The future of computer support for learning:
An American/German DeLFIc vision

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Abstract: The task of designing software to support e-learning is complex. In particular, it requires careful consideration of social factors of adoption and use by communities. The tradition of engineering in America is too exclusively focused on the individual user; German philosophy provides a foundation for developing new methodologies oriented to groups of people learning collaboratively.

1 Two Traditions

Many of us are trained in both American-style engineering and German-style philosophy. Given these contrasting theoretical perspectives, how are we to approach the research challenges of computer support for e-learning?

The American engineer Claude Shannon developed a mathematical theory of technical communication that helped to design efficient telephone systems [Sh49]. He conceived of communication as the transfer of information from a sender to a receiver. This model is often applied to education, seen as a transfer of information from a teacher to a student. It is tempting for us to view computer support in this way as a neutral medium for the conveying of educational information from distributed database sources to online student recipients.

But German philosophy sees education as an intellectual process of *Bildung*, not as the simple accumulation of received factoids. There is the crucial matter of *verstehen*. In the extreme case of Martin Heidegger, language is not a neutral medium for transferring bits of information, but an active source of truth that opens up new worlds for us [He35]: *Sprache spricht*. According to this, we might say that our job is to design environments and media that create new communication spaces to bring together people and ideas in ways that stimulate and nurture the building of increased community knowledge.

Past efforts at developing computer support for learning started with the engineering model and moved from that to increasingly complex approaches. We can identify the following historical phases of this research [Ko96]:

- Repetitive student drill of atomic facts and algorithmic procedures

- Tutoring based on cognitive models of individual learning

- Hypertext information sources for exploration

- Support for collaborative learning and discourse

While each of these approaches has its legitimate role in education, the last one seems to hold the most intriguing and intransigent research challenges for us.

2 The Problem

Today's combination of fast computers, global networks, distributed databases and powerful collaboration software has the potential to support interactions among groups of people, relieved of the limitations of the past. Group communication need no longer be moderated by a teacher or hierarchical authority; people can interact with others around the globe; contributions can be made whenever inspiration strikes; the record of discussions can be preserved and reflected upon. Imagine the Open Source development model scaled up to learning in all kinds of student and virtual communities [Ra01].

But attempts to design software environments to support e-learning bump into formidable barriers. I have conducted various design studies with innovative functionality: for using discussion forums and chat streams to build group knowledge [St98], for using interconnected workspaces to organize different perspectives on shared ideas [SH98; St01] and for using negotiation folders to structure consensus building [St03a]. In each case, social issues of adoption and community practices repeatedly overwhelmed the technical innovations. This is not a coincidence.

Consider email, the major success in collaboration software to date. It has taken a good decade for email to attain widespread usage. And look how hard it still is even for computer scientists like us to use email: spam, privacy, security, contact lists, message management and many other hassles continually plague us. It takes us incredible amounts of time, energy, reorganizing and worry to maintain our email lives, especially when traveling. If each new tool for e-learning is going to continue to be this much work for every user, then our software will face insurmountable resistance from users.

3 The Vision

We need to drastically expand the traditional engineering model that focused on technical issues of transmission and that leaves the interpretation, use and sharing of all content to the unproblematized individual recipient. We need to think about how our systems can and do:

- Create and structure communities

- Define and generate educational realms of knowledge

- Give form to intentions and meanings, forcing users to come to an understanding of the system's designed affordances

- Impose new tasks and transform existing social practices

- Make life more rewarding, if also more complex

To do this, the research community on computer support for e-learning should:

- Focus *system requirements* on user communities and interacting groups, rather than primarily on individual users and their psychology [St03b]

- Stress *design considerations* related to social issues and social practices [St04b]

- Develop *evaluation methodologies* for collaborative learning based on the group unit of analysis [SC04]

- Articulate a *theoretical framework* that situates software in its socio-technical context, drawing on traditions of German social philosophy [St04a]

Until now, we have tried to uncritically use traditional approaches taken over from other fields: technical engineering, cognitive psychology, single-user productivity software, non-collaborative pedagogy. The DeLFIc oracle, however, indicates that significant progress in supporting e-learning requires that we recognize the social, collaborative basis of all learning and re-think the role of digital artifacts and virtual media within the social practices that constitute e-learning. This does not mean throwing away all the methods we know from the past. The future is likely to see a proliferation of alternative approaches and methodologies, some complementary, others mutually inconsistent. But an innovative appropriation of classic German thought can play an important role as a balance to individualistic American-style engineering.

References

[He35]   Heidegger, M. (1935/2003). Der Ursprung des Kunstwerkes. In M. Heidegger (Ed.), *Holzwege*. Frankfurt a. M., Germany: Klostermann.

[Ko96]   Koschmann, T. (1996). Paradigm shifts and instructional technology. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 1-23). Mahwah, NJ: Lawrence Erlbaum.

[Ra01]   Raymond, E. (2001). *The cathedral and the bazaar: Musings on linux and open source by an accidental revolutionary*. New York, NY: O'Reilly.

[Sh49]   Shannon, C., & Weaver, W. (1949). *The mathematical theory of communication*. Chicago, Il: University of Illinois Press.

[St98]   Stahl, G. (1998). *Collaborative information environments for innovative communities of practice.* Paper presented at the German Computer-Supported Cooperative Work Conference (D-CSCW '98): Groupware und organizatorische Innovation, Dortmund, Germany. Retrieved from http://www.cis.drexel.edu/faculty/gerry/publications/ conferences/1998/dcscw98/dcscw.html.

[SH98]   Stahl, G., & Herrmann, T. (1998). *Verschränkung von Perspektiven durch Aushandlung.* Paper presented at the Interaktion in Web: Innovative Kommunikationsformen, Marburg, Germany. Retrieved from http://www.cis.drexel.edu/faculty/gerry/publications/conferences/1998/verschrankung.

[St01]   Stahl, G. (2001). WebGuide: Guiding collaborative learning on the Web with perspectives. *Journal of Interactive Media in Education, 2001*(1). Retrieved from http://www-jime.open.ac.uk/2001/1 and http://www.cis.drexel.edu/faculty/gerry/cscl/papers/ch10.pdf.

[St03a] Stahl, G. (2003). *Knowledge negotiation in asynchronous learning networks.* Paper presented at the Hawai'i International Conference on System Sciences (HICSS '03), Hawaii, HA. Retrieved from http://www.cis.drexel.edu/faculty/gerry/cscl/papers/ch12.pdf.

[St03b] Stahl, G. (2003). Meaning and interpretation in collaboration. In B. Wasson, S. Ludvigsen & U. Hoppe (Eds.), *Designing for change in networked learning environments: Proceedings of the international conference on computer support for collaborative learning (CSCL '03)* (pp. 523-532). Bergen, Norway: Kluwer Publishers. Retrieved from http://www.cis.drexel.edu/faculty/gerry/cscl/papers/ch20.pdf.

[St04a] Stahl, G. (2004, to appear). Building collaborative knowing: Elements of a social theory of learning. In J.-W. Strijbos, P. Kirschner & R. Martens (Eds.), *What we know about CSCL in higher education*. Amsterdam, NL: Kluwer. Retrieved from http://www.cis.drexel.edu/faculty/gerry/cscl/papers/ch16.pdf.

[St04b] Stahl, G. (2004, to appear). Groupware goes to school: Adapting BSCW to the classroom. *International Journal of Computer Applications Technology (IJCAT), 19 "Current approaches for groupware design, implementation and evaluation"*(3/4). Retrieved from http://www.cis.drexel.edu/faculty/gerry/cscl/papers/ch11.pdf .

[SC04]   Stahl, G., & Carell, A. (2004. to appear). Die Rolle von Kommunikationskonzepten für eine CSCL-Didaktik. In J. Haake, G. Schwabe & M. Wessner (Eds.), *CSCL-Kompendium*. München, Germany: Oldenbourg. Retrieved from http://www.cis.drexel.edu/faculty/gerry/cscl/papers/ch17.pdf.