will become intermediate-moderators and then alumni; a subset of them will be recruited to serve as moderators. In this way, the trajectories through the online CoP layers will parallel trajectories through the live CoPs; furthermore, the online CoP will take on generational qualities, which is very rare among previous attempts at online CoP.

Acknowledgements

This material is based upon work supported by the National Science Foundation under Grants DGE-0128389, EHR-0226972 and DGE-9906511. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

References

- Bos, N., Krajcik, J., & Patrick, H. (1995). Telecommunications for Teachers: Supporting Reflection and Collaboration Among Teaching Professionals. *Journal of Computers in Mathematics and Science Teaching*, 14(1/2), 187--202.
- Hsu, E. (2001). On-line Math Teacher Conversations: Graphical, Statistical and Semantic Analysis. In R. Speiser, C. A. Maher & C. N. Walter (Eds.), *Proceedings of the Twenty-Third Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 673). Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education. SE 065 164.
- Hsu, E. (2004). Professional Development and Overlapping Online/Live Communities of Practice. In preparation.
- Johnson, C. M. (2001). A survey of current research on online communities of practice. *The Internet and Higher Education*, 4, 45--60.
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. New York, NY: Cambridge University Press.
- Levin, J., & Cervantes, R. (2002). Understanding the Lifecycles of Network-based Learning Communities. In K. A. Renninger & W. Shumar (Eds.), *Building virtual communities: Learning and change in cyberspace*. New York, NY: Cambridge University Press.
- Pearson, J. (1999). Electronic networking in initial teacher education: is a virtual faculty of education possible? *Computers & Education*, 32, 221-238.
- Schlager, M., Fusco, J., & Schank, P. (2002). Evolution of an On-line Education Community of Practice. In K. A. Renninger & W. Shumar (Eds.), *Building virtual communities: Learning and change in cyberspace*. New York, NY: Cambridge University Press.
- Shulman, L. S. (1987). Knowledge and Teaching: foundations of the new reform. *Harvard Educational Review*, 57(1), 1--22.
- Wenger, E. (1998). *Communities of practice: Learning, Meaning and Identity*. New York, NY: Cambridge University Press.
- Wenger, E., McDermott, R., & Snyder, W. M. (2002). *Cultivating Communities of Practice: a guide to managing knowledge*. Boston, MA: Harvard Business School Press.
- Wiesenmayer, K. L., & Meadows, G. R. (1997). Addressing Science Teacher's Initial Perceptions of the Classroom Uses of Internet and Worl Wide Web-Based Resource Materials. *Journal of Science Education and Technology*, 6(4), 329--335.