CASE STUDY 3: CSCW AWARENESS FOR MEMORY IN EDUCATION

The focus of this case student is on situational and transactive memory and the applications of CSCW awareness mechanisms for the analysis and long-term preservation of these memories in the educational environment.

Situational and Transactive Memory

While they represent very different topics, both situational and transactive memory play critical roles in mediating the discourse and interaction of online electronic learning communities. In a business environment, the transactive memory of a corporation is critical to allow that company to function as a cohesive whole rather than a grouping of disjoint individuals. The very notion of a commercial enterprise is based around the idea of a grouping of individuals, each performing a specific narrow role, and with knowledge of the roles and expertise of those around them, performing actions on behalf of the company in direct or indirect collaboration with the other employees of the company. Each individual in the company generates specific pockets of knowledge and retains and applies that knowledge in the role he or she occupies. The assemblage of all of these unique memories formed by the grouping together of a company's employees towards a single set of goals forms a collective memory that serves the company. Similarly, the various units of a company form miniature "ecosystems" of knowledge in which members of that knowledge ecosystem all share a common set of background knowledge used to interpret and synthesize new knowledge. For example, the technical sales division of a software company that focuses on higher education sales has a common set of knowledge of how the postsecondary arena functions and is able to understand how new software packages produced by the company would be best marketed to this segment. This situational memory is a key component that allows a company to function as it does, with units specializing in specific action areas of a company and interacting together. In the case of online learning communities, these same phenomena hold true in that the faculty and instructional staff of an institution form its long-term memory, building a shared set of background knowledge over time that they convey to students through a set of formal courses and informal interactions. A department builds transactional knowledge it uses to direct incoming graduate students to the most appropriate faculty for advising and research collaborations, and students within courses learn each others' core competencies for group project and homework collaborations, while the situational knowledge each brings to the table means every students takes away a slightly different view of the knowledge conveyed in a given lecture.

Situational Memory and Distributed Learning

The topic of situated memory has been given considerable discussion across a broad array of fields, most particularly in the literature of business management. For example,

a 2002 study by the Harvard Business School discussed the issue of *Situated Knowledge and Learning in Dispersed Teams*. [1] A key focus of the study involved the impact of geographic dispersion on cooperative teams on the collaborative learning process. The authors note that within a particular geographic locale, members at that site share in a certain set of situated knowledge: "because their members understand and participate in locale–specific practices, dispersed teams can easily access and use unique locale–specific knowledge resources to resolve problems that arise in those same locales." Members at other sites, however, do not share in this same background knowledge and this can create contention: "when dispersed teams need knowledge situated at a site other than where the problem occurred, they must first recognize and adjust for locale–specific practices within which that knowledge is embedded before they can use it". This is an important distinction that is often overlooked. Many system designs have the implicit assumption that "information is information" and make no attempt to accommodate the wide range of differing backgrounds that users bring with them in their interpretation of and takeaway from the data. In particular, most online systems only tag posted information with a datestamp and the username of the posting user, but record no information about geographic location. Four users could be located in the same country, but the system offers no direct information that would help these users discover each other or other users discover their country of origin in order to understand what these deeper geographic impacts on situated knowledge may be.

While this study focused on learning and education in the context of a computer supported cooperative work, it has significant implications for electronic learning environments. A primary reason for using online electronic portal systems to mediate communication among learning communities is geographic dispersion among team members. So-called "distance education" or "virtual university" education uses electronic technology to bridge the distance gap between class members and allow them to participate together as if they were physically colocated. Each class member brings with him or her into the classroom specific background knowledge and practices local to that geographic location and hence these same issues that face CSCW environments are also a significant issue for distance education environments.

Memory and Learning

As the first case study in this series introduced, Computer Supported Cooperative Work (CSCW) environments can incorporate advanced "awareness" technology to allow them to dynamically "learn" about the actors and communication flows they mediate. Such systems can, over time, develop the types of "transactive memories" and tease out the "situated knowledge" that become important in helping to form online learning communities.

Transactional knowledge can be very important to the learning environment, as discussed earlier, in that it helps students form their own informal communities within the larger

[1] Sole, Deborah & Edmonson, Amy. (2002). *Situated Knowledge and Learning in Dispersed Teams*. British Journal of Management. 13*(S2)*. pp. S17-S34.

formal community established by the class structure. Students in a geographically or culturally dispersed class must also grapple with the potential for situated knowledge issues to interfere with their ability to uniformly interpret course material in the same way. However, in the traditional learning environment, all of these memory tasks and sub community formation activities must be entirely student-driven and occur outside the constraints of the mediating portal environment. Students may use the portal system to exchange communications with other students, but the portal itself provides little useful information that can assist them in the formation of these knowledge communities. However, this does not need to be the case. As discussed in the first case study, it is possible to use semantic analysis software to automate many aspects of this process by allowing the machine to build up profiles over time in an inline, but transparent, process. Instead of forcing users to wade through message board postings and other communications from other users trying to understand which users have expertise in which topics, semantic analysis software can silently built up a topical profile of each user's messages. These profiles, when aggregated, give a picture of the types of communication that user engages in while in the system. Combined with traditional connectivity measures like who talks to whom in the system, a comprehensive structural and semantic profile of the communal memory of a learning community may be constructed and utilized in the furtherance of the learning and execution goals of the community.

Uniquely, the desire for the preservation of transactional and situational memory is different in the educational world from the corporate world. Every company experiences personnel turnover, but the level of employee "churn" is usually relatively low in most industries, especially in those involving higher levels of education or thought processes, such as information-driven industries. Transactional memory may need to be adjusted on occasion as an employee leaves the company, a new employee joins the company, or key employees transition to new roles and are no longer as involved in their former core competencies (especially in technical professions). In an educational environment, however, an instructional course begins with a fresh slate each semester. Rather than trying to preserve the knowledge produced by former generations in terms of assignments, homework submissions, message postings, exam scores, etc, there is actually the very opposite driving force. The educational experience relies on every student beginning a course with a blank slate and on the same footing as previous students. Hence, rather than something that is constructed and preserved over time, transactional memory in an instructional course is something that must be constructed quickly, purpose-built to serve a very small and narrow set of goals within the educational confines of that course, and then wiped clean for the next semester. Students may interact with the same peers in other courses, but in each case the transactional knowledge of previous courses is no longer available to them through the elearning environment and they must retain their own internalized knowledge of who knows what. This is a very important distinction between traditional CSCW portals and elearning environments in terms of the goals of how communal memories are built and how they should be preserved over time.

The Merger of CSCW and E-Learning Systems

Historically, the development trajectories of e-learning and CSCW systems have taken disjoint paths and development of the two classes of system has occurred largely in parallel. In many cases this was due to more mundane issues of licensing and implementation and ongoing long-term maintenance costs of large enterprise CSCW systems. The complexity of CSCW systems has been a concern in the education environment and the unique needs of educational-based systems (grading, assignment posting, etc) post distinct implementation challenges within the business-focused CSCW environment. However, in recent years there has been a steady shift in both types of systems towards a complementary middle ground. As businesses begin implementing online training and certification for employees, education-related functionality has trickled into their environments. At the same time, as higher education institutions of tens of thousands of students adopt multi-campus course delivery platforms, they find themselves faced with scalability issues that demand many of the enterprise features of CSCW systems.

Yet, thus far, platforms targeting online education have primarily focused on content delivery and management: serving up course files, handling grade management, etc. Many stock corporate systems focus on similar needs in the enterprise, but a new breed of systems from companies like IBM are beginning to focus on "human asset management", treating human employees as capital assets with specific application areas and performance capacities and targeting their utilization accordingly. For example, an IBM program manager requiring a particular skillset for a project in a certain country can call up a list of possible employees from a database, and the system prioritizes candidates based on the level of skill needed, geographic location, past experience on similar types of projects, etc. At the moment, online education systems still do not offer this kind of transactional memory, but it is likely that they will continue to expand over time to incorporate this expertise. In a classroom setting, this would allow students to reach out to classmates with established skillsets in particular problem areas when forming groups for collaborative work assignments, to ask for help on homework assignments, etc.