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Special Issue on "Computer Support for Learning Communities"

Edited by Markus Rohde, Volker Wulf & Gerry Stahl

Introduction:

Computer Support for Learning Communities

GERRY STAHL, MARKUS ROHDE, VOLKER WOLF

This special issue emerged from two workshops on community-based learning: one at the Sixth International Conference on the Learning Sciences (ICLS 2004), held in Santa Monica, CA, and the other at the International Conference on Computer-Supported Collaborative Learning (CSCL 2005), held in Taipei, Taiwan. A call for papers was issued as a follow-up to these stimulating workshops; 16 papers were submitted, of which six were accepted following a rigorous double loop peer reviewing process. This special issue is part of a wider discourse on learning communities, specifically the conferences series on Communities and Technologies and related publications (Huysman *et al.* 2003; Ackerman *et al.* 2003; Huysman and Wulf 2004; Klamma *et al.* 2004; Stahl 2006).

Within the perspective of the history of computers, interest in computer support for communities represents a logical progression. In the mid-twentieth century, computers were viewed as self-contained machines; designer's concerns stressed internal efficiency in terms of logical operations and memory allocation. It took visionaries like Bush (1945) and Engelbart (1962) to conceptualize computers as extenders of human intellect. Then designers had to consider human-computer interaction, how individuals actually used computer tools. Although the visionaries provided glimpses of inter-personal implications, most software development focused on tools for individual users and at best took into account human psychology.

More recently, the fields of Computer Supported Cooperative Work (CSCW), Computer Supported Collaborative Learning (CSCL) and Communities and Technologies (C&T) have begun to think about how small groups and communities-of-practice relate to computational infrastructures. Consideration of small groups brought in anthropologists and communication analysts. As we now expand to consider computer support for communities, social theorists and business management specialists also become involved in the multidisciplinary effort. Consideration of the community already includes the ultimate expansion to thinking about computers and the world. Groupware bleeds unnoticed into global applications: The burgeoning variety of Internet-based communication media—IM, email, wiki, blog—bring the world together into a maze of community. At this point, computer artifacts become pervasive infrastructure and social practices of usage, far outstripping the plans of technology designers.

Modern communities are learning communities in the sense that they evolve through the collective building of knowledge and the shifting participation of their members (Lave and Wenger 1991). Conversely, learning can be viewed in terms of a member's increasingly skilled participation in knowledge-based communities. The interplay of community members and the development of their participations are increasingly mediated by computers, networks, software, databases, websites, digital media, etc. The theme of computer support for learning communities is a timely and significant one.

The papers collected here not only recognize the irresistible potential of computer support for learning communities, but at the same time they delve into the ubiquitous barriers and social contradictions involved. They recognize that the design of community-based learning is not simply a matter of technological engineering, but integrally involves intransigent social issues. Existing community structures and educational institutions evolved to meet the needs of a bygone era; adapting them to a high-tech knowledge society confronts conflicts that would not even occur to armchair designers. To

uncover and explore these realities of developing learning communities, each paper in this special issue (a) investigates a concrete real-world case and (b) subjects data from that case to scientific analysis. The results may not always be encouraging, but they are thought-provoking and important.

Learning about computing in the community. The first paper takes us out into the community, to a geographically-based nonprofit community organization. It asks how one can foster the kind of practical, technical learning within such an organization that it needs to achieve its goals today. The staffing of a nonprofit is not structured to support learning of its own participants, although its mission in the case study example depends upon educating the local population about ecological issues. In order to accomplish this mission, the organization must learn how to develop and maintain an effective Web site despite severe limitations on technical skills and financial resources. Issues of community computing under these conditions highlight a number of general problems and suggest some innovative responses for diversifying participation, managing organizational knowledge and enhancing social capital. The paper shows how carefully structuring technical training as participatory design can help the organization to learn in a sustainable way.

Re-engineering a learning community at school. Another study by the same group takes what they learned about the nonprofit Web site experience back into the public school. Just as the technical support experts learned from the community volunteers in a way that engaged and empowered the people in the organization, so the teachers in the school learned from their students in an interaction that benefited everyone. Students are often more technically facile than their teachers, so why not, argues this paper, let the students teach the teachers about technical matters. The experience results in authentic learning for the students and ties their learning to tangible practical ends that motivate engagement.

Implementing collaborative inquiry despite school. The kind of learning that builds inquiry skills is severely constrained by the social structure of conventional schooling, even in countries like Finland with successful, progressive education systems. The physical space and time of the school separates students and isolates teachers. It compartmentalizes learning into bite-size servings of unrelated disciplines. It divides lessons from testing—contradicting the formative role of assessment and focusing activity around a tyranny of grading. While this case study transformed some of those conditions, it still found that concerns about grading formed a major barrier to collaborative inquiry. Another, related problem was continued student orientation toward completing assigned work tasks, rather than pursuing progressive inquiry defined as the continuing improvement of knowledge objects (questions, ideas, explanations) within the learning community. Computer support can only facilitate knowledge building if the social relations and the epistemic orientation of teachers and students are already focused on pursuing collaborative inquiry.

Influences of student, group and task characteristics. A traditional mode of analysis within educational research is the statistical analysis of quantified independent variables upon dependent ones, such as exam scores and other operational indicators of learning outcomes. This paper illustrates a multilevel analysis that can distinguish effects of individual differences from effects of participation in small groups. Here, the "learning community" is a freshman college course of 230 students divided randomly into groups of 10. The "computer support" is a generic threaded discussion tool for each small group to communicate about assigned themes. Each student is required to post at least 2 messages to each theme within a 3 week period. A sophisticated statistical analysis is unable to find significant effects of this exercise on the learning within the small groups, despite all the literature that the authors cite on the benefits of CSCL. Perhaps the point is that it takes more than a vanilla communication medium and a minimal imposed interaction task among randomly collected students to constitute effective computer support or a consequential learning community.

Moderation strategies for learning communities. This study explores some techniques for building a more effective learning community through carefully designed computer support and skillful pedagogical facilitation. First, the small group of 12 college students was given an intensive two-month collaborative learning assignment. Second, they were given a sophisticated computer-based environment in which to work. While this software was also a threaded discussion system, it included extensive functionality to support and scaffold collaborative knowledge building, including tools for the students or for a moderator to link, highlight, annotate, manipulate and structure posted notes. The reported experiment is a unique attempt to investigate the applicability of small-group facilitation techniques to computer-supported threaded discussion. Interestingly, the designed functionality for moderation can be used by the students themselves as well as by an outside moderator.

Issues in building social capital in learning communities. The final paper takes the classroom back out into the community, into the reality outside of school walls. It tries to build an apprenticeship learning community consisting of future and current entrepreneurs. By building working relationships between a student community and an entrepreneurial community, it strives to increase trust and thereby build social capital as well as understanding. Although the students are university computer scientists, the computer support only plays a mundane role in the community building. The paper nicely details both the theory and detailed practicalities of trying to match two very culturally different communities, and evaluates the limited success. Perhaps this points to the moral of the special issue as a whole: that the complexities of the social issues dwarf the technical support issues, which however, still need to be respected.

In these six diverse papers we see a range of approaches to computer support for learning communities. Their contrasting experimental approaches and incompatible analytic methodologies illustrate major directions within this multidisciplinary field. The pros and cons of these alternatives are highlighted by the juxtaposition of the papers. Each paper presents its theoretical foundations and its scientific methodology, illustrating these with a concrete application. Despite sophistication of theory, complexity of method and extent of research effort, each study falls short of achieving desired learning and community outcomes. The papers not only present important findings; they also illustrate in their various shortcomings the abiding limitations of our current knowledge of this important question: how to provide adequate socio-technical support so that learning communities can achieve their manifest potential.

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